



**ANNUAL GROUNDWATER MONITORING  
AND CORRECTIVE ACTION REPORT FOR 2019  
Coal Combustion Residual Rule Groundwater Monitoring System Compliance  
Cholla Power Plant  
Navajo County, Arizona**

**Submitted to:**

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## LIST OF ACRONYMS AND ABBREVIATIONS

§	Section
Annual Report	Annual Groundwater Monitoring and Corrective Action Report
AMEC	AMEC Environment & Infrastructure, Inc.
amsl	above mean sea level
APS	Arizona Public Service
BAM	Bottom Ash Monofill
BAP	Bottom Ash Pond
BTV(s)	Background Threshold Value(s)
CCR	coal combustion residuals
CCR units	CCR landfills and surface impoundments
CFR	Code of Federal Regulations
Cholla	Cholla Power Plant
CSM	Conceptual Site Model
FAP	Fly Ash Pond
ft	foot, feet
GWPS(s)	Groundwater Protection Standard(s)
I-40	Interstate 40
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
SAP	Sampling and Analysis Plan
SEDI	Sedimentation Pond
SSI(s)	statistically significant increase(s)
SSL(s)	statistically significant level(s)
TestAmerica	TestAmerica Laboratories, Inc.
USEPA	United States Environmental Protection Agency
Wood	Wood Environment & Infrastructure Solutions, Inc.

## 1.0 INTRODUCTION

This *Annual Groundwater Monitoring and Corrective Action Report for 2019* (Annual Report) was prepared on behalf of Arizona Public Service (APS) by Wood Environment & Infrastructure Solutions, Inc. (Wood) for the Cholla Power Plant (Cholla) located in Navajo County, Arizona. The Annual Report summarizes groundwater monitoring and corrective action data collected to support compliance with coal combustion residuals (CCR) groundwater monitoring requirements detailed in 40 Code of Federal Regulations (CFR) Sections (§) 257.90 through 257.98 (herein referred to as the CCR Rule) (Federal Register, 2018).

The CCR Rule became effective on October 19, 2015 and established standards for the disposal of CCR in landfills and surface impoundments (CCR units). In particular, the CCR Rule set forth groundwater monitoring and corrective action requirements for CCR units. The CCR Rule includes the requirement that an “annual groundwater monitoring and corrective action report” be prepared by January 31 for the preceding calendar year (the reporting period). This Annual Report prepared for the 2019 calendar year is intended to document the status of the groundwater monitoring and corrective action programs for each CCR unit, summarize key actions completed, and forecast key activities for 2020. APS additionally considers this report to meet the semiannual reporting requirement of 40 CFR §257.97(a) for selecting and designing remedies pursuant to the CCR Rule.

The remainder of this section (Section 1.0) provides a summary description of the power generating facility, the CCR units present at the facility, and the facility’s environmental setting which forms the basis for assessment of underlying groundwater conditions. Sections 2.0 and 3.0 present groundwater monitoring and corrective action activities performed during the reporting period, respectively. Key activities identified for the upcoming year are presented in Section 4.0. Section 5.0 presents report references.

### 1.1 Site Background

#### 1.1.1 Facility and CCR Unit Description

*Facility Description.* Cholla is an operating power plant owned by APS and PacifiCorp. The plant burns coal in three electrical generating units (Units 1, 3, and 4) and has a net generating capacity of 767 megawatts. Coal burned at the plant was previously sourced from the McKinley Mine in New Mexico. When the McKinley Mine closed in 2009, the source of coal switched to the Lee Ranch and El Segundo mines near Grants, New Mexico.

*Facility Location.* The plant and associated infrastructure are located on land owned/leased by APS adjacent to Interstate 40 (I-40) between the City of Winslow and the City of Holbrook in Navajo County, Arizona (Figure 1-1). The plant sits next to the Cholla Reservoir, a cooling pond and water storage reservoir that was originally constructed in the early 1900s by the Joseph City Irrigation Company (Shilling, 2005). Now used by APS for cooling water, Cholla Reservoir receives deliveries of groundwater pumped from the nearby Cholla Well Field extracting from the Coconino Sandstone Aquifer. The typical water surface elevation of Cholla Reservoir is 5,022 feet (ft) above mean sea level (amsl).

*CCR Unit Description.* Plant infrastructure includes four single CCR units referred to as the Fly Ash Pond (FAP), Bottom Ash Pond (BAP), Bottom Ash Monofill (BAM), and Sedimentation Pond (SEDI). All the CCR units except the SEDI are located north of I-40 (Figure 1-2). The SEDI was the first of the CCR Units placed into service in 1976. The FAP and BAP dams were completed in 1978, and the BAM came into operation in the late 1990s. Table 1-1 summarizes the location, function, operation, size/construction, and history of

each unit. The boundaries of CCR units depicted in Figure 1-2 are based on available historical plans for the units.

### 1.1.2 Environmental Setting

Unless otherwise noted, the following information is abstracted from Montgomery & Associates (2011), Montgomery & Associates (2017a), and AMEC Environment & Infrastructure, Inc. (2012).

*Climate.* The plant is located in an arid climate within the Little Colorado River Basin. The area receives an average of 6 to 12 inches of precipitation annually. The evaporation rate exceeds the rate of precipitation by an order of magnitude.

*Topography.* Cholla is located at an elevation of approximately 5,025 ft amsl in the Colorado Plateau physiographic province of northeastern Arizona. This area is characterized by canyons, high elevations, and narrow, widely spaced riverbeds. The topography of the plant area is characterized by rolling terrain, open vistas, and incised drainages/arroyos. In the vicinity of the plant, the ground surface gently slopes towards the Little Colorado River to the south at approximately 60 ft per mile; however, surface drainage immediately near Cholla Reservoir flows towards the reservoir. About two miles north and south of the plant, the ground surface rises out of the alluvial floodplain to an elevation of 5,100 to 5,200 ft amsl.

*Surface Water Hydrology.* The plant is located north of the Little Colorado River within the Middle Little Colorado watershed. The Little Colorado River is a meandering, perennial stream with a large alluvial floodplain.

*Site Geology.* The Colorado Plateau, on which the plant is located, is typified by horizontal layered sequences of sedimentary rock, primarily sandstones, siltstones, and claystones. At the plant and nearby CCR units, the uppermost geologic units that are expected to influence groundwater flow and contribute to variations in naturally occurring constituent concentrations across the site are as follows (in descending order):

- Little Colorado River and Tanner Wash Alluviums: These quaternary surface alluviums overlie the bedrock formations in localized areas at Cholla and surrounding CCR units. The alluvium is unconsolidated, heterogeneous, and consists of clay, silt, sand, and gravel. In general, the Tanner Wash Alluvium is finer-grained than the Little Colorado River Alluvium. The alluvium ranges in thickness from non-existent to approximately 200 ft, and in general is thickest underneath the plant and Cholla Reservoir. Around the CCR units, the alluvium ranges from approximately 50 ft thick in the vicinity of the FAP Dam to 100 ft thick in the vicinity of the southern BAP Dam.
- Moenkopi Formation: The Moenkopi Formation is the uppermost geologic unit beneath the plant and the CCR units (as depicted in Figure 1-2) and is present at land surface in areas where the alluvium is non-existent. The thickness of the Moenkopi Formation near the plant ranges from non-existent to over 300 ft; where it is sufficiently thick, the Moenkopi Formation acts as an aquitard between the shallow alluvial aquifer and the underlying Coconino Sandstone Aquifer. The Moenkopi Formation consists of three members, described below:
  - Holbrook Member: this is a relatively permeable, well-consolidated sandstone. The Holbrook Member is the uppermost member of the Moenkopi Formation and is not known to be present in the subsurface in the vicinity of the plant.

- Moqui Member: this is the primary confining unit within the Moenkopi Formation and consists of maroon and greenish mudstone with abundant gypsum. The Moqui Member is approximately 250 to 300 ft thick near the plant.
- Wupatki Member: this is the lowest member of the Moenkopi Formation and is approximately 30 to 50 ft thick. The Wupatki Formation is comprised of relatively permeable sandstone and is in hydraulic connection with the underlying Coconino Sandstone.
- Coconino Sandstone: The Permian-age Coconino Sandstone is the principal lithologic unit of the C-aquifer, a regionally important aquifer for water supply. It is composed of very fine- to fine-grained sandstone with variable permeability depending on the degree of fracturing and cementation. The unit is approximately 375 to 400 ft thick in the vicinity of the plant.
- Schnebly Hill Formation: The Schnebly Hill Formation is a very fine-grained, reddish sandstone that is about 300 to 350 ft thick near the plant. It is part of the C-aquifer, but its hydraulic conductivity is about 10 to 28 percent that of the Coconino Sandstone.
- Supai Formation: The Pennsylvanian to Lower Permian Supai Formation underlies the Coconino Sandstone. It has minimal impact on the surface operations of Cholla, other than containing an approximately 600-ft thick deposit of halite and anhydrite in the Cholla well field area that impacts groundwater quality both regionally and in the vicinity of the plant.

*Applicable Hydrostratigraphy.* Two hydrostratigraphic units are conceptualized beneath the plant and associated CCR units. These units form the basis for the hydrogeologic Conceptual Site Model (CSM) developed by Montgomery & Associates (2011 and 2017a) for the purpose of evaluating compliance wells for the CCR Groundwater Monitoring System.

The first hydrogeologic unit, the Lower Colorado and Tanner Wash Alluvial Aquifers, is present under the plant area, Cholla Reservoir, and the Tanner Wash and Little Colorado River drainage channels adjacent to the BAP and FAP, respectively. The alluvial aquifer in this area receives recharge from the Little Colorado River and any leakage through anthropogenic features such as the reservoir and the nearby Joseph City Canal. The alluvial aquifer is not used as a drinking water supply but does support a riparian habitat. Depth to water in the alluvial aquifers ranges from several ft to several tens of ft below land surface in the Cholla area, varying spatially based on proximity to recharge sources and topography and seasonally based on rainfall-runoff patterns. Where present, groundwater flows generally in the downstream direction of the drainages under which it is present, that is, east to west in the Little Colorado River alluvium and north to south in the Tanner Wash alluvium. Groundwater flow in the Little Colorado River alluvial aquifer is also influenced by deeper paleochannels that may not coincide with the present river channel.

The second hydrogeologic unit is the C-aquifer, which consists of the Coconino Sandstone and Schnebly Hill Formation in the vicinity of the plant. Groundwater in this aquifer is under confined conditions in areas north of the Little Colorado River where the Moqui member of the Moenkopi Formation acts as a confining bed. Groundwater movement in the C-aquifer is generally to the north. However, the Cholla well field (southwest of the plant) has created a cone of depression that has made the localized groundwater flow in a westerly direction in that area. Near the FAP, the inferred flow of the groundwater in the C-aquifer is to the west or northwest, possibly due to the broad, northwest-trending anticline that extends from the vicinity of the FAP to near Joseph City.

The alluvial aquifer and the C-aquifer are separated by the Moenkopi Formation, a regional aquitard that creates a barrier between the two aquifers in the vicinity of Cholla where the unit is sufficiently thick. In

areas where the C-aquifer in the Coconino Sandstone is confined (primarily north of the Little Colorado River), the Wupatki member of the Moenkopi has been observed to be water-bearing; however, the Moqui member, which is 250 to 300 ft thick in the vicinity of the plant, prevents hydraulic connection between the alluvial aquifer and the C-aquifer and is effectively bedrock when considering water quality conditions and groundwater movement in a significant portion of the alluvial aquifer.

*Uppermost Aquifer by CCR Unit.* The CCR Rule requires that the uppermost aquifer underlying each CCR unit be monitored to evaluate potential impacts from the unit. At Cholla, the uppermost aquifer by unit is as follows:

- FAP (Little Colorado River Alluvium): The FAP is constructed primarily on the relatively impermeable Moenkopi Formation; however, alluvial sediments are present in the vicinity of the FAP while the dam itself extends to bedrock. Groundwater at the toe of the FAP dam flows west-southwest through localized shallow alluvial sediments (which are fairly fine grained) and then merges with the Little Colorado River Alluvium where the predominant direction of groundwater flow is to the west.
- BAP (Tanner Wash Alluvium): The BAP is located in the Tanner Wash drainage area. The northern and western edges of the BAP are constructed on the Moenkopi Formation, whereas the southern edge rests primarily on alluvial material. The BAP dams have a clay core that extend through the alluvium to bedrock where the alluvium was less than 20 ft thick at the time of dam construction. In regions where the alluvium was greater than 20 ft thick, a cutoff wall was constructed that generally extended to bedrock. Due to the depths involved, the cutoff wall does not extend to bedrock in the middle of the channel underlying the southern dam. There is an approximately 10 to 20-ft thick layer of alluvium below the base of the cutoff wall in this region (at an elevation of 4,980 ft above mean sea level). Groundwater near the BAP flows south-southwest through the Tanner Wash Alluvium to its confluence with the Little Colorado River Alluvium. The results of a recent investigation conducted in 2019 indicates the Moenkopi Moqui is saturated downgradient of the BAP (see Section 3.4); the extent of saturation is currently unknown but may impact the CSM for this unit in the future.
- BAM (Coconino Sandstone): The BAM is a CCR landfill constructed in the Tanner Wash watershed. It is constructed on the Moenkopi Formation where no saturated alluvium is present; water levels from nearby wells indicate that the Moenkopi is unsaturated beneath the BAM. Therefore, the uppermost hydrogeologic unit at the BAM is the Coconino Sandstone Aquifer which exists under confined conditions more than 300 ft bgs in the vicinity of the BAM. Groundwater in the Coconino Aquifer beneath the BAM flows to the north-northwest.
- SEDI (Little Colorado River Alluvium): The SEDI is constructed on the Little Colorado Alluvium. Groundwater near the SEDI flows parallel to the direction of Little Colorado River surface flows, approximately to the southwest.

## 1.2 CCR Groundwater Monitoring System

Multiple monitoring well systems are in place at Cholla to monitor groundwater conditions beneath the four site CCR units and support ongoing assessment of impacts from potential leakage. Table 1-2 identifies each well with associated CCR unit information, the date of well installation, and well construction details. Figure 1-2 presents a map of the well locations.

Installation of these networks is summarized in the report *Cholla Power Plant Coal Combustion Residuals Program – Design, Installation, and Evaluation of Completeness of Groundwater Monitoring Networks* (CCR Groundwater Monitoring System Certification Report) and is identified as compliant with 40 CFR §257.91(a) through (e) (Montgomery & Associates, 2017a). Per the CCR Rule, site monitoring systems are required to evaluate groundwater quality that is representative of background (i.e., groundwater that has not been affected by leakage from a CCR unit) and groundwater passing the downgradient boundary of each CCR unit, in the uppermost water-bearing hydrostratigraphic unit underlying the CCR unit.

### 1.2.1 Monitoring System Description

*Background Groundwater Monitoring Wells.* Background groundwater quality at the site can be established by a single monitoring well or a group of monitoring wells. If a group of monitoring wells is used, these wells should be screened within the same lithologic unit, exhibit similar groundwater chemistry, illustrate similar statistical merits, and be supported by the CSM. The grouping and adequacy of background wells identified for Cholla to assess background water quality are assumed adequate until proven otherwise.

Per the *CCR Groundwater Monitoring System Certification Report*, the following monitoring wells are designated as “background monitoring wells” for the respective geologic and hydrostratigraphic conditions underlying Cholla (Montgomery & Associates, 2017a):

- Background Wells for the FAP and the BAP (Little Colorado River and Tanner Wash Alluvium): The upgradient boundary of the FAP rests on a thick section of the Moenkopi Formation; there is no saturated alluvium present in the area upgradient from the FAP boundary. Therefore, background well M-64A was installed west of the plant in the Little Colorado River floodplain to serve as a background well for FAP. The BAP, in the Tanner Wash alluvium, discharges to and is hydraulically connected to the Little Colorado River alluvium. Because hydrogeologic conditions at the BAP prevented installation of an upgradient background well (as they did at the FAP), M-64A also serves as the background well for the BAP. Travel time calculations performed for the *CCR Groundwater Monitoring System Certification Report* (Montgomery & Associates, 2017a) indicated that M-64A is located far enough downgradient from the FAP and the BAP to represent unimpacted groundwater; however, it is notable that selection of this background well location is not ideal and has the potential to promote spatial heterogeneity issues in statistical data analysis.
- Background Wells for the SEDI (Little Colorado River Alluvium): The groundwater flow direction in the vicinity of the SEDI is to the west-southwest. Background well M-62A is installed in the alluvium on the east (upgradient) side of the SEDI.
- Background Wells for the BAM (Coconino Sandstone): The groundwater flow direction in the Coconino Sandstone Aquifer in the vicinity of the BAM is to the north-northwest. Background well M-54 is installed in the Coconino Sandstone on the southeast (upgradient) side of the BAM.

Due to the natural heterogeneity of the geologic and hydrogeologic conditions underlying Cholla, background constituent concentrations are expected to be spatially heterogeneous (varying) across the site. The site is also expected to exhibit both spatial and temporal heterogeneity attributable to local climatic regimes, potential leakage from Cholla Reservoir, and potential operational activity at the site. The groundwater monitoring well networks, respective to sampling coverage and frequency, appear to adequately represent this spatial and temporal heterogeneity, pending further review.

*Downgradient Monitoring Well Networks.* A total of 17 downgradient wells are in place at the site to monitor the downgradient groundwater conditions of each CCR unit (Table 1-2). Fourteen of these monitoring wells



are installed in either the Little Colorado River or Tanner Wash Alluvium. The remaining three wells are completed in the Coconino Sandstone. The grouping of monitoring wells, spatial density, and coverage of the monitoring well network are assumed representative and adequate until proven otherwise. These wells are grouped by respective CCR unit, as described below:

- **FAP Downgradient Wells (Little Colorado River Alluvium):** The groundwater flow direction in the alluvium downgradient of the FAP dam (i.e., the waste boundary) is west-southwest. The alluvial thickness in this area is limited; in some places it may be up to 50 ft thick but in others it is non-existent. On this basis, three downgradient wells were initially designated for the FAP boundary. Efforts undertaken by Montgomery & Associates to install a fourth downgradient FAP waste boundary well were unsuccessful (Montgomery & Associates, 2017a). The three downgradient boundary wells are named W-123, M-50A, and M-51A. In 2018, three additional wells were installed to evaluate groundwater conditions downgradient of the FAP (Wood, 2020). These wells are identified as MW-65A, MW-66A, and MW-67A. FAP downgradient wells are screened within the Little Colorado River Alluvium.
- **SEDI Downgradient Wells (Little Colorado River Alluvium):** The groundwater flow direction in the alluvium underlying the SEDI is to the west-southwest. Three downgradient wells were designated for the SEDI: M-56A, M-57A, and M-58A; these are screened within the Little Colorado River Alluvium.
- **BAP Downgradient Wells (Tanner Wash Alluvium):** The groundwater flow direction in the alluvium underlying the BAP is generally to the southwest along Tanner Wash; however, there is a radial component of groundwater flow towards the east-southeast due to hydraulic head from the BAP. Five downgradient monitoring wells are designated for the BAP: M-52A, M-53A, W-305, W-306, and W-314; these are identified as screened in the Tanner Wash Alluvium based on well log information.
- **BAM Downgradient Wells (Coconino Sandstone):** The uppermost hydrogeologic unit underlying the BAM is the C-aquifer in the Coconino Sandstone, which flows towards the north-northwest in this vicinity. Three downgradient monitoring wells were installed to monitor the quality of groundwater passing the waste boundary of the BAM. These wells are named M-59, M-60, and M-61, and they are completed in the Coconino Sandstone.

*Supplementary Site Monitoring Wells.* There are many groundwater monitoring wells at the site that are not part of the CCR groundwater monitoring system but may provide useful information to the program, particularly in the region downgradient of the FAP and BAP. Figure 1-2 identifies these wells.

### **1.2.2 Implemented Changes to Monitoring System**

Most of the wells that comprise the site CCR groundwater monitoring system were installed prior to or during 2015 (Table 1-2). No changes were implemented to the monitoring system in 2019; however, two well installation programs occurred in 2019 to support corrective measures assessment and have added two new supplementary wells to the monitoring system. The results of these investigations are summarized in Section 3.1.

## **2.0 GROUNDWATER MONITORING PROGRAM**

The groundwater monitoring and corrective action process defined in the CCR Rule includes a phased approach to groundwater monitoring, leading (if applicable) to the establishment of groundwater

protection standards (GWPSs) for each CCR unit. Exceedances of the GWPSs that are determined to be statistically significant can trigger requirements for additional groundwater characterization and corrective action assessment followed by implementation.

The first phase of groundwater monitoring is the detection monitoring phase. This phase focuses on a set of constituents (listed in Appendix III of the CCR Rule) that are the more mobile components of CCR and therefore represent indicators of possible impacts from CCR in groundwater. If statistically significant increases (SSIs) of any of the Appendix III constituents relative to background conditions are detected in the downgradient waste boundary wells and cannot be demonstrated to be associated with a source other than the CCR unit, then groundwater monitoring moves into the second phase, assessment monitoring.

The second phase of groundwater monitoring focuses on the constituents listed in Appendix IV of the CCR Rule. The Appendix IV constituents generally are less mobile and occur at lower concentrations in groundwater than the Appendix III constituents. Concentrations of Appendix IV constituents in downgradient wells are compared to GWPSs. The GWPSs, established for Appendix IV constituents only, are the higher of either the federal Safe Drinking Water Act Maximum Contaminant Level (MCL), alternative risk-based GWPSs established in the CCR Rule, or the background concentration for each constituent.

If exceedances of the GWPSs are determined to be occurring in the downgradient boundary wells at statistically significant levels (SSIs) and no alternative sources for the exceedances can be demonstrated, then both additional groundwater characterization and assessment of corrective actions are initiated. Following assessment of corrective measures, a remedy (or set of remedial activities) is selected and implemented as the groundwater corrective action program for the CCR unit. According to the CCR Rule, groundwater corrective action will continue until compliance with the GWPSs has been attained in all impacted wells and sustained for a period of three consecutive years.

## **2.1 Program Status**

### **2.1.1 Summary of Key Actions Completed**

A summary of key actions conducted at the site during 2019 to address CCR Rule requirements is as follows:

- Documentation of Groundwater Monitoring Activities Conducted in 2018 - 40 CFR §257.90(e) requires that an Annual Groundwater Monitoring and Corrective Action Report for applicable sites be prepared for existing CCR units annually on January 31 of the following year. During the reporting period, APS prepared the *Annual Groundwater Monitoring and Corrective Action Report for 2018, Coal Combustion Residual Rule Groundwater Monitoring System Compliance, Cholla Power Plant* (Wood, 2019a), placed the report in the facility's operating record, and posted the report to APS's CCR information webpage in accordance with 40 CFR §257.105(h)(1) and 40 CFR §257.106(h)(1).
- Continuation of the Detection Monitoring Program at the BAM – 40 CFR §257.94(b) requires the continuation of detection monitoring at a semiannual frequency for Appendix III constituents at CCR units where statistical analysis of Appendix III constituent data do not indicate an SSI over background. Section 2.2 summarizes detection monitoring activities during the reporting period.
- Completion of Statistical Analyses for Appendix III Constituents at the BAM – For CCR units in the detection monitoring program, 40 CFR §257.93(h) requires the evaluation of groundwater monitoring data for SSIs over background of Appendix III constituents no later than 90 days after completing associated sampling and analysis. During the reporting period, APS performed two

statistical analyses using updated analytical data for Appendix III constituents at BAM monitoring wells. The statistical analyses are summarized in Section 2.3.1.

- Continuation of the Assessment Monitoring Program at the SEDI - 40 CFR §257.95(b) and (d)(1) require the continuation of assessment monitoring annually for Appendix IV constituents and semiannually for Appendix III and detected Appendix IV constituents at CCR units where statistical analysis of Appendix III constituents indicate an SSI over background. Section 2.2 summarizes assessment monitoring activities during the reporting period.
- Completion of Statistical Analyses for Appendix IV Constituents at the SEDI – For CCR units in the assessment monitoring program, 40 CFR §257.93(h) requires the statistical evaluation of groundwater monitoring data for exceedances in Appendix IV constituent concentrations no later than 90 days after completing associated sampling and analysis. During the reporting period, APS performed two statistical analyses using updated Appendix IV constituent data collected from SEDI monitoring wells. The statistical analyses are summarized in Section 2.3.2.
- Conduct of an Alternative Source Demonstration (ASD) for Appendix III Constituents at the BAM – 40 CFR §257.94(e)(2) allows owners to evaluate whether a source other than the subject CCR unit resulted in declaring an SSI over background during a statistical analysis conducted pursuant to the CCR Rule. In response to background exceedances of fluoride at the BAM, an ASD was prepared during the reporting period, which is summarized in Section 2.1.4.
- Conduct of an ASD for Select Appendix IV Constituents at the FAP – 40 CFR §257.95(g)(3)(ii) allows owners to evaluate whether a source other than the subject CCR unit resulted in declaring an exceedance over a GWPS at an SSL during a statistical analysis conducted pursuant to the CCR Rule. In response to GWPS exceedances of cobalt and arsenic at the FAP, an ASD was prepared during the reporting period, which is summarized in Section 2.1.4.
- Conduct of an ASD for a Select Appendix IV Constituent at the BAP – As described above, 40 CFR §257.95(g)(3)(ii) allows owners to evaluate if an alternative source is responsible for declared GWPS exceedances at CCR units. To assess GWPS exceedances of lithium at the BAP, an ASD was prepared during the reporting period, which is summarized in Section 2.1.4.
- Characterization of the Nature and Extent of Potential Releases Indicated at the FAP and BAP – 40 CFR §257.95(g)(1) requires characterization of the nature and extent of releases from CCR units where one or more Appendix IV constituents exceed GWPSs at SSLs. Section 3.1 summarizes the results of a hydrogeologic investigation conducted during the reporting period to address this requirement.
- Preparation of a Corrective Measures Assessment (CMA) for the FAP and the BAP – 40 CFR §257.96(a) requires the owner to complete a CMA within 90 days of detecting an Appendix IV constituent exceedance over the GWPS at an SSL. In response to GWPS exceedances at the FAP and BAP, APS demonstrated the need for a 60-day extension to the deadline and completed a CMA during the reporting period which is summarized in Section 3.3. The CMA was placed in the facility's operating record and posted to APS's CCR information webpage in accordance with 40 CFR §257.105(h)(10).
- Preparation of a Semiannual Progress Report on Remedy Selection for the BAP and the FAP - 40 CFR §257.97(a) requires the preparation of semiannual reports which document the progress of remedy selection for CCR units that have potentially impacted groundwater. During the reporting period, APS prepared the first semiannual report to fulfill this requirement in July 2019. Activities supporting remedy selection conducted during the second semiannual reporting period of 2019 are summarized in Section 3.4.

- Pre-Design Studies – Pursuant to the assessment of corrective measures initiated per 40 CFR §257.96(a), various predesign studies (a Moenkopi Moqui investigation at the FAP, stratified sampling of water in the BAP, a leaching evaluation at the BAP, a BAP dewatering projection, and existing seepage intercept system evaluation) were progressed during the reporting period. These activities are summarized in Section 3.4.

### **2.1.2 Problems Encountered and Resolutions to Problems**

There were no problems encountered during the reporting period.

### **2.1.3 Groundwater Monitoring Program Transitions**

No CCR unit monitoring program transitions occurred during the reporting period.

### **2.1.4 Alternative Source Demonstrations**

During the reporting period, APS prepared three ASDs in response to declared exceedances at the BAM, the BAP, and the FAP. The results of the ASDs are summarized below.

*ASD for fluoride at the BAM.* A statistical analysis of Appendix III constituents at CCR wells downgradient of the BAM (Section 2.3.1) declared background exceedances for fluoride at CCR wells MW-60 and MW-61. To address these exceedances, APS prepared an ASD (Appendix A) during the reporting period which demonstrated that the exceedances were not indicative of a release from the BAM, but rather the result of natural spatial variations in groundwater. The ASD is supported by the following lines of evidence:

- The thick section of the Moenkopi Moqui formation separating the BAM from the Coconino Sandstone Aquifer and the upward vertical gradient of the aquifer;
- The lack of significant trends in the concentrations of boron and sulfate (two indicators of coal ash impacts) in groundwater beneath the BAM;
- Lithologic differences noted on BAM CCR well boring logs which indicate mineralogical variations within the Coconino Sandstone Aquifer; and
- Documented spatial variability of groundwater chemistry in the Coconino Sandstone Aquifer.

Due to the observed spatial heterogeneity in groundwater beneath the BAM, the ASD recommended performing intrawell statistical comparison methods for fluoride in monitoring wells M-60 and M-61.

*ASD for lithium at the BAP.* A statistical analysis of Appendix IV constituents performed by APS in 2018 declared an exceedance at an SSL above the GWPS for lithium at CCR well W-306 (Wood, 2018b). To address this exceedance, APS prepared an ASD (Appendix B) during the reporting period which demonstrated that the exceedance was not indicative of a release from the BAP, but rather the result of natural spatial variation in groundwater lithium concentrations. The ASD is supported by the following lines of evidence:

- Demonstrated spatial heterogeneity of lithium and other compounds in alluvial groundwater;
- Spatial distributions of lithium in the alluvial aquifer which are not indicative of a release from the BAP; and
- Lower concentrations of lithium in BAP water than in downgradient monitoring wells.

Recommendations from the ASD include developing intrawell statistical comparisons for lithium at CCR wells downgradient of the BAP.

*ASD for arsenic and cobalt at the FAP:* A statistical analysis of Appendix IV constituent data from CCR wells downgradient of the FAP declared exceedances at SSLs over the GWPS for cobalt and arsenic at CCR well M-51A (Wood, 2018c). The ASD performed during the reporting period (Appendix C) demonstrated that the cobalt exceedance was a false positive because the non-parametric method used to evaluate the data had to rely on use of an elevated laboratory reporting limit value exceeding the GWPS for cobalt as the criterion for comparison to the GWPS. For the arsenic exceedance, several potential sources were examined, including sampling and laboratory causes, statistical evaluation causes, anthropogenic causes, and natural variation causes. Based on these reviews, no alternative source could be demonstrated for the arsenic exceedance at M-51A, and as such, the ASD for arsenic is inconclusive. Recommendations for further evaluation of arsenic at the FAP are presented in the ASD.

## **2.2 Monitoring Data Collected**

During 2019, APS conducted CCR groundwater monitoring at Cholla in accordance with the Sampling and Analysis Plan (SAP) entitled *Groundwater Sampling and Analysis Program* (Montgomery & Associates, 2015). The SAP documents the methods and procedures used to conduct groundwater sampling, analyze collected samples for CCR constituents, and assess associated analytical data for quality assurance purposes. Also during 2019, APS collected pond water samples from the FAP and the BAP for analysis of Appendix III constituents. As with the groundwater samples, the pond water samples were collected and analyzed using industry-standard procedures.

The following sections summarize monitoring activities conducted in 2019. Table 2-1 identifies when monitoring occurred, and which units were monitored. During the reporting period, detection monitoring included evaluation of collected samples for Appendix III constituents on a semiannual basis (40 CFR §257.94[b]) and assessment monitoring included evaluation of collected samples for all Appendix IV constituents on an annual basis (40 CFR §257.95[b]) and detected Appendix IV constituents as well as all Appendix III constituents on a semiannual basis (40 CFR §257.95[d][1]).

To simplify the monitoring schedule in the future, APS monitored select units earlier than scheduled during the last monitoring round of 2019 so that all site units will be monitored on the same semiannual schedule (i.e., the second and fourth monitoring quarter of each year) going forward.

### **2.2.1 Water Level Monitoring**

Appendix D presents groundwater elevation data collected during groundwater sampling with hydrographs depicting collected groundwater elevations over time. Groundwater elevations for each CCR unit are graphed independently based on assessment of the data during initial CSM development; review of the data indicate that the Coconino Sandstone Aquifer underlying the BAM is distinct from the alluvial aquifer underlying the FAP, BAP, and SEDI. As shown in monitoring well hydrographs, groundwater elevations in 2019 were relatively stable and/or consistent with nearby wells with the following exceptions:

- M-52A, M-53A, W-305, W-306, and W-314 (downgradient wells for the BAP): Similar to previous monitoring events, throughout the reporting period groundwater elevations at M-53A (located at the western edge of the southern BAP dam) were approximately 10 ft higher than groundwater elevations in wells located towards the central portion of the southern BAP dam (i.e. M-52A, W-305, and W-306). Groundwater elevations at W-314, located downgradient of the eastern portion

of the BAP dam, were similar to previous reporting periods. The overall decline in groundwater elevations at W-314 continued throughout 2019.

- M-50A, M-51A, W-123, MW-65A, MW-66A, and MW-67A (downgradient wells for the FAP): Groundwater elevations in these wells remained relatively consistent throughout the reporting period. Although no increasing or decreasing trends are noted in individual wells, there is a fairly steep hydraulic gradient at the toe of the FAP dam, as evidenced by the 10- to 20-ft elevation difference between M-51A and W-123 (relatively highest) and M-50A (relatively lowest). Further downgradient, groundwater elevations in MW-65A, MW-66A, and MW-67A indicate that the hydraulic gradient begins to flatten with distance from the FAP.

The significance of these exceptions will continue to be evaluated as additional data are collected.

Figures 2-1 through 2-4 present potentiometric surface maps that are representative of conditions at the time of groundwater sampling based on hydrograph data. The estimated direction of groundwater flow derived from collected groundwater elevation data are noted on the figures. As indicated, groundwater in the alluvium appears to flow to the south to southwest from the FAP and the drainage area associated with Tanner Wash (where the BAP is located), towards the Little Colorado River where flows trend more west (consistent with surface water flows). Note that the hydraulic gradient indicated at the FAP represents an average between the six downgradient wells; at the toe of the dam, the hydraulic gradient is higher. Groundwater flow in the Coconino Sandstone Aquifer underlying the BAM is to the north.

### **2.2.2 Groundwater Flow Rate Estimation**

The CCR Rule requires that groundwater flow rates beneath CCR units be estimated during each monitoring event. To meet this requirement, water levels measured at the time of sampling were used to calculate the direction and magnitude of the hydraulic gradient in the vicinity of each unit using a spreadsheet tool available on the United States Environmental Protection Agency (USEPA) website (USEPA, 2014). Hydraulic gradient estimates were refined in 2019 by incorporating water level data from several additional wells into the calculations, resulting in a hydraulic gradient representing a larger areal extent of the uppermost aquifer downgradient of site CCR units. Darcy's Equation for flow through porous media was then used with site data (where available) and/or literature-based hydraulic conductivity and effective porosity values for hydrogeologic units to estimate average linear groundwater flow velocities. Table 2-2 identifies the wells used in the analysis and summarizes the results of these calculations.

For the Tanner Wash Alluvium downgradient of the BAP, the hydraulic gradient was consistent throughout the reporting period at 0.015 ft per ft. The direction of groundwater flow was south in the direction of surface water flows in Tanner Wash (185 to 187 degrees from north). The corresponding groundwater flow rate throughout the reporting period was 0.11 ft per day.

For the localized alluvial sediments in the vicinity of the FAP, the hydraulic gradient and flow direction were also relatively stable. The magnitude of the hydraulic gradient was 0.022 ft per ft during each monitoring round and the direction of groundwater flow was to the southwest towards the Little Colorado River (240 degrees from north). The corresponding groundwater flow rate was 0.0054 ft per day.

For the Little Colorado River Alluvium downgradient of the SEDI, the hydraulic gradient and flow direction was more variable than the other units, although the range in water level elevations between the compliance and background CCR wells is less pronounced. The magnitude of the hydraulic gradient ranged from 0.00075 to 0.00097 ft per ft during the reporting period, and the direction of groundwater flow was generally

west to southwest towards the Little Colorado River (254 to 280 degrees from north). The corresponding groundwater flow rates ranged from 0.38 to 0.49 ft per day. In the February 2019 monitoring event, a depth to water measurement collected at M-62A reported a water level of 4,986.79 ft amsl, which is over 5 ft higher than water levels measured at other SEDI wells during the same sampling event. Since November 2015, water levels at the SEDI wells have been within tenths of a ft of each other, and three subsequent measurements collected at M-62A during the reporting period do not show higher than normal water levels. Therefore, it is likely that the February 2019 measurement at M-62A is an error in field measurement and represents an erroneous data point. Therefore, to avoid reporting a groundwater flow rate estimate inconsistent with the rest of the reporting period, calculations using a reduced set of monitoring well data were not made for the February 2019 monitoring event at the SEDI.

For the Coconino Sandstone Aquifer underlying the BAM, the hydraulic gradient and flow direction were stable throughout the reporting period. The magnitude of the hydraulic gradient ranged from 0.0085 to 0.0088 ft per ft and the direction of groundwater flow was to the north (358 degrees from north). The corresponding groundwater flow rate was 1.8 ft per day.

### **2.2.3 Sample Collection**

APS collected, labeled, preserved, and shipped groundwater samples in accordance with the SAP (Montgomery & Associates, 2015). In accordance with 40 CFR §257.93(i), collected groundwater samples were not field filtered prior to analysis. Pursuant to the SAP, quality control samples (i.e., field duplicates, field blanks and extra sample volume for matrix spike samples) were collected during each groundwater monitoring event. These samples are noted on associated chain-of-custody documentation.

### **2.2.4 Sample Analysis and Data Validation**

APS submitted groundwater samples to TestAmerica Laboratories, Inc. (TestAmerica) and Radiation Safety Engineering, Inc. (Radiation Safety) located in Phoenix, Arizona for analysis. TestAmerica evaluated samples for all constituents other than radium. Radiation Safety performed radium analyses. Both TestAmerica and Radiation Safety are Arizona Department of Health Services-licensed laboratories (AZ0728 and AZ0462, respectively). Appendix E presents the associated Laboratory Reports of Analysis organized by CCR unit.

Table 2-1 identifies the analytes evaluated during each monitoring event. Analytes varied based on the monitoring program (i.e. detection vs. assessment monitoring). The SAP identifies Appendix III and Appendix IV constituents with associated analytical methods.

Following receipt of final laboratory reports of analysis, the reports and associated sample data collected during detection and assessment monitoring were evaluated for quality assurance purposes. The scope of the review was a USEPA Stage 2A validation. Appendix F presents the *2019 Data Validation Report* which documents these reviews.

As noted in the *2019 Data Validation Report*, the fluoride result associated with a supplementary pond water sample collected from the FAP in March 2019 was rejected on the basis that there were multiple datasets available for the same parameter and based on professional judgement, one result was rejected in favor of data from the other dataset.

## 2.2.5 Sample Results

Appendix E presents sample results in the Laboratory Reports of Analysis. The sampling coverage and frequency of the groundwater monitoring system is assumed representative and adequate of spatial and temporal heterogeneity until proven otherwise.

## 2.3 Statistical Analysis of Monitoring Data

During the reporting period, statistical analyses were conducted to evaluate whether collected monitoring data indicate site CCR units have adversely impacted underlying groundwater. These analyses were conducted pursuant to the *Statistical Data Analysis Work Plan* (Wood, 2018a). The analyses are summarized in the following sections.

### 2.3.1 Evaluation of Appendix III Constituent Data

The BAM was the only unit at the site that remained in detection monitoring as of the end of 2018.

The initial statistical analysis performed for the BAM indicated that there were no SSIs over background for Appendix III constituents in initial monitoring round data (Montgomery & Associates, 2018a). Based on an assessment conducted to evaluate the statistical method used to calculate background concentrations, Wood concluded in 2018 that background concentrations calculated from data collected during the initial monitoring round were overly conservative and not appropriate for comparisons of data collected after initial monitoring rounds (Wood, 2019a). Accordingly, APS updated the background concentrations for Appendix III constituents at the BAM in April 2019 (Appendix G). The revised BTVs are shown in Table 2-3.

The April 2019 statistical analysis resulted in declarations of fluoride exceedances at BAM compliance wells M-60 and M-61. As the exceedances were suspected to be attributed to natural spatial heterogeneity in the aquifer, APS conducted an ASD for fluoride at the BAM during the reporting period (Section 2.1.4). The ASD demonstrated that the exceedance could be attributed to spatial heterogeneity and recommended reevaluating fluoride data collected from select wells downgradient of the BAM using intrawell statistical comparisons.

In October 2019, APS evaluated data collected through April 2019 using the recommendations of the ASD (Appendix H). This analysis confirmed that there were no fluoride exceedances at M-60 and M-61 but identified an initial exceedance for pH at BAM compliance well M-59 (Table 2-3). Resampling of M-59 for pH occurred as part of the BAM detection monitoring program in October 2019; results will be statistically evaluated in early 2020.

### 2.3.2 Evaluation of Appendix IV Constituent Data

The SEDI was the only unit at the site that required statistical evaluations of collected Appendix IV constituent data as of the end of 2018.

During the reporting period, APS performed a statistical analysis of February and April 2019 data in August 2019 and completed analysis of August 2019 data in January 2020 (Appendices I and J, respectively). On the basis that one or more Appendix III constituents continued to exceed BTVs and the statistical assessment indicated that Appendix IV constituent concentrations did not exceed applicable GWPSs, APS continued assessment monitoring at the SEDI in accordance with 40 CFR §257.95(f).



### 3.0 CORRECTIVE ACTION PROGRAM

Based on the declaration that one or more Appendix IV constituents are present at SSLs above GWPSs downgradient of the FAP and the BAP, these units are currently in the corrective action program. Notification of exceedances occurred November 14, 2018 and were documented in the Annual Groundwater Monitoring and Corrective Action Report for 2018 (Wood, 2019a).

Summaries of corrective action program activities performed during the reporting period are presented in the following sections.

#### 3.1 Characterization of Potential Releases from CCR Units

To characterize releases from CCR units, 40 CFR §257.95(g)(1) requires: (i) the installation of wells to define the extent of contaminant plumes, (ii) collection of data on the nature and estimated quantity of material released, (iii) installation of at least one well at the facility boundary in the direction of contaminant migration, and (iv) sampling of these wells to characterize the nature and extent of the release.

During the reporting period, activities conducted to address CCR Rule release characterization requirements downgradient of the FAP and BAP included:

- The collection of groundwater quality data throughout 2019 (Section 2.2);
- The collection of pond water quality data from the FAP and BAP (Section 2.2);
- Completion of a *Well Installation and Hydrogeologic Investigation Report* (Appendix K) to document the 2018 installation and sampling of monitoring wells to meet the requirements of 40 CFR §257.95(g)(1); and
- Characterization of the nature and extent of the release from the FAP and BAP in the form of plume maps derived from the hydrogeologic investigation.

Findings from the characterization activities can be summarized as follows:

- FAP: Arsenic, cobalt, fluoride, lithium, and molybdenum are present at concentrations above the respective GWPSs in groundwater downgradient of the FAP, with the inferred extent of each constituent depicted on Figures 3-1 through 3-5, respectively. Fluoride, lithium, and molybdenum all exceed the respective GWPSs in groundwater beneath downgradient properties. Arsenic, fluoride, lithium, and molybdenum are present in pond water in the FAP at concentrations exceeding the GWPS.
- BAP: Cobalt and lithium are present at concentrations above the respective GWPSs in groundwater downgradient of the BAP, with the inferred extent of each constituent depicted on Figures 3-6 and 3-7, respectively. Both constituents are elevated above the respective GWPSs in groundwater beneath downgradient properties; however, pursuant to the ASD prepared for lithium downgradient of the BAP, the lithium exceedance is attributable to natural spatial heterogeneity in groundwater lithium concentrations and not a release from the BAP. Cobalt is present in pond water in the BAP at concentrations below both the GWPS and concentrations observed in the groundwater.

### **3.2 Notification to Landowners of Groundwater Impacts**

APS notified private property owners downgradient of the FAP and the BAP of Appendix IV exceedances in groundwater per 40 CFR §257.95(g)(2). The notifications were placed in the facility's operating record in accordance with 40 CFR §257.105(h)(8) and are included in Appendix L. APS attempted to notify the owner of public property in the vicinity of the BAP but identified the incorrect agency based on county assessor records. APS was in the process of notifying the correct agency (the Bureau of Land Management) at the time this annual report was prepared.

### **3.3 Corrective Measures Assessments**

After declaration of an Appendix IV constituent exceedance over a GWPS at an SSL, an assessment of corrective measures to prevent further releases, remediate any releases, and restore affected areas to original conditions must be initiated per 40 CFR §257.96(a).

On February 13, 2019, APS placed a notification of the initiation of a CMA in the facility's operating record and to APS's CCR information webpage in accordance with 40 CFR §257.105(h)(9) and 40 CFR §257.106(h)(7) (Appendix L). On April 15, 2019, APS demonstrated the need for additional time to complete the CMA in accordance with 40 CFR §257.96(a) (Appendix M).

The CMA for the FAP and the BAP was prepared on June 14, 2019 and posted to APS's CCR information webpage in accordance with 40 CFR §257.105(h)(10) and 40 CFR §257.106(h)(8). The CMA evaluates the performance of several combined corrective measures to address cobalt and lithium at the BAP and arsenic, fluoride, lithium, and molybdenum at the FAP, which include:

- Operation of existing seepage collection systems at the FAP and the BAP in areas where impacts at ground surface were previously observed;
- Pond dewatering and subsequent closure with CCR in place using engineering control measures to limit the introduction of stormwater into the unit, thereby controlling the ongoing source of seepage from the unit in the future;
- Installation and operation of various groundwater intercept systems to capture impacted groundwater directly downgradient of the unit at potentially high contaminant flux locations; and
- Ongoing monitored natural attenuation of CCR constituents.

### **3.4 Semiannual Progress Report on Remedy Selection for the FAP and BAP**

40 CFR §257.97(a) requires the preparation of semiannual reports which document the progress of remedy selection for CCR units that have potentially impacted groundwater until the remedy is selected. Accordingly, APS prepared the first semiannual report during the reporting period on July 15, 2019 which describes the progress of remedy selection for the FAP and the BAP, which is presented in Appendix N.

This Annual Groundwater Monitoring and Corrective Action Report for 2019 fulfills the requirements of 40 CFR §257.97(a) for a subsequent semiannual progress report by providing the following updates on remedy selection for the FAP and BAP:

- *Moenkopi Moqui Investigation at the FAP.* To investigate potential saturation in the Moenkopi Formation downgradient of the FAP, a new well (MW-68M) was targeted for installation in the

Moqui member on the south side of I-40 during the reporting period. Observations made during the MW-68M borehole advancement indicated that the Moqui is unsaturated downgradient of the FAP and groundwater appears to flow primarily within alluvial deposits overlying the Moqui. The MW-68M well screen was installed within the dry Moqui member to detect any potential future migration of groundwater in the Moqui. However, the annular seal failed to prevent migration of alluvial water into the well screen, and the well was subsequently abandoned (Appendix O).

- *Seepage System Evaluation and Testing.* Investigative assessments of the FAP and BAP seepage systems were conducted to better understand the influence these systems have on intercepting seepage discharges to the alluvium and collect information that will be used in designing selected corrective measures. Field activities were conducted during the reporting period that included inspecting existing seepage collection systems on the basis of functionality, piping configuration, and existing metering capability (i.e., flow totalizers). Transducers were installed in the sumps of the pumping wells to gain a better understanding of the cycle frequency of the systems. The results of the system evaluation and recommendations for optimizing the system performance to enhance seepage collection will be documented in early 2020 and used to inform remedy selection.
- *Aquifer Testing Downgradient of the FAP.* As part of the seepage system evaluation, transducers were installed in the sumps of the pumping wells to gain a better understanding of the cycle frequency of the systems. This information will be used in the design of an aquifer test using existing wells downgradient of the FAP. The aquifer testing is anticipated to occur in early 2020. Data collected during the test will be used to estimate local hydraulic conductivity of the alluvial aquifer and potential radius of influence from extraction wells for remediation.
- *Stratified Sampling of Water in the BAP and Leaching Evaluation at the BAP.* Stratified BAP water samples and leach samples were collected (as proposed in the CMA [Wood, 2019b]) during the reporting period to promote the existing understanding of cobalt GWPS exceedances at monitoring wells downgradient of the BAP. Two new wells were installed adjacent to M-52A (i.e., MW-69A and MW-70M) as part of the leach sample collection effort in the alluvium and Moenkopi Moqui, respectively. Results of well installation activities suggested that groundwater flow occurs in the Moqui downgradient of the BAP (Appendix P) and that M-52A is screened within both the alluvium and the Moenkopi Moqui. The stratified water sampling and leaching sample collection activities were completed in November 2019 and results will be documented in early 2020.
- *Bottom Ash Pond Dewatering Projection.* To evaluate the duration of time until the BAP no longer has ponded water and seepage from the BAP has declined to a steady state level, a dewatering projection was developed. The dewatering projection is based on a water balance of the BAP that accounts for precipitation, evaporation, and natural seepage through the foundation of the BAP dam. Results of the dewatering projection will be documented in early 2020 and will be used to inform timeframes for remedy selection.

### 3.5 CCR Unit Closure Activities

The SEDI is currently scheduled for removal from plant operations in 2020. During the reporting period, APS procured design services for rerouting discharges to the SEDI. Following implementation of this work, the SEDI will be closed by removal of CCR in accordance with the closure plan for this unit (AECOM, 2016).

#### **4.0 KEY ACTIVITIES FOR UPCOMING YEAR**

During 2020, the following key activities will likely be conducted to support CCR groundwater monitoring and corrective action compliance at the site:

- Preparation of an Annual Groundwater Monitoring and Corrective Action Report for 2020 – Per 40 CFR §257.90(e), an annual report must be prepared no later than January 31 of the year following the calendar year documented in the report.
- Continued Detection Monitoring at the BAM with Ongoing Statistical Evaluation for SSIs – Per 40 CFR §257.94(b), detection monitoring (including analysis of collected samples for Appendix III constituents) will continue on a semiannual basis. On an ongoing basis, APS will determine whether there has been an SSI over background at the CCR units undergoing detection monitoring within 90 days of sampling and analysis (40 CFR §257.93[h][2]).
- Initiation of Assessment Monitoring for CCR Units with an SSI over Background (as applicable) – Per 40 CFR §257.94(e)(1), within 90 days of detecting an SSI over background levels for any Appendix III constituent, an assessment monitoring program must be established.
- Continued Assessment Monitoring at the BAP, FAP, and SEDI – While corrective action evaluation progresses at the BAP and FAP, assessment monitoring (including analysis of collected samples for Appendix III and Appendix IV constituents) must be conducted on a semiannual basis per 40 CFR §257.95(b) and (d)(1). At the SEDI, assessment monitoring must be conducted for as long as concentrations of Appendix III and IV constituents exceed background values per 40 CFR §257.95(f) or closure of the unit occurs.
- Public Meeting – Per 40 CFR §257.96(e), APS will conduct a public meeting with interested and affected parties to present the results of the CMA for the FAP and the BAP at least 30 days prior to selecting remedies for each CCR unit.
- Remedy Selection – APS will select remedies for the FAP and the BAP that meet the requirements of 40 CFR §257.97(b). Additionally, APS will prepare a remedy selection report for each unit per 40 CFR §257.97(a).
- Initiation of Remedial Activities – Per 40 CFR §257.91(f), APS will begin remedial activities at the FAP and the BAP within 90 days of selecting a remedy for each unit.

Since the CCR Rule is implemented in phases based on analysis of data collected during the groundwater monitoring program, the foregoing list only includes reasonably probable activities that will occur in 2020; this list is not comprehensive.

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**TABLES**

**Table 1-1  
Description of Coal Combustion Residual Units**

CCR Unit	Function	Operation	Size/Construction	History
Fly Ash Pond (FAP)	<i>Single CCR unit</i> - surface impoundment to store slurried fly ash from the plant.	Receives a slurry from the plant that contains primarily fly ash but may also contain some bottom ash, boiler slag, flue gas emission control residuals, boiler cleaning waste, oil/water separator solids, and storm water. Periodically receives solids from the SEDI.	- 430 acres in aerial extent. - Total storage capacity of about 18,000 acre-feet. - Normal operating pool elevation of 5,114 feet amsl.	- Constructed beginning in 1976 and placed into service in 1978. - Unlined; constructed on Moenkopi bedrock and a thin veneer of alluvial sediments. - The dam is constructed of earth fill with a central clay core that extends to bedrock where bedrock is shallow. In the central portion of the dam, where bedrock is deeper, a slurry cutoff wall extends one foot into bedrock or two feet into stiff clay.
Sedimentation Pond (SEDI)	<i>Single CCR unit</i> - collects water from drains around plant site, including storm water, process water, plant water, and slurry from plant leaks.	Collects discharge from on-site secondary wastewater treatment plant, effluent from the oil/water separator, vehicle wash water, plant wash water, and FGD wastes from scrubber or scrubber feed tank upsets. Water collected in the SEDI is pumped to Cholla's general water sump for recycling as process water.	- 1.3 acres in aerial extent. - Total storage capacity of 10.5 acre-feet. - Maximum pond depth of 10 feet. - the top of the pond side slope is at 5,019 feet amsl	- Placed into service in 1976. - Lined with a 2-foot-thick layer of compacted clay. - Constructed below grade.
Bottom Ash Pond (BAP)	<i>Single CCR unit</i> - surface impoundment to store slurried bottom ash from the plant.	Bottom ash is pumped to the BAP as a slurry. The bottom ash settles in the east and west upstream storage cells and the water is decanted to the reservoir and ultimately siphoned back to the plant for reuse. Slurry may also contain fly ash, boiler slag, flue gas emission control residuals, sedimentation pond effluent, cooling tower blowdown, oil/water separator effluent and solids, boiler cleaning waste, and storm water. Periodically receives solids from the SEDI.	- 105 acres in aerial extent. - Total storage capacity of 2,300 acre-feet. - Normal operating pool elevation of 5,117.8 feet amsl.	- Constructed beginning in 1976 and placed into service in 1978. - Unlined; constructed on Moenkopi bedrock and Tanner Wash alluvium. - Consists of a reservoir directly behind the dam and two storage cells upstream of the reservoir. - The dam is constructed of earth fill with a central clay core that extends to bedrock where bedrock is shallow. In the central portion of the dam, where bedrock is deeper, a slurry cutoff wall extends one foot into bedrock or two feet into stiff clay.
Bottom Ash Monofill (BAM)	<i>Single CCR unit</i> - landfill for bottom ash solids excavated from the BAP.	Bottom ash that has been drained of water is excavated from the BAP and permanently stored in the BAM.	- 41 acres in aerial extent.	- Placed into service in 1999.

**Notes:**

amsl - above mean sea level

BAP - Bottom Ash Pond

BAM - Bottom Ash Monofill

CCR - Coal combustion residuals

FAP - Fly Ash Pond

FGD - flue gas deulfurization

SEDI - Sedimentation Pond

**Source:**

GEI Consultants, Inc. 2009. *Final Coal Ash Impoundment Specific Site Assessment Report, Arizona Public Service, Cholla Power Plant.* Submitted to Lockheed-Martin Corporation. December 2009.



**Table 1-2  
CCR Groundwater Monitoring System Summary**

Well	CCR Unit	Well Designation	Hydrogeologic Unit	Date Installed	Borehole Depth [ft bgs]	Top of Casing Elevation [ft AMSL]	Ground Surface Elevation [ft AMSL]	Top of Screen [ft bgs]	Bottom of Screen [ft bgs]	Screen Length [ft]	Top Screen Elevation [ft AMSL]	Bottom Screen Elevation [ft AMSL]	Bottom Borehole Elevation [ft AMSL]
M-54	BAM	Background	Coconino Sandstone	10/2/2015	370	5070.71	5068.21	315	365	50	4,753.21	4,703.21	4,698.21
M-59	BAM	Downgradient	Coconino Sandstone	10/21/2015	425	5136.00	5133.86	373	423	50	4,760.86	4,710.86	4,708.86
M-60	BAM	Downgradient	Coconino Sandstone	11/1/2015	450	5151.18	5148.69	395	445	50	4,753.69	4,703.69	4,698.69
M-61	BAM	Downgradient	Coconino Sandstone	11/13/2015	420	5127.58	5124.95	365	415	50	4,759.95	4,709.95	4,704.95
M-47A	BAP	Supplementary	LCR Alluvium	1/20/2012	184	5020.34	NA	31	60	29.5	NA	NA	NA
W-317	BAP	Supplementary	LCR Alluvium	11/10/2011	122.5	5022.27	NA	29	59	30	NA	NA	NA
M-52A	BAP	Downgradient	Tanner Wash Alluvium	9/22/2015	83	5049.36	5047.08	20	70	50	5,027.08	4,977.08	4,964.08
M-53A	BAP	Downgradient	Tanner Wash Alluvium	9/22/2015	38	5044.68	5042.09	10	35	25	5,032.09	5,007.09	5,004.09
M-55A	BAP	Supplementary	Tanner Wash Alluvium	10/30/2015	60	5062.82	5060.06	20	55	35	5,040.06	5,005.06	5,000.06
W-301	BAP	Supplementary	Tanner Wash Alluvium	10/4/1983	62	5033.68	NA	40	60	20	NA	NA	NA
W-302	BAP	Supplementary	Tanner Wash Alluvium	11/1/1983	44	5036.42	5033.90	27	42	15	5,006.90	4,991.90	4,989.90
W-303	BAP	Supplementary	Tanner Wash Alluvium	10/26/1983	32	5039.70	5037.20	20	30	10	5,017.20	5,007.20	5,005.20
W-304	BAP	Supplementary	Tanner Wash Alluvium	10/26/1983	56	5038.60	5036.10	35	54	19	5,001.10	4,982.10	4,980.10
W-305	BAP	Downgradient	Tanner Wash Alluvium	10/7/1983	102	5046.80	5044.65	80	100	20	4,964.65	4,944.65	4,942.65
W-306	BAP	Downgradient	Tanner Wash Alluvium	10/11/1983	52	5046.74	5044.78	30	50	20	5,014.78	4,994.78	4,992.78
W-307	BAP	Supplementary	Tanner Wash Alluvium	10/21/1983	62	5045.22	5042.70	40	60	20	5,002.70	4,982.70	4,980.70
W-308	BAP	Supplementary	Tanner Wash Alluvium	10/19/1983	72	5051.54	5049.00	50	70	20	4,999.00	4,979.00	4,977.00
W-309	BAP	Supplementary	Tanner Wash Alluvium	10/14/1983	81	5062.01	5059.50	64	79	15	4,995.50	4,980.50	4,978.50
W-314	BAP	Downgradient	Tanner Wash Alluvium	1/27/1992	63	5051.10	5051.32	41	61	20	5,010.32	4,990.32	4,988.32
W-313	BAP	Supplementary	Moenkopi Formation	1/27/1992	293	5051.32	NA	272	292	20	NA	NA	NA
W-311	BAP	Supplementary	Coconino Sandstone	12/14/1991	281	5050.03	NA	259	279	20	NA	NA	NA
DM-04R	FAP	Supplementary	LCR Alluvium	11/22/2008	90	5018.43	5015.77	35	65	30	4,980.77	4,950.77	4,925.77
M-43A	FAP	Supplementary	LCR Alluvium	11/21/2008	80	5022.56	5019.87	40	70	30	4,979.87	4,949.87	4,939.87
M-45A	FAP	Supplementary	LCR Alluvium	11/12/2011	68	5025.57	NA	31	60	29.7	NA	NA	NA
M-46A	FAP	Supplementary	LCR Alluvium	11/14/2011	33.5	5025.36	NA	22	34	12	NA	NA	NA
M-49A	FAP	Supplementary	LCR Alluvium	9/17/2015	35	NA	NA	10	20	10	NA	NA	NA
M-50A	FAP	Downgradient	LCR Alluvium	9/18/2015	32	5038.18	5035.65	9	29	20	5,026.65	5,006.65	5,003.65
M-51A	FAP	Downgradient	LCR Alluvium	9/19/2015	14	5041.77	5039.10	7	12	5	5,032.10	5,027.10	5,025.10
W-123	FAP	Downgradient	LCR Alluvium	11/4/1983	40	5039.84	5038.14	14	29	15	5,024.14	5,009.14	4,998.14
W-126	FAP	Supplementary	LCR Alluvium	December 1995	50	5034.75	NA	15	45	30	NA	NA	NA
W-127	FAP	Supplementary	LCR Alluvium	2/11/1997	33.3	5030.04	NA	15	30	15	NA	NA	NA
M-63A	FAP	Supplementary	LCR Alluvium	9/25/2015	57	5337.02	NA	NA	NA	NA	NA	NA	NA
MW-65A	FAP	Downgradient	LCR Alluvium	11/15/2018	25	5027.86	5026.21	9	19	10	5,017.31	5,007.31	5,001.21
MW-66A	FAP	Downgradient	LCR Alluvium	11/14/2018	60	5033.35	5032.46	24	49	25.1	5,008.86	4,983.76	4,972.46
MW-67A	FAP	Downgradient	LCR Alluvium	11/16/2018	50	5025.38	5024.05	15	45	30.1	5,009.45	4,979.35	4,974.05
W-124	FAP	Supplementary	Moenkopi Formation	2/14/1992	96	5037.53	NA	76	96	20	NA	NA	NA
M-44S	FAP	Supplementary	Moenkopi Formation	11/13/2008	290	5145.63	5143.01	250	280	30	4,893.01	4,863.01	4,853.01
M-44D	FAP	Supplementary	Coconino Sandstone	11/13/2008	385	5143.52	5140.94	320	380	60	4,820.94	4,760.94	4,755.94

**Table 1-2  
CCR Groundwater Monitoring System Summary**

Well	CCR Unit	Well Designation	Hydrogeologic Unit	Date Installed	Borehole Depth [ft bgs]	Top of Casing Elevation [ft AMSL]	Ground Surface Elevation [ft AMSL]	Top of Screen [ft bgs]	Bottom of Screen [ft bgs]	Screen Length [ft]	Top Screen Elevation [ft AMSL]	Bottom Screen Elevation [ft AMSL]	Bottom Borehole Elevation [ft AMSL]
W-125	FAP	Supplementary	Coconino Sandstone	2/13/1992	141	5038.37	NA	120	140	20	NA	NA	NA
M-64A	FAP/BAP	Background	LCR Alluvium	2/9/2017	69	4991.90	4988.90	30	60	30	4,958.90	4,928.90	4,919.90
CR-1	SEDI	Supplementary	LCR Alluvium	9/24/1983	45	5010.20	NA	25	45	20	NA	NA	NA
M-56A	SEDI	Downgradient	LCR Alluvium	10/7/2015	100	5023.17	5020.63	40	85	45	4,980.63	4,935.63	4,920.63
M-57A	SEDI	Downgradient	LCR Alluvium	10/8/2015	100	5023.82	5021.16	40	85	45	4,981.16	4,936.16	4,921.16
M-58A	SEDI	Downgradient	LCR Alluvium	10/13/2015	100	5023.84	5021.24	39	84	45	4,982.24	4,937.24	4,921.24
M-62A	SEDI	Background	LCR Alluvium	11/17/2015	97	5020.87	5021.01	39	84	45	4,982.01	4,937.01	4,924.01

**Notes:**

Source of presented information presented is Montgomery & Associates, 2017; and Wood Environment & Infrastructure Solutions, Inc. Surveying, 2018.

Vertical datum is NAVD 88

AMSL - Above mean sea level

BAM - Bottom Ash Monofill

BAP - Bottom Ash Pond

bgs - below ground surface

CCR - Coal combustion residuals

FAP - Fly Ash Pond

ft - feet

LCR - Little Colorado River

NA - Not Available

SEDI - Sedimentation Pond

**Table 2-1  
Groundwater Monitoring Event Summary for 2019**

CCR UNIT	Well ID	Monitoring System Well Type	Sampling Date (Monitoring Program)												Number of Field Original Samples Collected in 2019 <sup>(c)</sup>
			Feb 13-15, 2019 (Assessment)	Feb 15, 2019 (Assessment)	Mar 30, 2019 (Characterization)	Apr 8-9, 2019 (Detection)	Apr 8-11, 2019 (Assessment)	Apr 15-17, 2019 (Assessment)	Apr 17-18, 2019 (Assessment)	Jul 31, 2019 Aug 1-9, 2019 (Assessment)	Aug 9, 2019 (Assessment)	Oct 22-23, 2019 (Detection)	Oct 21-24, 2019 Nov 25-26, 2019 (Assessment)	Oct 21, 2019 Nov 25, 2019 (Assessment)	
BAP	M-52A	CCR	X	---	---	---	---	X	---	X	---	---	X	---	4
	M-53A	CCR	X	---	---	---	---	X	---	X	---	---	X	---	4
	M-55A	Supplementary	X	---	---	---	---	X	---	X	---	---	X	---	4
	M-64A <sup>(a)</sup>	CCR	X	---	---	---	X	X	---	X	---	---	X	---	5
	W-301	Supplementary	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-302	Supplementary	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-304	Supplementary	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-305	CCR	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-306	CCR	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-307	Supplementary	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-308	Supplementary	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-309	Supplementary	X	---	---	---	---	X	---	X	---	---	X	---	4
	W-314	CCR	X	---	---	---	---	X	---	X	---	---	X	---	4
W-317	CCR	---	---	X	---	---	X	---	X	---	---	X	---	3	
N/A	Pond Water	---	---	X	---	---	---	---	---	---	---	---	---	1	
BAM	M-54	CCR	---	---	---	X	---	---	---	---	---	X	---	---	2
	M-59	CCR	---	---	---	X	---	---	---	---	---	X	---	---	2
	M-60	CCR	---	---	---	X	---	---	---	---	---	X	---	---	2
	M-61	CCR	---	---	---	X	---	---	---	---	---	X	---	---	2
SEDI	M-56A	CCR	---	X	---	---	---	---	X	---	X	---	---	X	4
	M-57A	CCR	---	X	---	---	---	---	X	---	X	---	---	X	4
	M-58A	CCR	---	X	---	---	---	---	X	---	X	---	---	X	4
	M-62A	CCR	---	X	---	---	---	---	X	---	X	---	---	X	4
FAP	M-43A	Supplementary	---	---	---	---	---	---	---	---	---	---	Obstructed <sup>(b)</sup>	---	0
	M-46A	Supplementary	---	---	---	---	---	---	---	---	---	---	X	---	1
	M-50A	CCR	X	---	---	---	X	---	---	---	---	---	X	---	3
	M-51A	CCR	X	---	---	---	X	---	---	---	---	---	X	---	3
	M-65A	CCR	X	---	---	---	X	---	---	---	---	---	X	---	3
	M-66A	CCR	X	---	---	---	X	---	---	---	---	---	X	---	3
	M-67A	CCR	X	---	---	---	X	---	---	---	---	---	X	---	3
	W-123	CCR	X	---	---	---	X	---	---	---	---	---	X	---	3
	W-126	Supplementary	---	---	---	---	X	---	---	---	---	---	X	---	3
N/A	Pond Water	---	---	X	---	---	---	---	---	---	---	---	---	1	
<i>Analyzed Constituents</i>			<i>App IV</i>	<i>App III and Detected App IV</i>	<i>App III and Detected App IV, General Chemistry</i>	<i>App III</i>	<i>App III and Detected App IV</i>	<i>Detected App IV</i>	<i>App IV</i>	<i>App III</i>	<i>App III and Detected App IV</i>	<i>App III</i>	<i>App III and App IV</i>	<i>App III and Detected App IV</i>	104

**Notes:**

<sup>(a)</sup> Background well for both the BAP and FAP.

<sup>(b)</sup> Well scheduled for monitoring but not monitored.

<sup>(c)</sup> Totals exclude field duplicate samples.

X - Well Monitored  
--- - Well Not Monitored

App - Appendix  
BAM - Bottom Ash Monofill

BAP - Bottom Ash Pond  
CCR - coal combustion residuals

FAP - Fly Ash Pond  
ID - Identification

N/A - Not Applicable  
SEDI - Sedimentation Pond

**Table 2-2  
Aquifer Properties and Groundwater Flow Calculations**

CCR Unit (Wells Used in Calculations)	Estimated Hydraulic Conductivity [ft/d]	Estimated Effective Porosity	Monitoring Event	Calculated Hydraulic Gradient [ft/ft]	Calculated Groundwater Flow Direction [degrees from North]	Estimated Groundwater Flow Rate [ft/d]
BAP (M-52A, M-53A, W-301, W-302, W-304, W-306, W-307)	0.96 <sup>(a)</sup>	0.13 <sup>(a)</sup>	February 2019	0.015	187	0.11
			April 2019	0.015	187	0.11
			August 2019	0.015	186	0.11
			October 2019	0.015	185	0.11
FAP (M-50A, M-51A, W-123, W-126, MW-65A, MW-66A, MW-67A)	0.032 <sup>(a)</sup>	0.13 <sup>(a)</sup>	February 2019	0.022	240	0.0054
			April 2019	0.022	240	0.0054
			October 2019	0.022	240	0.0054
SEDI (MW-56A, MW-58A, MW-62A)	66 <sup>(a)</sup>	0.13 <sup>(a)</sup>	February 2019	NC	NC	NC
			April 2019	0.00075	271	0.38
			August 2019	0.00089	280	0.45
			October 2019	0.00097	254	0.49
BAM (M-54, M-59, M61)	31 <sup>(a)</sup>	0.15 <sup>(a)</sup>	April 2019	0.0085	358	1.8
			October 2019	0.0088	358	1.8

**Notes:**

BAM - Bottom Ash Monofill  
 BAP - Bottom Ash Pond  
 CCR - Coal Combustion Residuals  
 d - day  
 FAP - Fly Ash Pond  
 ft - feet  
 NC - Not Calculated  
 SEDI - Sedimentation Pond

**References:**

<sup>(a)</sup> Montgomery & Associates, 2018

**Table 2-3  
Summary of Statistical Analysis of Appendix III Constituent Data**

BAM					
Constituent	Initial Background Concentration (Calculated in 2018)	Revised Background Concentration (Calculated in 2019)	Location of SSI Over Background During 2019	Results of Statistical Analysis	Recommendation
Boron	0.57 mg/L	0.55 mg/L	---	No exceedances	---
Calcium	110 mg/L	100 mg/L	---	No exceedances	---
Chloride	1,600 mg/L	1,600 mg/L	---	No exceedances	---
Fluoride	1.4 mg/L	1.4 mg/L	M-60, M-61	No exceedances	Intrawell Statistical Comparisons
pH	7.6 SU	7.3 to 7.8	M-59	Initial exceedance at M-59	Resampling
Sulfate	400 mg/L	380 mg/L	---	No exceedances	---
TDS	3,400 mg/L	3,200 mg/L	---	No exceedances	---

**Notes:**

- ASD - Alternative Source Demonstration
- BAM - Bottom Ash Monofill
- mg/L - milligrams per liter
- SSI - statistically significant increase
- SU - standard pH units
- TDS - total dissolved solids

**FIGURES**



Path: X:\Projects\20-L onterm Projects\A.P.S Cholla Compliance Support\MXD\Annual\_Groundwater\_Monitoring\2019\Figure 1-1\_Site\_Location\_Map.mxd



Job No. 14-2018-2040  
 PM: EHL  
 Date: 1/31/2020  
 Scale: 1" = 1.5 miles



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Arizona Public Service  
 Cholla Power Plant  
 Navajo County, Arizona

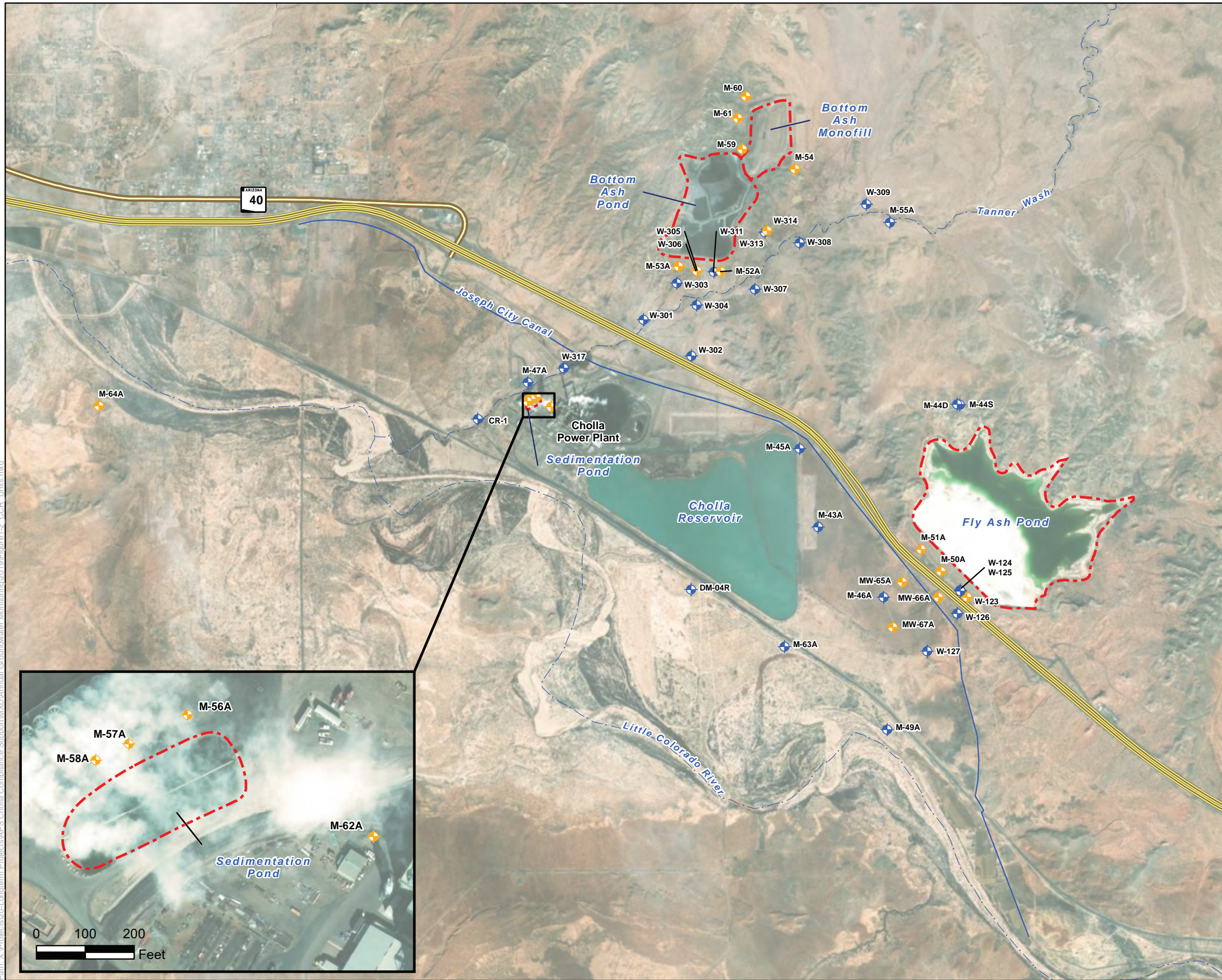
Site Location Map

FIGURE  
 1-1





Path: X:\Projects\20-Longterm Projects\APS Cholla Compliance Support\MXD\Annual Groundwater Monitoring\2019\Figure1-2\_CCR\_Units.mxd

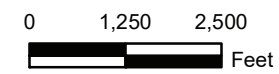


**Legend**

- ◆ CCR Monitoring Well Location
- ◆ Supplementary Site Monitoring Well Location
- Ephemeral Surface Water Feature
- Canal
- Approximate Extent of CCR Unit

**Notes:**







CCR Coal Combustion Residuals



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE 1-2</b>	<b>CCR Units and Monitoring System Summary</b>
Job No. 1420182040 PM: EHL Date: 1/31/2020 Scale: 1" = 2500'	
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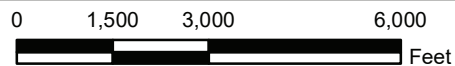
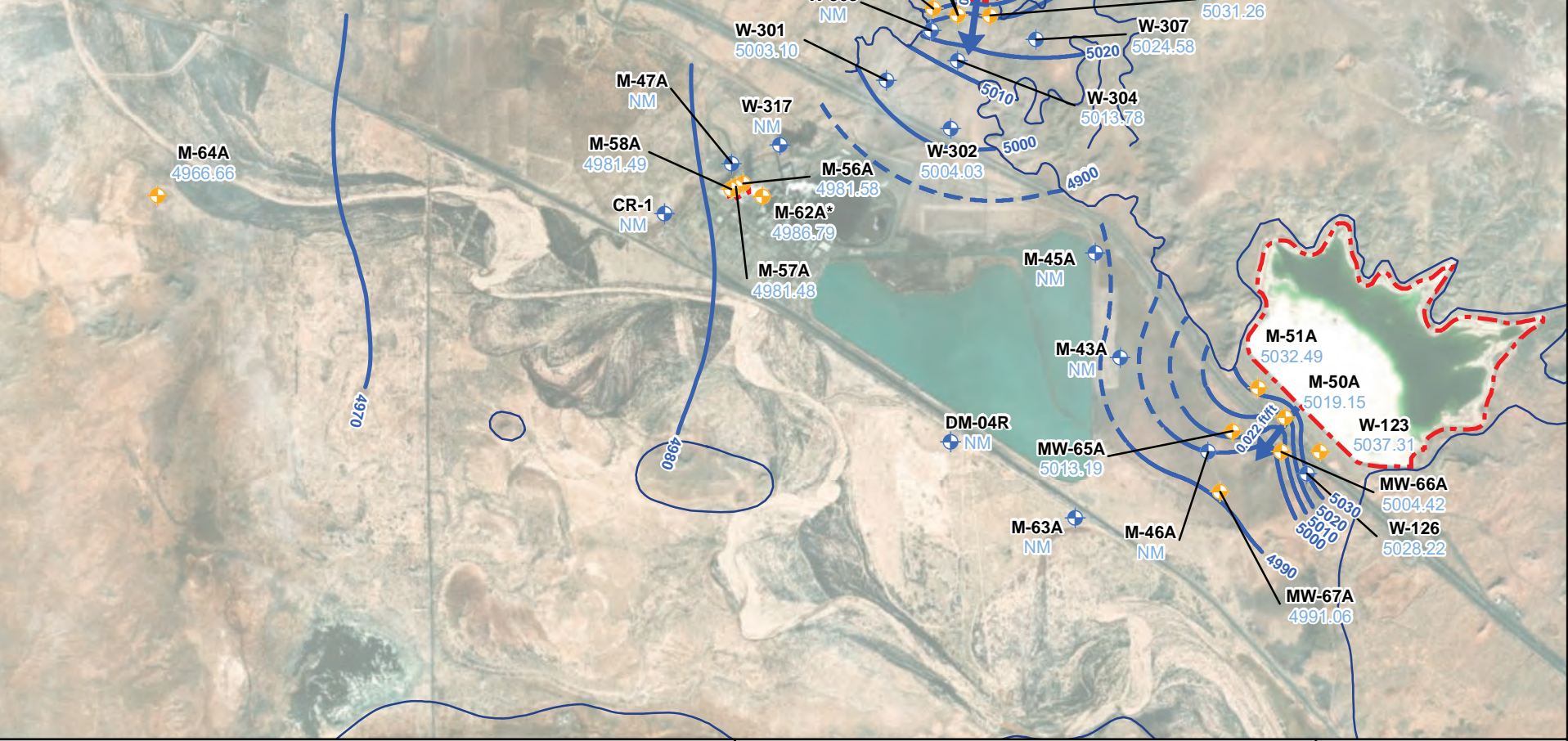


**Legend**

-  CCR Monitoring Well Location
-  Supplementary Site Monitoring Well Location
-  Groundwater Elevation Contour (ft amsl)
-  Alluvial Aquifer; dashed where inferred
-  Groundwater Flow Direction
-  Extent of Alluvial Material

 Approximate Extent of CCR Unit

**Notes and Abbreviations:**  
**MW-65A** Well Identification  
 5013.19 Groundwater Elevation (ft amsl)  
 NM Not Measured  
 \* Well not used in potentiometric surface mapping  
 ft amsl Feet above mean sea level  
 CCR Coal Combustion Residuals  
 Note: Only wells with groundwater elevations were used in contouring



Arizona Public Service  
 Cholla Power Plant  
 Navajo County, Arizona

Job No.	14-2018-2040
PM:	EHL
Date:	1/31/2020
Scale:	1" = 3,000'



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**Potentiometric Surface Map  
 February 2019**



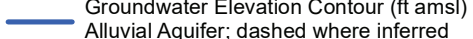


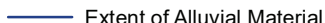
FIGURE  
 2-1



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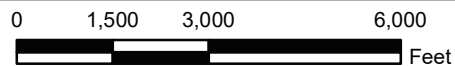
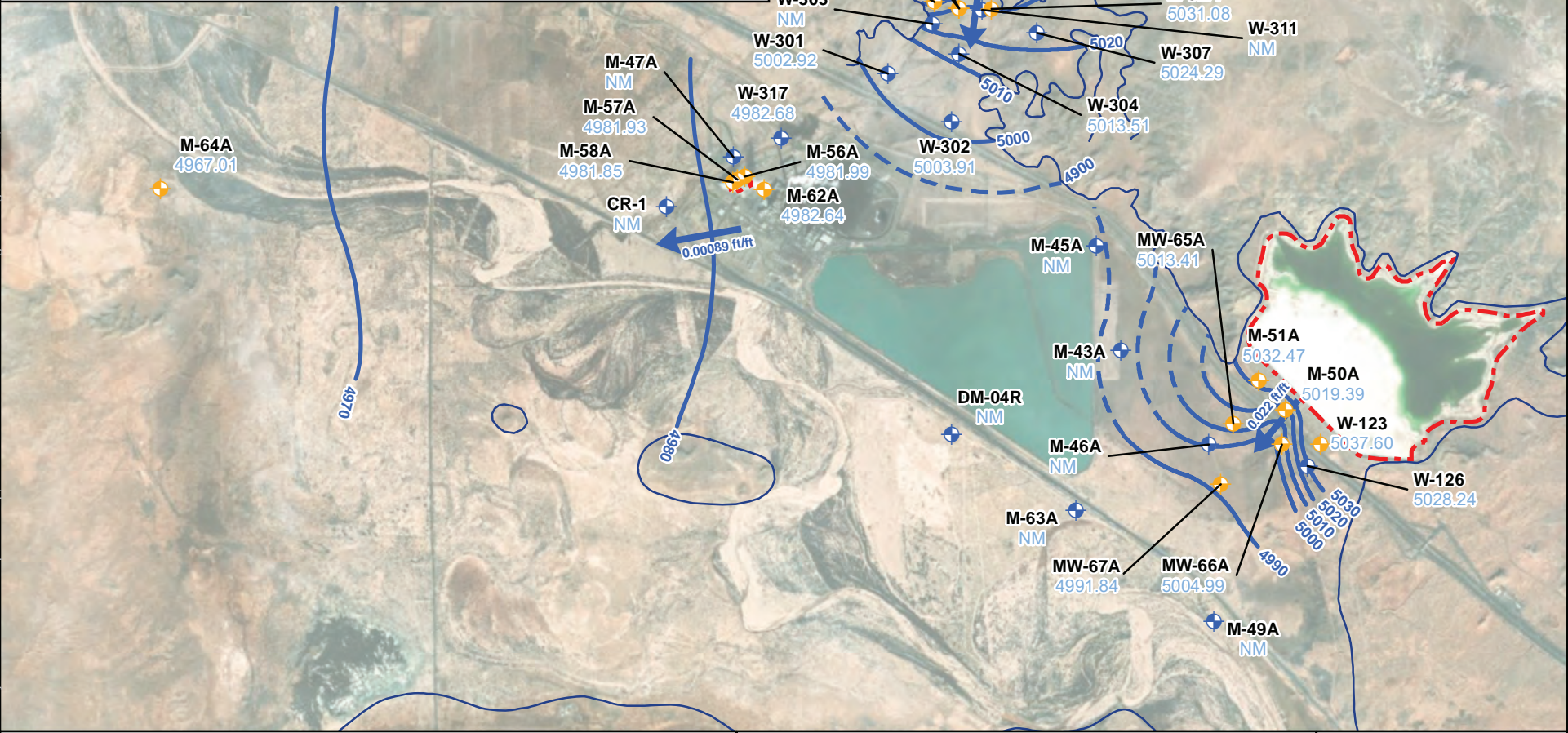
**Legend**

-  CCR Monitoring Well Location
-  Supplementary Site Monitoring Well Location
-  Groundwater Elevation Contour (ft amsl)  
Alluvial Aquifer; dashed where inferred
-  Groundwater Elevation Contour (ft amsl)  
C-Aquifer
-  Groundwater Flow Direction
-  Extent of Alluvial Material

 Approximate Extent of CCR Unit

**Notes and Abbreviations:**

- MW-65A** Well Identification
  - 5013.41 Groundwater Elevation (ft amsl)
  - NM Not Measured
  - ft amsl Feet above mean sea level
  - CCR Coal Combustion Residuals
- Note: Only wells with groundwater elevations were used in contouring



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Navajo County, Arizona



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**Potentiometric Surface Map**  
April 2019

FIGURE  
2-2

Path: X:\Projects\20-L Longterm Projects\A.P.S. Cholla Compliance Support\MXD\Annual Groundwater Monitoring\2019\Figure 2-2\_202019.mxd



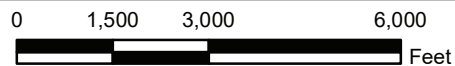
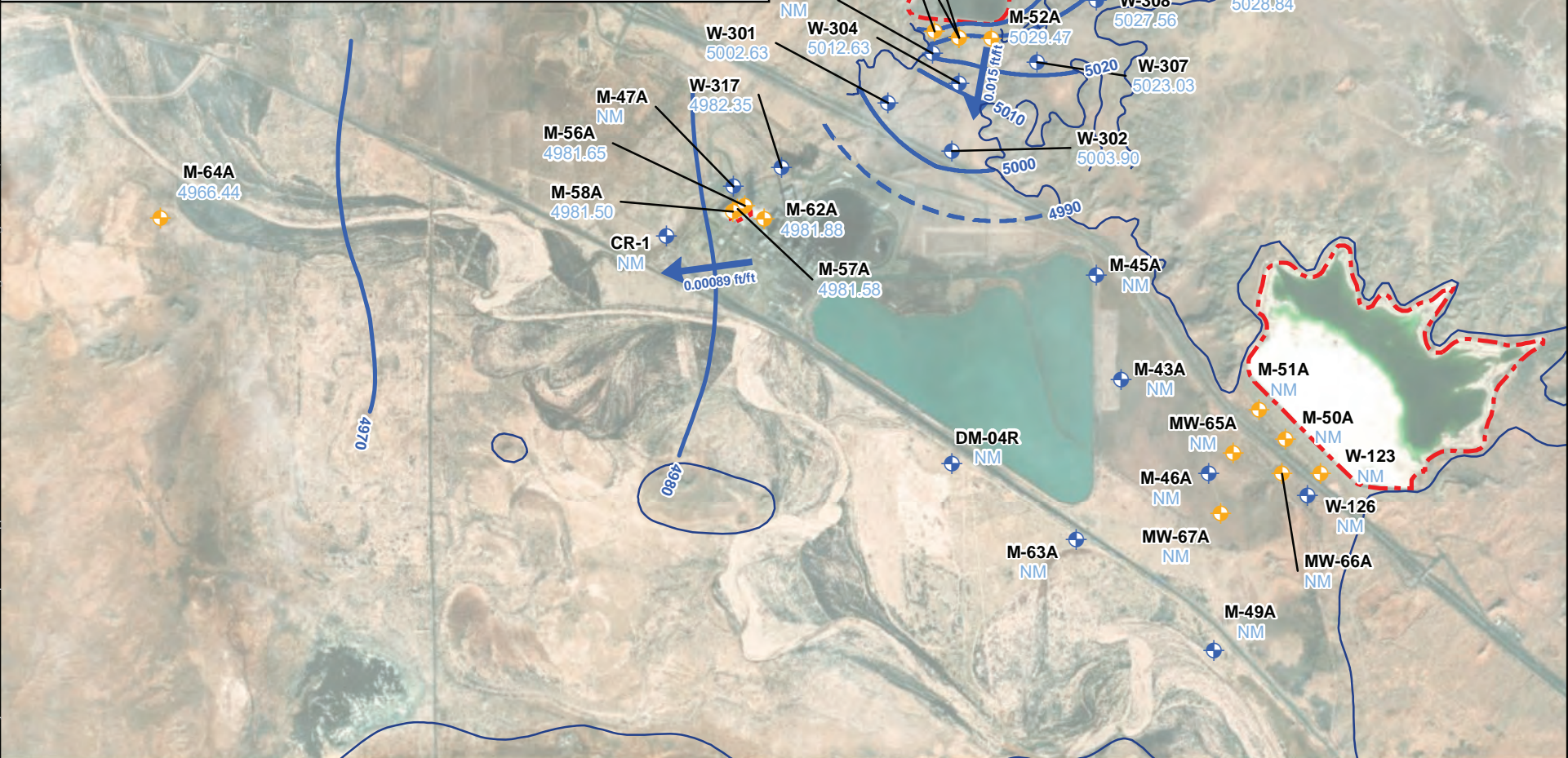
**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Groundwater Elevation Contour (ft amsl)
- Alluvial Aquifer; dashed where inferred
- Groundwater Flow Direction
- Extent of Alluvial Material

Approximate Extent of CCR Unit

**Notes and Abbreviations:**

- MW-65A** Well Identification
  - NM** Groundwater Elevation (ft amsl)
  - NM** Not Measured
  - ft amsl** Feet above mean sea level
  - CCR** Coal Combustion Residuals
- Note: Only wells with groundwater elevations were used in contouring



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**Potentiometric Surface Map**  
**August 2019**



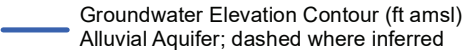


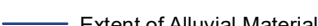
FIGURE  
**2-3**




Path: X:\Projects\20-L onterm Projects\APS Cholla Compliance Support\MXD\Annual Groundwater Monitoring\2019\Figure2-3\_302019.mxd



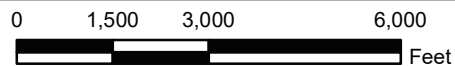
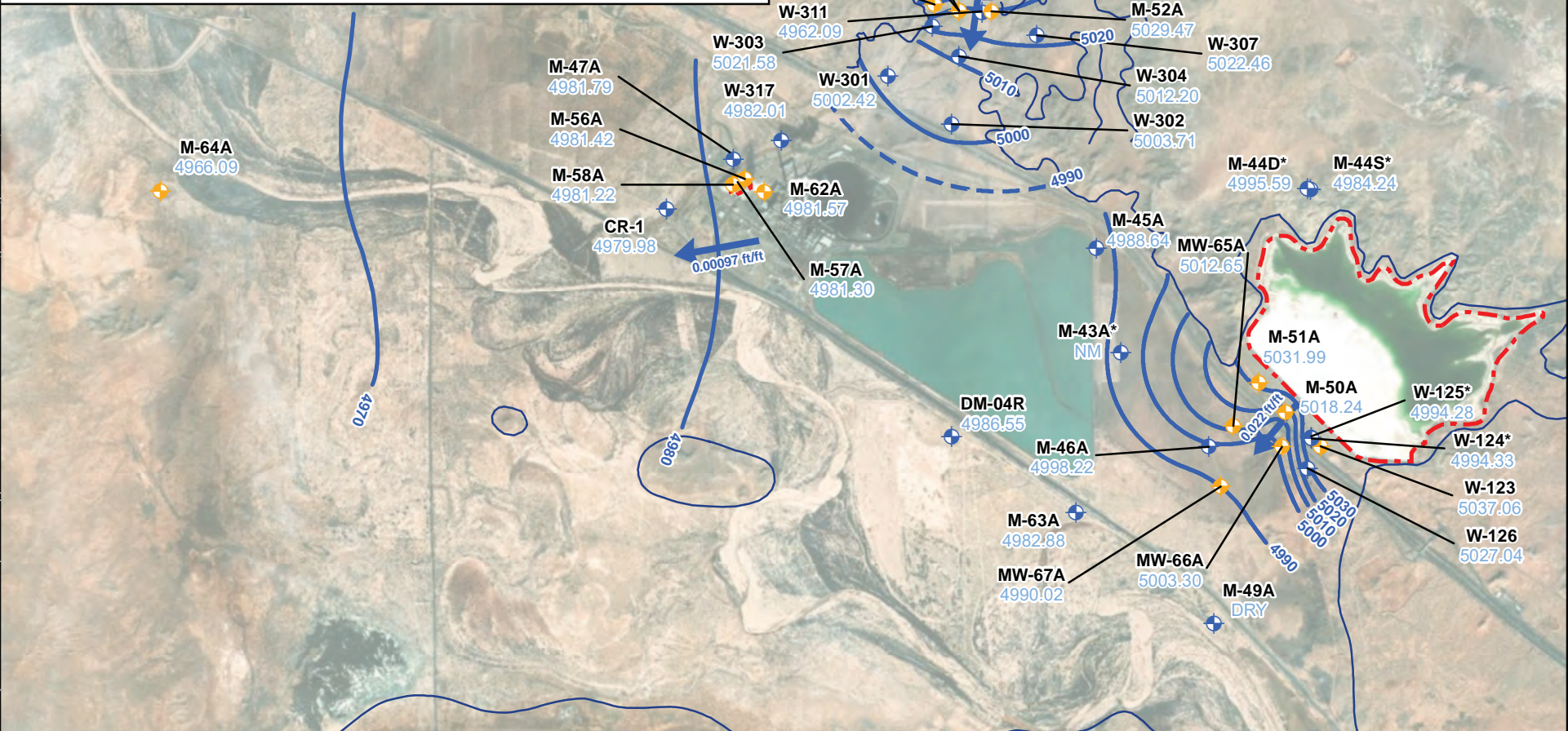
**Legend**

-  CCR Monitoring Well Location
-  Supplementary Site Monitoring Well Location
-  Groundwater Elevation Contour (ft amsl)  
Alluvial Aquifer; dashed where inferred
-  Groundwater Elevation Contour (ft amsl)  
C-Aquifer
-  Groundwater Flow Direction
-  Extent of Alluvial Material

 Approximate Extent of CCR Unit

**Notes and Abbreviations:**

- MW-65A** Well Identification  
5012.65 Groundwater Elevation (ft amsl)
  - NM** Not Measured
  - \*** Well not used in potentiometric surface mapping
  - ft amsl** Feet above mean sea level
  - CCR** Coal Combustion Residuals
- Note: Only wells with groundwater elevations were used in contouring



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Cholla Power Plant  
Navajo County, Arizona

Job No.	14-2018-2040
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Date:	1/31/2020
Scale:	1" = 3,000'



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**Potentiometric Surface Map**  
October 2019

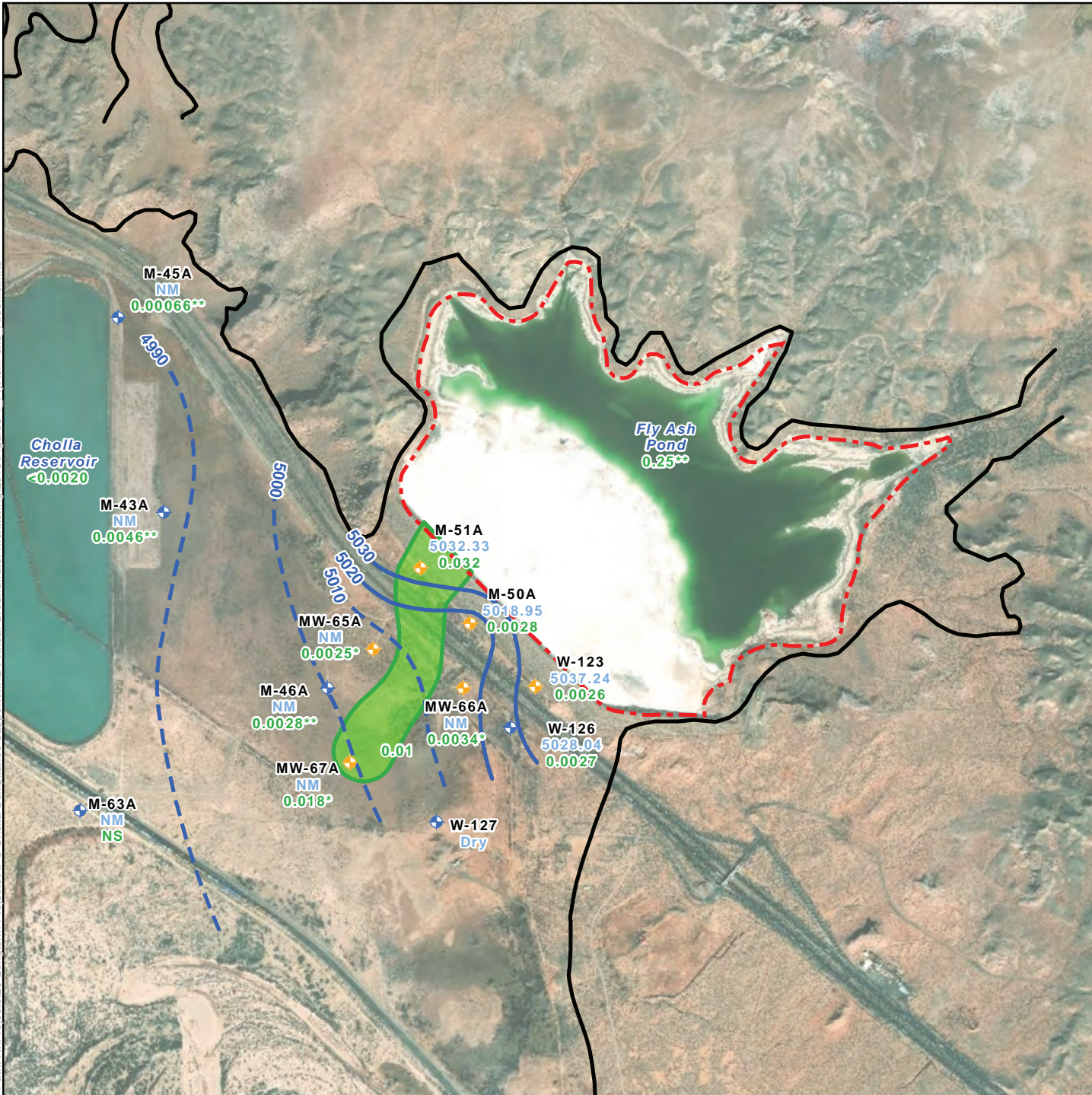
FIGURE  
2-4



Path: X:\Projects\20-L Longterm Projects\APS Cholla Compliance Support\MXD\Annual Groundwater Monitoring\2019\Figure2-4\_402019.mxd



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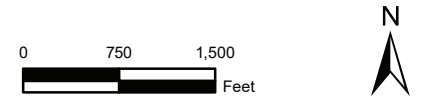
State Overview

**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit
- Potentiometric Surface - October 2018**
- (Dashed Where Inferred)
- Arsenic Concentration in Alluvial Aquifer (October-December 2018)**
- >0.01 mg/L
- GWPS (0.01 mg/L; Dashed Where Inferred)

**Notes:**

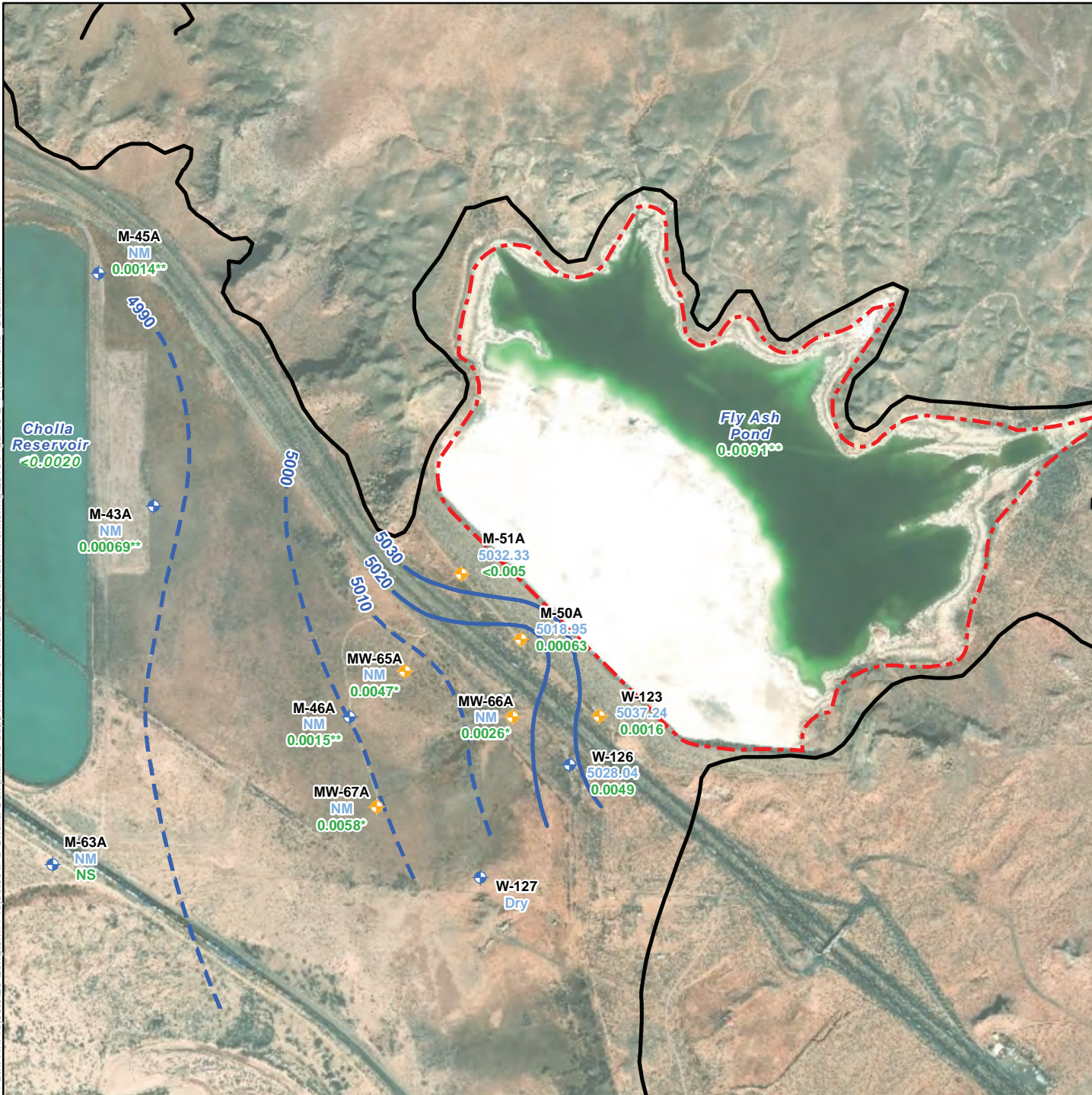
- W-123** Well Identification
- 5037.24** Groundwater elevation (ft amsl) measured in October 2018
- 0.0026** Arsenic concentration (mg/L) measured in October 2018
- \*** Sampled in December 2018
- \*\*** Sampled in December 2016
- ft amsl Feet above mean sea level
- NM Groundwater Elevation Not Measured
- NS Not Sampled
- mg/L Milligrams per liter
- GWPS Groundwater Protection Standard



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE</b> <b>3-1</b>	<b>Arsenic Iso-Concentration Map for the Fly Ash Pond</b>
Job No. 1420182040 PM: EHL Date: 1/31/2020 Scale: 1"= 1,500'	
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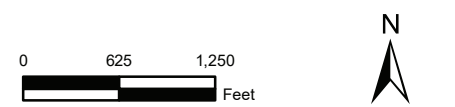


Path: X:\Projects\201-Longterm\Projects\APS\Cholla Compliance Support\MXD\Annual Groundwater Monitoring\2019\Figure3-2\_FlyAshPond\_Cobalt.mxd



- Legend**
- CCR Monitoring Well Location
  - Supplementary Site Monitoring Well Location
  - Estimated Alluvium
  - Approximate Extent of CCR Unit
- Potentiometric Surface - October 2018**
- (Dashed Where Inferred)
- GWPS for Cobalt is 0.006 mg/L (no exceedences)

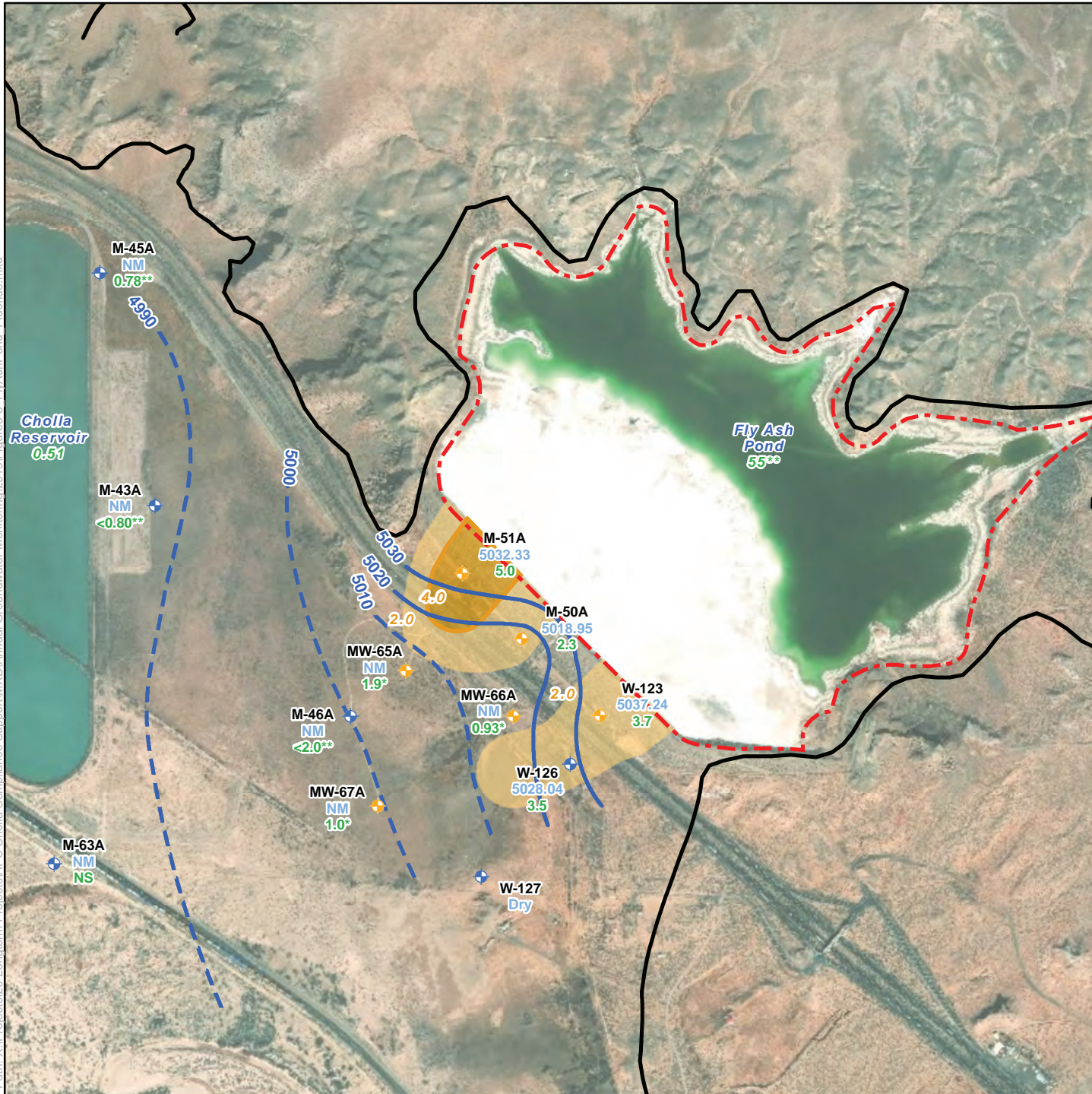
- Notes:**
- W-123** Well Identification
  - 5037.24** Groundwater elevation (ft amsl) measured in October 2018
  - 0.0016** Cobalt concentration (mg/L) measured in October 2018
  - \*** Sampled in December 2018
  - \*\*** Sampled in December 2016
  - ft amsl Feet above mean sea level
  - NM Groundwater Elevation Not Measured
  - NS Not Sampled
  - mg/L Milligrams per liter
  - GWPS Groundwater Protection Standard



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE 3-2</b>	<b>Cobalt Iso-Concentration Map for the Fly Ash Pond</b>
Job No. 1420182040	
PM: EHL	
Date: 1/31/2020	
Scale: 1"= 1250'	
<small>The map shown here has been created with all due and reasonable care and is strictly for use with Wood Environment &amp; Infrastructure Solutions, Inc. Project Number 1420182040. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Wood Environment &amp; Infrastructure Solutions, Inc. assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.</small>	



Path: X:\Projects\201-LandTerm\Projects\APS Cholla Compliance Support\MXD\Annual Groundwater Monitoring\2019\Figure3-3\_FlyAshPond\_Fluoride.mxd

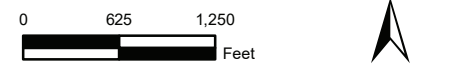


- Legend**
- CCR Monitoring Well Location
  - Supplementary Site Monitoring Well Location
  - Estimated Alluvial
  - Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**  
 (Dashed Where Inferred)

- Fluoride Concentration in Alluvial Aquifer (October-December 2018)**
- 2 mg/L
  - 4 mg/L
  - GWPS (4 mg/L; Dashed Where Inferred)

- Notes:**
- W-123** Well Identification
  - 5037.24** Groundwater elevation (ft amsl) measured in October 2018
  - 3.7** Fluoride concentration (mg/L) measured in October 2018
  - \*** Sampled in December 2018
  - \*\*** Sampled in December 2016
  - ft amsl Feet above mean sea level
  - NM Groundwater Elevation Not Measured
  - NS Not Sampled
  - mg/L Milligrams per liter
  - GWPS Groundwater Protection Standard



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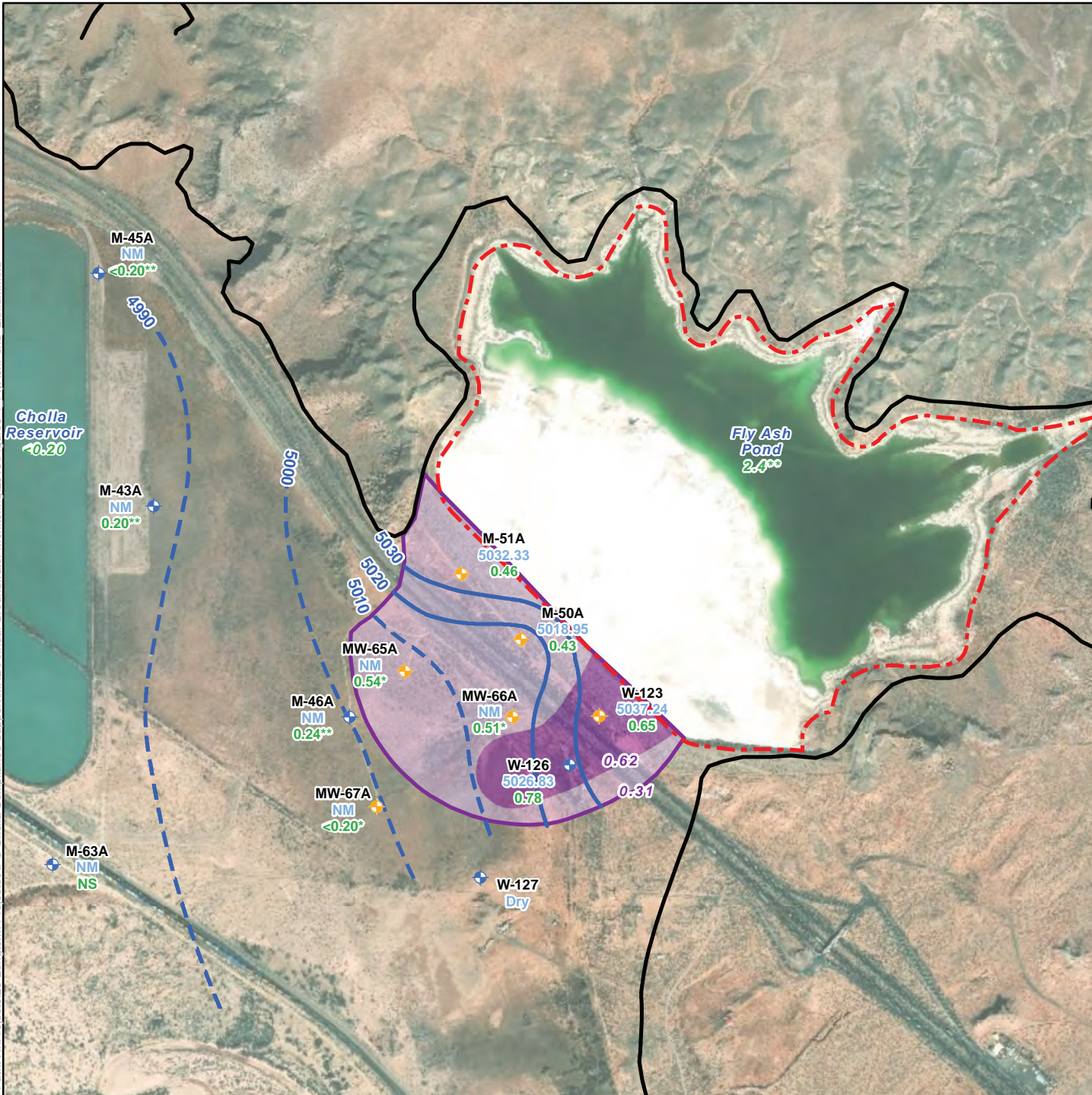
**FIGURE 3-3 Fluoride Iso-Concentration Map for the Fly Ash Pond**

Job No.	1420182040	
PM:	EHL	
Date:	1/31/2020	
Scale:	1"= 1250'	

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- Legend**
- CCR Monitoring Well Location
  - Supplementary Site Monitoring Well Location
  - Estimated Alluvial Extent
  - Approximate Extent of CCR Unit

- Potentiometric Surface - October 2018**
- (Dashed Where Inferred)
- Lithium Concentration in Alluvial Aquifer (October-December 2018)**
- >0.31 mg/L
  - >0.62 mg/L
  - GWPS (0.31 mg/L; Dashed Where Inferred)

- Notes:**
- W-123** Well Identification
  - 5037.24** Groundwater elevation (ft amsl) measured in October 2018
  - 0.65** Lithium concentration (mg/L) measured in October 2018
  - \*** Sampled in December 2018
  - \*\*** Sampled in December 2016
  - ft amsl** Feet above mean sea level
  - NM** Groundwater Elevation Not Measured
  - NS** Not Sampled
  - mg/L** Milligrams per liter
  - GWPS** Groundwater Protection Standard
- 0 625 1,250 Feet
- 

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Navajo County, Arizona

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**FIGURE 3-4** Lithium Iso-Concentration Map for the Fly Ash Pond

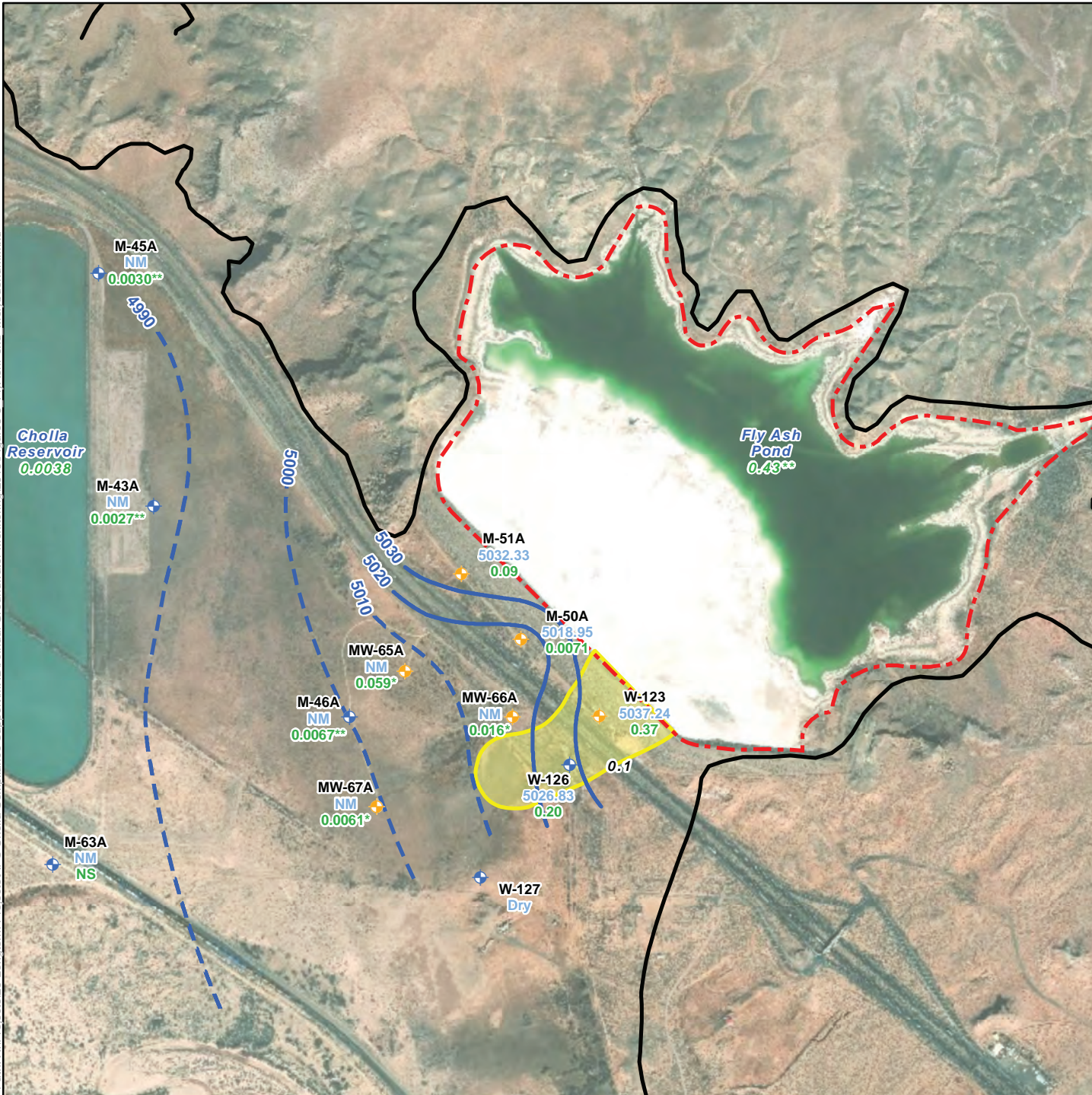
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Job No. 1420182040	
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Date: 1/31/2020	
Scale: 1"= 1250'	

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Path: X:\Projects\201-Longterm\Projects\APS\Cholla Compliance Support\MXD\Annual Groundwater Monitoring\2019\Figure3-5\_FlyAshPond\_Molybdenum.mxd



**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

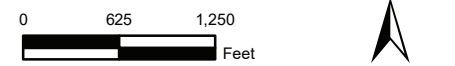
**Potentiometric Surface - October 2018**

- (Dashed Where Inferred)

**Molybdenum Concentration in Alluvial Aquifer (October-December 2018)**

- >0.1 mg/L
- GWPS (0.1 mg/L; Dashed Where Inferred)

- Notes:**
- W-123** Well Identification
  - 5037.24** Groundwater elevation (ft amsl) measured in October 2018
  - 0.37** Lithium concentration (mg/L) measured in October 2018
  - \*** Sampled in December 2018
  - \*\*** Sampled in December 2016
  - ft amsl Feet above mean sea level
  - NM Groundwater Elevation Not Measured
  - NS Not Sampled
  - mg/L Milligrams per liter
  - GWPS Groundwater Protection Standard



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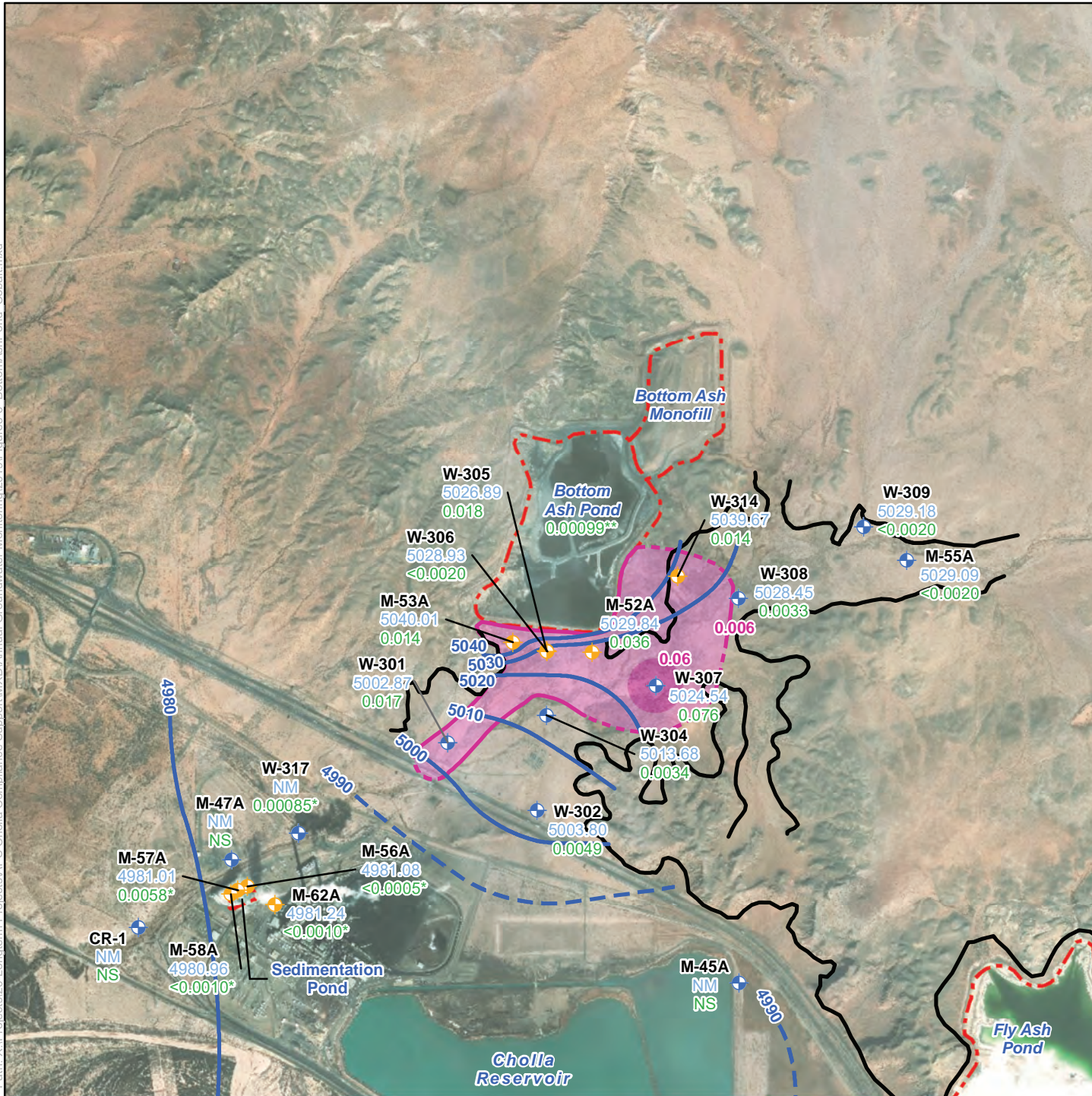
---

**FIGURE 3-5** Molybdenum Iso-Concentration Map for the Fly Ash Pond

Job No. 1420182040	
PM: EHL	
Date: 1/31/2020	
Scale: 1"= 1250'	

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**Legend**

- ◆ CCR Monitoring Well Location
- ◆ Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

— (Dashed Where Inferred)

**Cobalt Concentration in Alluvial Aquifer (December 2018)**

- >0.06 mg/L
- >0.006 mg/L
- GWPS (0.006 mg/L; Dashed Where Inferred)

**Notes:**

- W-309** Well Identification
- 5029.18** Groundwater elevation (ft amsl) measured in October 2018
- <math><0.0020</math>** Cobalt concentration (mg/L)
- \*** Sampled in May 2018
- \*\*** Sampled in March 2019

ft amsl Feet above mean sea level  
 mg/L Milligrams per liter  
 NM Groundwater Elevation Not Measured  
 NS Not Sampled  
 GWPS Groundwater Protection Standard

0 1,000 2,000 Feet

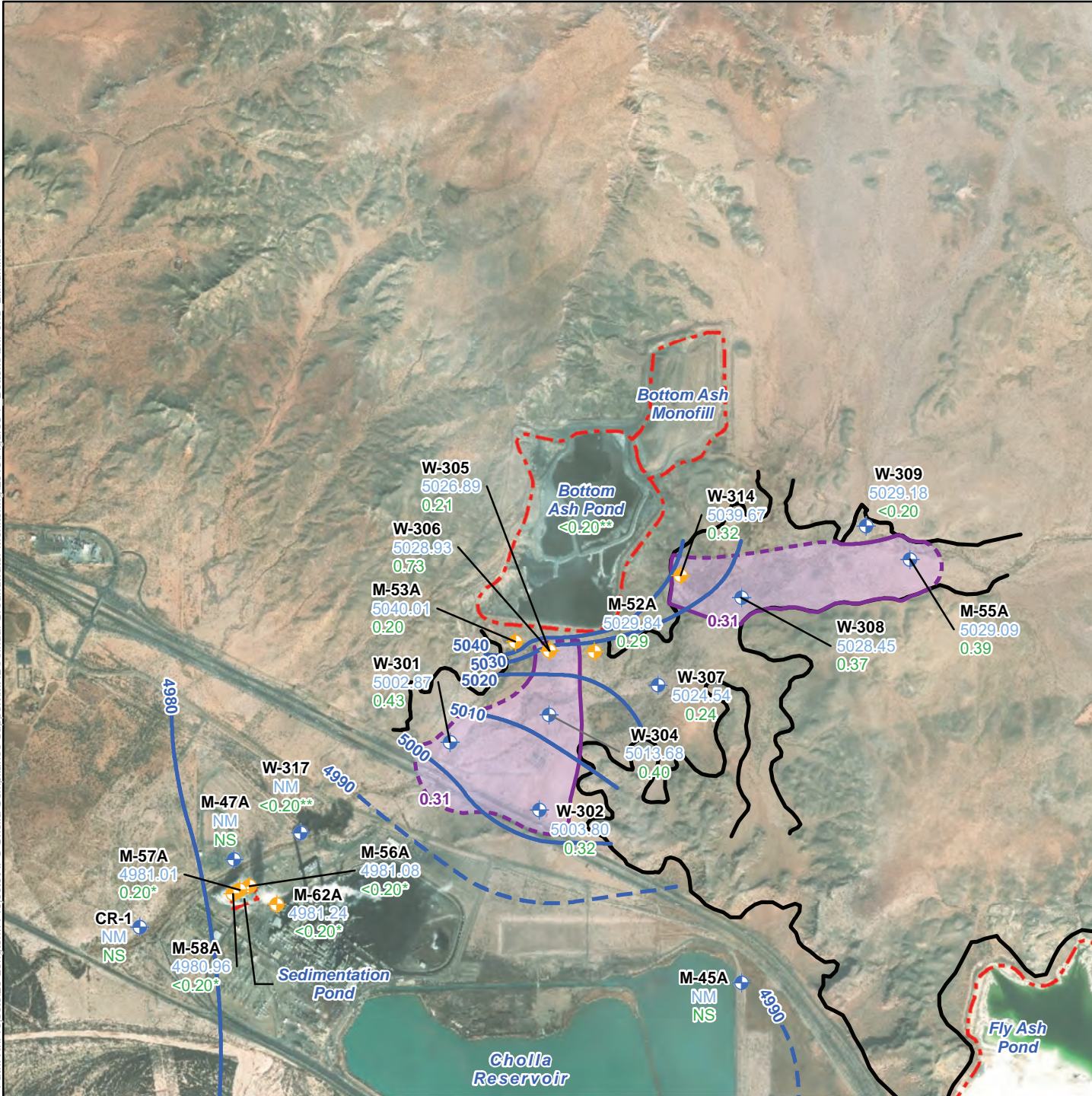
Arizona Public Service  
 Cholla Power Plant  
 Navajo County, Arizona

<b>FIGURE</b>	<b>3-6 Cobalt Iso-Concentration Map for the Bottom Ash Pond</b>
Job No.	1420182040
PM:	EHL
Date:	1/31/2020
Scale:	1"= 2,000'

wood.

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**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

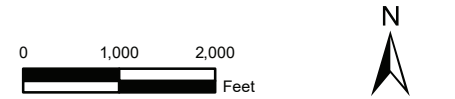
(Dashed Where Inferred)

**Lithium Concentration in Alluvial Aquifer (December 2018)**

>0.31 mg/L

GWPS (0.31 mg/L; Dashed Where Inferred)

- Notes:**
- W-309** Well Identification
  - 5029.18 Groundwater elevation (ft amsl) measured in October 2018
  - <0.20 Lithium concentration (mg/L)
  - \* Sampled in May 2018
  - \*\* Sampled in March 2019
  - ft amsl Feet above mean sea level
  - mg/L Milligrams per liter
  - NM Groundwater Elevation Not Measured
  - NS Not Sampled
  - GWPS Groundwater Protection Standard



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Navajo County, Arizona

<b>FIGURE</b> 3-7	<b>Lithium Iso-Concentration Map for the Bottom Ash Pond</b>
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**APPENDIX A**  
**WOOD TECHNICAL MEMORANDUM DOCUMENTING AN ALTERNATIVE SOURCE**  
**DEMONSTRATION FOR FLUORIDE AT THE BAM**

# Technical Memorandum

---

<b>To:</b>	Michele Robertson, RG Pamela Norris	<b>File No:</b>	14-2018-2040
<b>From:</b>	Emily LoDolce, PE	<b>Reviewed by:</b>	Natalie Chrisman Lazarr, PE Carla Landrum, PhD
<b>Date:</b>	August 14, 2019		

**Subject: ALTERNATIVE SOURCE DEMONSTRATION  
FOR FLUORIDE AT THE BAM  
Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

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## 1.0 INTRODUCTION

This technical memorandum (memo) documents an Alternative Source Demonstration (ASD) for the Bottom Ash Monofill (BAM) located at the Arizona Public Service Company (APS) Cholla Power Plant (Cholla) in Navajo County, Arizona (the Site). The ASD was prepared pursuant to Coal Combustion Residuals (CCR) Rule requirements for groundwater monitoring and corrective action detailed in 40 Code of Federal Regulations (CFR) Sections (§) 257.90 through 257.98 (Federal Register, 2018).

Site background, CCR groundwater monitoring system, and historical operational information is presented in the *2018 Annual Groundwater Monitoring and Corrective Action Report* (Wood Environment & Infrastructure Solutions, Inc. [Wood], 2019a). The BAM is one of four CCR units at the Site. The BAM is a solid waste landfill that is used for disposal of de-watered bottom ash solids excavated from the adjacent Bottom Ash Pond (BAP). The BAM is approximately 41 acres in aerial extent and was placed into service in 1999. The BAM is constructed on the Moenkopi Formation, which has a low permeability and is not considered a usable aquifer. Therefore, the Coconino Sandstone of the C-aquifer is the uppermost water-bearing unit underlying the BAM.

Statistical evaluations of Appendix III constituent data collected from BAM compliance monitoring wells (i.e., MW-59, MW-60, and MW-61) between December 2015 and October 2018 declared statistically significant increases (SSIs) over the Background Threshold Value (BTV) for fluoride at MW-60 and MW-61 in April 2019 (Wood 2019b). The exceedances at these compliance wells were consistently no more than one tenth of a sample unit (i.e., 0.1 milligrams per liter [mg/L]) above the respective BTV (1.4 mg/L).

Pursuant to 40 CFR §257.94(e)(2) of the CCR Rule, the owner/operator can demonstrate that a source, other than the CCR unit, caused the apparent SSI within 90 days of the official SSI declaration. Potential alternative sources include sampling and analysis errors, anthropogenic causes, and statistical method inadequacies due to natural variation in groundwater quality. Each of these sources are explored within the scope of this memo. Wood’s approach to the ASD was to systematically review these potential alternative sources to evaluate if any of these causes resulted in the apparent BTV exceedances observed at BAM compliance wells.





## **2.0 EVALUATION OF POTENTIAL ALTERNATIVE SOURCES**

### **2.1 Sampling and Laboratory Causes**

To assess potential sampling and laboratory causes, Wood reviewed sampling and analysis procedures as well as the results of laboratory data validation.

Based on a review of sampling procedures, Wood concluded that APS has conducted field sampling activities in accordance with the groundwater Sampling and Analysis Plan (SAP) developed for the Site (Montgomery & Associates, 2015) to comply with the CCR Rule. On the basis that the SAP is sufficiently detailed and contains appropriate procedures for groundwater level measurement, groundwater sample collection, sample control, laboratory analysis, and data validation, no apparent sampling causes for fluoride exceedances were noted.

Wood also reviewed the results of laboratory report data validation for BAM compliance monitoring well samples collected during the period of interest (Montgomery & Associates, 2018a, 2018b). The scope of data validation activities was a US Environmental Protection Agency (USEPA) Stage 2A validation. Based on Wood's review, field and laboratory quality control data did not indicate an issue that would contribute to the BTV exceedances for fluoride observed at the BAM compliance wells.

Although Wood did not find evidence of sampling or laboratory analysis errors that would explain the declared exceedances of only 0.1 mg/L above the BTV, review of analytical results for MW-60 and MW-61 indicated that the same level of variability (i.e.  $\pm 0.1$  mg/L) occurred between original and duplicate fluoride analyses. This level of variability was not flagged during data validation because duplicate results within  $\pm 0.4$  mg/L (the analytical reporting limit) at the fluoride concentrations observed in the BAM compliance wells are considered acceptably precise per USEPA guidelines (USEPA, 2017). These observations indicate that the magnitude of the declared exceedances was too small to be reliably distinguished by the analytical method and thus limitations in analytical precision contributed to the identification of SSIs during statistical assessment of BAM groundwater data

### **2.2 Anthropogenic Sources**

To explore the possibility that the SSIs over background can be attributed to an alternative anthropogenic source, Wood reviewed historical property uses, surrounding property uses, and upgradient land uses to evaluate whether there are any potential anthropogenic sources (including and other than the BAM) for the fluoride SSIs declared at BAM compliance wells.

The surrounding land uses are undeveloped, rural land with the exception of the power plant and associated infrastructure, the closest of which is the BAP, a Cholla CCR unit and surface water impoundment hydraulically upgradient of the BAM. Both the BAP and the BAM are separated from the Coconino Sandstone C-aquifer by the Moenkopi Formation. The primary member of the Moenkopi is the Moqui, a roughly 250- to 300-foot-thick confining unit dominated by low-permeability siltstone and mudstone that acts as an aquitard and confining layer above the Coconino Sandstone C-aquifer. Groundwater levels in Site monitoring wells completed in the Coconino Sandstone rise above the screened interval of the well, indicating an upward vertical gradient in the C-aquifer. This condition is present in M-54 (the BAM background well), M-59, M-60, and M-61.

Due to the thick section of the Moqui formation separating the BAM and the BAP from the Coconino Sandstone C-aquifer in this area and the upward vertical gradient in the aquifer, there is little potential for

impacts to the C-aquifer from the BAM or BAP. On this basis, there is adequate evidence to eliminate anthropogenic sources as the cause of the BTV exceedances for fluoride downgradient of the BAM.

### **2.3 Statistical Method Cause**

A statistical method cause refers to the possibility that the method used to statistically evaluate collected data is inappropriate for the statistical comparisons performed. The method is generally inappropriate for making a defensible statistical comparison in instances where the sample data violate the method assumption(s).

Currently, the BAM groundwater monitoring system is designed to perform interwell statistical comparisons (Wood, 2019b). An interwell comparison is one where samples collected from two different geographic locations within the same water bearing unit are used to perform the statistical evaluation. One geographic location represents background, or expected, groundwater conditions if the BAM is not impacting groundwater, and the other geographic location represents groundwater conditions beneath the BAM. Sample data collected from the two geographic locations are then statistically compared to assess site compliance. The interwell comparison method assumes that background groundwater conditions are representative of groundwater conditions observed by the compliance wells. In general, interwell comparisons perform poorly in cases where it is not possible to establish an adequate and representative background location for one or more sample constituents. Factors leading to inadequate or non-representative background can include, for example, spatial heterogeneity in groundwater conditions or discontinuous lithologies between background and compliance monitoring well locations. These inadequacies can cause an interwell statistical comparison to be meaningless and result in false positive or false negative statistical results. The US EPA's Unified Guidance presents the basis for implementing the interwell statistical comparison method (US EPA, 2009).

The BTV for fluoride was developed using the data collected from background monitoring well M-54 (Figure 1). As shown in Table 1, the fluoride concentrations over time in a given compliance well are consistent within 0.1 mg/L. Minor spatial variations in groundwater quality can be due to any number of naturally-occurring phenomena, such as variations in mineralogy, preferential flowpaths, zones of recharge, etc., and would explain the spatial variation observed between the compliance wells. The C-aquifer is a deep and relatively isolated confined aquifer with an upward vertical gradient and these factors likely explain the time-stable concentrations observed in individual compliance wells.

The assessment of the natural variation causes below is rooted in the premise that spatial heterogeneity in fluoride concentrations in the C-aquifer at Cholla are not adequately represented by data collected from the background well and, as such, the underlying interwell assumptions are invalid.

### **2.4 Natural Variation Cause**

Fluoride is naturally present in sandstone aquifers in the Plateau uplands water province, where the BAM is located. In this region, minor constituents in groundwater (such as fluoride, nitrate, magnesium, silica, and iron) vary considerably between wells drilled in the same aquifer (Kister et al., 1987). To evaluate natural spatial variation as the cause of the fluoride exceedance, Wood reviewed the following lines of evidence:

- The presence of boron and sulfate in downgradient compliance wells at levels below the BTV;
- Noted differences in lithology between compliance wells; and,
- Documented variation of naturally-occurring constituents in groundwater.

#### **2.4.1 Boron and Sulfate at Levels below the BTV**

Boron and sulfate are indicators of coal ash impacts in groundwater because the two compounds are present in most coal ash and are generally non-reactive and highly mobile in aquifer environments. In a statistical analysis of detection monitoring data (Wood, 2019b), Wood used the Mann-Kendall trend test analysis to evaluate for trends in Appendix III constituents, including boron and sulfate. The results of the Mann-Kendall analysis showed insufficient evidence to identify a significant trend in boron at a  $p = 0.05$  level of significance. For sulfate, there was insufficient evidence to identify a significant trend in M-54 and M-60, and statistically significant evidence of an increasing trend in M-59 and M-61. The concentrations of these constituents continue to be below the BTVs. The lack of an identifiable trend in boron, and the inconsistency of trend in sulfate, suggests that the BAM is not the cause of the apparent exceedance for fluoride.

#### **2.4.2 Well Construction Review**

Wood reviewed the lithologic boring and well construction logs (Appendix A) for the BAM compliance wells to see if differences in lithology or construction could be attributed to the apparent exceedance. A summary of this review is presented in Table 2. The wells are all screened entirely in the Coconino Sandstone. The tops of the screens begin between 13 and 15 ft below the Moenkopi/Coconino contact surface, and each well has a 50-ft screen interval. The general description of the lithology in all wells and intervals is "fine sandstone, white, moderately lithified." However, some differences were noted:

- The cuttings from M-54 and M-59 reacted to acid, whereas the cuttings from M-60 and M-61 had no reaction. Reacting with acid indicates the presence of carbonate minerals, such as calcite ( $\text{CaCO}_3$ ), in the rock.
- The cuttings from M-54 were noted as "mostly pulverized" with chips ranging in size from 0.2 to 0.4 inches, while the cuttings from M-59, M-60, and M-61 were generally noted as "pulverized, very fine to fine sand size chips".

These minor differences in lithology noted on the boring logs are indicative of wider mineralogical variation within the sandstone and support the finding that natural spatial variations in the aquifer could have contributed to the fluoride exceedance.

#### **2.4.3 Spatial Variation in Water Quality in Sandstone Aquifers**

The uppermost aquifer at the BAM is the Coconino Sandstone unit of the C-aquifer, a very fine- to fine-grained, cross-bedded, aeolian sandstone with variable permeability (Montgomery & Associates, 2017). Wood reviewed scientific publications describing the Coconino Sandstone in search of typical background values for fluoride. The results of this review are as follows:

- The chemical quality of water in the Coconino Sandstone C-aquifer varies based on location. The spatial differences in chemical composition are coincident with variations in total dissolved solids (TDS) concentrations (Mann and Nemecek, 1983).
- The upper sequences of the Supai Formation, which underlie the Coconino Sandstone, is also a water-bearing rock unit of the C-aquifer. It contains halite and gypsum beds and is thought to contribute to elevated levels of TDS in the groundwater in the Coconino Sandstone. The Holbrook



anticline, located south of Cholla, represents an area of upward leakage of poor quality groundwater from the Supai into the overlying Coconino (Montgomery & Associates, 2017).

- Regional mapping of TDS (McGavock, 2011) shows that the BAM is located in a transitional zone, with relatively lower TDS to the south grading into relatively higher TDS as groundwater flows to the north.

Because groundwater quality in the Coconino Sandstone is documented as being spatially variable, in part due to upward leakage of saline groundwater from the upper Supai Formation, the document review supports the conclusion that natural variation in groundwater quality based on location does occur and could contribute to the declaration of a fluoride exceedance.

### 3.0 FINDINGS AND RECOMMENDATIONS

The analysis documented herein concludes that the exceedances declared at the BAM for fluoride are not attributable to leachate from the BAM. Rather, exceedances appear to be associated with spatially inconsistent groundwater chemistry in the Coconino Sandstone attributable to natural variation in the formation. Multiple lines of chemical evidence support this conclusion which are summarized below:

- **Sampling and laboratory causes:** Based on Wood's review, sampling and laboratory analysis errors do not explain the exceedances. However, limitations in the analytical precision of fluoride analyses contributed to the identification of SSIs during statistical assessment of BAM groundwater data.
- **Anthropogenic causes:** On the basis of Wood's review of anthropogenic sources, there is insufficient evidence to conclude that anthropogenic sources are the cause of BTV exceedances for fluoride downgradient of the BAM.
- **Spatial heterogeneity in groundwater conditions:** The review of historical sampling data, scientific research documenting natural spatial variability in the water quality of the Coconino Sandstone, and compliance well lithology and construction suggest spatial heterogeneity is present. Spatial heterogeneity violates the interwell comparison method assumption, thereby making this method inadequate for assessing SSIs at the BAM for fluoride. The SSI declarations, resulting from marginally higher groundwater fluoride concentrations at M-60 and M-61, are likely due to natural spatial variation in the aquifer. Using these lines of evidence, **the SSI for fluoride at the BAM is declared to be a result of natural spatial variation.**

On the premise of spatial heterogeneity, Wood recommends intrawell statistical comparisons for fluoride in monitoring wells M-60 and M-61. Intrawell comparisons are an industry-accepted and recommended alternative to interwell comparisons (U.S. EPA, 2009). Intrawell statistical comparisons are detailed in the USEPA Unified Guidance (2009) and in the Statistical Data Analysis Work Plan for Cholla (Wood, 2018a).

These lines of evidence support this ASD prepared in accordance with 40 CFR §257.95(g)(3)(ii) and support the position that the BTV exceedances for fluoride declared on April 15, 2019 were not due to a release from the BAM. Therefore, Wood recommends that detection monitoring should continue at the BAM.

#### 4.0 CERTIFICATION

By means of this certification, I certify that I have reviewed this ASD and find the information presented herein accurate and appropriate and meet the requirements of 40 CFR §257.95(g)(3)(ii).



Natalie Chrisman Lazarr

Printed Name of Registered Professional Engineer

Signature

31672  
Registration No.

Arizona  
Registration State

14 August 2019  
Date

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**TABLES**



**Table 1**  
**BAM Detection Monitoring Fluoride Data**  
**December 2015 - October 2018**

Well ID	Sample ID	Sample Date	Fluoride (mg/L)
M-54	7799_O	12/3/2015	1.2
M-54	CH-M-54-0316_O	3/10/2016	1.3
M-54	CH-CCR-M54-516_O	5/20/2016	1.4
M-54	CH-CCR-M54-816_O	8/27/2016	1.4
M-54	CH-CCR-M54-916_O	9/22/2016	1.3
M-54	CH-CCR-M54-217_O	2/21/2017	1.3
M-54	CH-CCR-M54-41117_O	4/11/2017	1.3
M-54	CH-CCR-M54-42417_O	4/24/2017	1.3
M-54	CH-CCR-M54-51917_O	5/19/2017	1.3
M-54	CH-CCR-M54-52517_O	5/25/2017	1.4
M-54	CH-CCR-M54-62917_O	6/29/2017	1.4
M-54	CH-CCR-M54-72917_O	7/29/2017	1.4
M-54	CH-CCR-M54-90517_O	9/5/2017	1.4
M-54	CH-CCR-M54-120717_O	12/7/2017	1.4
M-54	CH-CCR-M-54-52518_O	5/25/2018	1.4
M-54	CH-CCR-M-54-102618	10/26/2018	1.4
M-59	7803_O	12/3/2015	1.3
M-59	CH-M-59-0316_O	3/10/2016	1.3
M-59	CH-CCR-M59-516_O	5/20/2016	1.4
M-59	CH-CCR-M59-816_O	8/27/2016	1.4
M-59	CH-CCR-M59-916_O	9/22/2016	1.4
M-59	CH-CCR-M59-217_O	2/22/2017	1.3
M-59	CH-CCR-M59-41117_O	4/11/2017	1.3
M-59	CH-CCR-M59-42417_O	4/24/2017	1.4
M-59	CH-CCR-M59-51917_O	5/19/2017	1.4
M-59	CH-CCR-M59-52517_O	5/25/2017	1.4
M-59	CH-CCR-M59-62917_O	6/29/2017	1.5
M-59	CH-CCR-M59-72917_O	7/29/2017	1.5
M-59	CH-CCR-M59-90517_O	9/5/2017	1.4
M-59	CH-CCR-M59-120717_O	12/7/2017	1.4
M-59	CH-CCR-M-59-52518_O	5/25/2018	1.4
M-59	CH-CCR-M-59-102618	10/26/2018	1.4
M-60	7801_O	12/3/2015	1.3
M-60	CH-M-60A-0316_O	3/9/2016	1.4
M-60	CH-CCR-M60-516_O	5/20/2016	1.5
M-60	CH-CCR-M60-816_O	8/27/2016	1.5
M-60	CH-CCR-M60-916_O	9/22/2016	1.4
M-60	CH-CCR-M60-217_O	2/22/2017	1.4
M-60	CH-CCR-M60-41117_O	4/11/2017	1.4
M-60	CH-CCR-M60-42417_O	4/24/2017	1.4
M-60	CH-CCR-M60-51917_O	5/19/2017	1.4
M-60	CH-CCR-M60-52517_O	5/25/2017	1.4
M-60	CH-CCR-M60-62917_O	6/29/2017	1.5
M-60	CH-CCR-M60-72917_O	7/29/2017	1.5
M-60	CH-CCR-M60-90517_O	9/5/2017	1.5
M-60	CH-CCR-M60-120717_O	12/7/2017	1.4
M-60	CH-CCR-M-60-52518_O	5/25/2018	1.5
M-60	CH-CCR-M-60-102618	10/26/2018	1.4
M-61	7802_O	12/3/2015	1.3

**Table 1**  
**BAM Detection Monitoring Fluoride Data**  
**December 2015 - October 2018**

<b>Well ID</b>	<b>Sample ID</b>	<b>Sample Date</b>	<b>Fluoride (mg/L)</b>
M-61	CH-M-61-0316_O	3/10/2016	1.4
M-61	CH-CCR-M61-516_O	5/20/2016	1.4
M-61	CH-CCR-M61-816_O	8/27/2016	1.5
M-61	CH-CCR-M61-916_O	9/22/2016	1.4
M-61	CH-CCR-M61-217_O	2/22/2017	1.4
M-61	CH-CCR-M61-41117_O	4/11/2017	1.4
M-61	CH-CCR-M61-42417_O	4/24/2017	1.4
M-61	CH-CCR-M61-51917_O	5/19/2017	1.3
M-61	CH-CCR-M61-52517_O	5/25/2017	1.4
M-61	CH-CCR-M61-62917_O	6/29/2017	1.5
M-61	CH-CCR-M61-72917_O	7/29/2017	1.5
M-61	CH-CCR-M61-90517_O	9/5/2017	1.5
M-61	CH-CCR-M61-120717_O	12/7/2017	1.4
M-61	CH-CCR-M-61-52518_O	5/25/2018	1.5
M-61	CH-CCR-M-61-102618	10/26/2018	1.4

Acronyms:

ID = identification

mg/L = milligrams per liter

**Table 2**  
**Boring Log Comparison for Background and Compliance Wells at the BAM**

Well Completion	Depth Interval (ft bgs)				Depth below the Moenkopi/Coconino Contact (ft)				Reaction to Acid				Comments			
	M-54	M-59	M-60	M-61	M-54	M-59	M-60	M-61	M-54	M-59	M-60	M-61	M-54	M-59	M-60	M-61
Top of Screen	315	373	395	365	13	13	15	15	weak to moderate	strong	none	none	Mostly pulverized; rounded chips to 0.4 in.	Pulverized; very fine to fine sand	Mostly pulverized very fine- fine sand size	Pulverized very fine to fine sand size chips
--Screen--	320-330	380-390	400-410	370-380	18-28	18-28	20-30	20-30								
--Screen--	330-340	390-400	410-420	380-390	28-38	28-38	30-40	30-40	strong	moderate			Mostly pulverized; rounded chips to 0.2 in.	Mostly pulverized very fine - fine sand size chips	Mostly pulverized, very fine to fine sand size; round chips to 0.1 in.	
--Screen--	340-350	400-410	420-430	390-400	38-48	38-48	40-50	40-50	moderate	weak						Mostly pulverized; rounded chips to 0.3 in.
--Screen--	350-360	410-420	430-440	400-410	48-58	48-58	50-60	50-60	strong				Mostly pulverized very fine - fine sand size chips	Pulverized very fine to fine sand size chips		
Bottom of Screen	365	423	445	415	63	63	65	65		Mostly pulverized; rounded chips to 0.4 in.					Rounded chips to 0.1 in.	

Note: General description for all intervals is "fine sandstone, white, moderately lithified, buff sandstone".

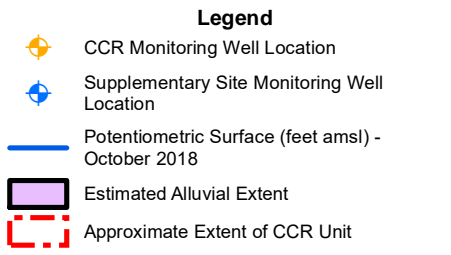
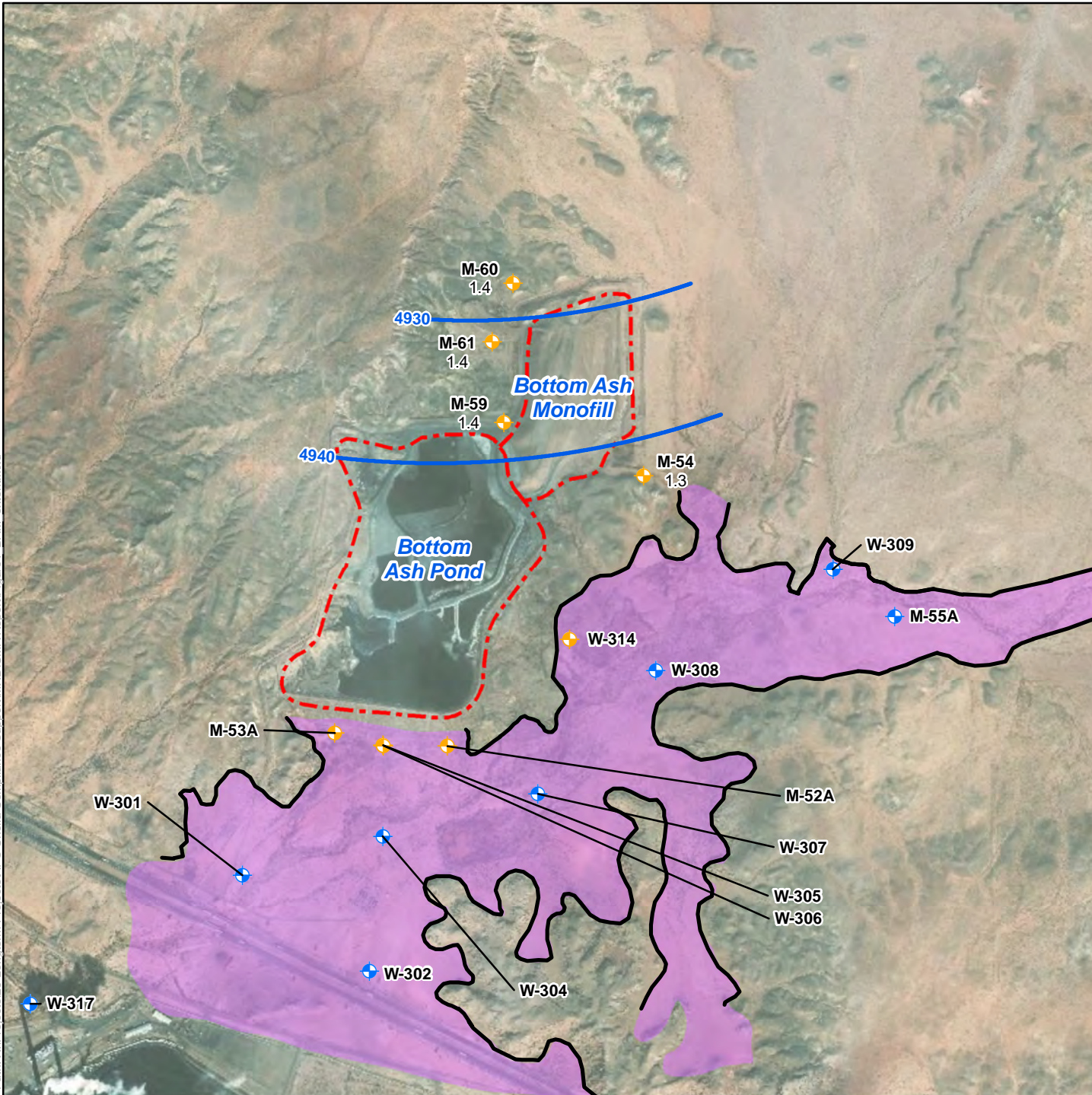
wood.

## FIGURES



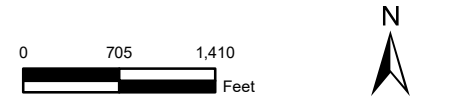


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**Notes:**

- M-60** Well Identification
- 1.4** Fluoride concentration (mg/L) measured in April 2019
- mg/L** Milligrams per liter
- amsl** Above mean sea level



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE 1</b>	<b>Bottom Ash Monofill Site Map and Fluoride Concentrations</b>
Job No. 1420182040 PM: NCL Date: 7/24/2019 Scale: 1"= 1,410'	
<small>The map shown here has been created with all due and reasonable care and is strictly for use with Wood Environment &amp; Infrastructure Solutions, Inc. Project Number 1420182040. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Wood Environment &amp; Infrastructure Solutions, Inc. assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.</small>	

**APPENDIX A**

**LITHOLOGIC LOGS AND WELL CONSTRUCTION DIAGRAMS**



**TABLE A-5. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-54 [55-918646]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DRILLING COMPANY: National Exploration Wells Pumps

LOGGED BY: C. Stielstra

DEPTH DRILLED / LAND SURFACE ELEVATION: 370.0 feet / 5068.208 feet msl

DATE DRILLED: 9/23 - 10/2/2015

CADASTRAL / NAD83 : (A-18-19)13cab / 1440088.611 N / 665508.134 E

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
<b>QUATERNARY ALLUVIUM (Qal)</b>				
0 - 10	<b>Qal</b>	alluvium; moderate brown [5YR4/4]; non-lithified to weakly lithified; reddish-brown and green siltstone; reaction to acid: weak	weathered, clayey cuttings	ARCH, Air Rotary; chips to 1 in
10 - 19	<b>Qal</b>	alluvium; moderate brown [5YR4/4]; non-lithified to weakly lithified; reddish-brown and green siltstone; fine grained sandstone; reaction to acid: weak	weathered, clayey cuttings	chips to 0.9 in
<b>TRIASSIC MOENKOPI FORMATION (TRm)</b>				
19 - 30	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown siltstone; fine grained green sandstone; reaction to acid: weak		chips to 0.7 in
30 - 40	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown siltstone; fine grained green sandstone; reaction to acid: weak to moderate	trace clay in cuttings	chips to 1.4 in
40 - 50	<b>TRm</b>	sandy siltstone; reddish brown [5YR4/3]; weakly to moderately lithified; reddish-brown siltstone; trace green siltstone; reaction to acid: weak to moderate	clayey cuttings	platy subangular-rounded chips to 0.9 in
50 - 60	<b>TRm</b>	sandy siltstone; dark reddish gray [5YR4/2]; moderately to well lithified; dark gray fine-grained sandstone; trace red and green siltstone; reaction to acid: weak		platy subangular-rounded chips to 0.5 in
60 - 70	<b>TRm</b>	sandy siltstone; yellowish red [5YR4/6], dark reddish gray [5YR4/2]; moderately to well lithified; reddish-brown siltstone; green fine-grained sandstone; dark grey, fine-grained sandstone; reaction to acid: weak to moderate	trace clay in cuttings	platy subangular-rounded chips to 0.9 in
70 - 80	<b>TRm</b>	sandy siltstone; moderate brown [5YR4/4]; weakly to moderately lithified; reddish-brown siltstone; trace green siltstone; reaction to acid: moderate to strong	trace clay in cuttings	platy subangular chips to 0.9 in
80 - 90	<b>TRm</b>	sandy siltstone; yellowish red [5YR4/6]; weakly to moderately lithified; reddish-brown siltstone; brown silty sandstone; reaction to acid: strong	trace clay in cuttings	platy subangular chips to 0.7 in

**TABLE A-5. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-54 [55-918646]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
90 - 100	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: moderate to strong		platy subangular chips to 0.6 in
100 - 110	TRm	sandy siltstone; moderate brown [5YR4/4]; moderately to well lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: moderate to strong		platy subangular chips to 0.6 in
110 - 120	TRm	sandy siltstone; yellowish red [5YR4/6]; moderately to moderately lithified; reddish-brown and green siltstone; reaction to acid: strong		platy subangular chips to 0.8 in
120 - 130	TRm	sandy siltstone; yellowish red [5YR4/6]; moderately to moderately lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: moderate	trace clay in cuttings	platy subangular chips to 0.6 in
130 - 140	TRm	sandy siltstone; yellowish red [5YR4/6]; moderately to moderately lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: weak to moderate	trace clay in cuttings	platy subangular chips to 0.7 in
140 - 150	TRm	sandy siltstone; yellowish red [5YR4/6], dark reddish brown [5YR3/2]; moderately to well lithified; reddish-brown and green siltstone; dark gray fine-grained sandstone; trace gypsum; reaction to acid: weak to moderate	trace clay in cuttings	platy subangular-angular chips to 0.9 in
150 - 160	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: weak to moderate		platy subangular-angular chips to 0.8 in
160 - 170	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to moderately lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: moderate		platy subangular-angular chips to 0.7 in
170 - 180	TRm	sandy siltstone; very dark brown [5YR2.5/2]; moderately to well lithified; dark gray fine-grained sandstone; trace fine green sandstone; reaction to acid: moderate to strong		platy rounded chips to 0.6 in
180 - 190	TRm	sandy siltstone; dark reddish brown [5YR3/4]; moderately to well lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: weak to moderate		platy subangular-angular chips to 0.6 in



**TABLE A-5. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-54 [55-918646]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
190 - 200	TRm	sandy siltstone; dark reddish brown [5YR3/4]; moderately to well lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: weak to moderate		platy subangular-angular chips to 0.9 in
200 - 210	TRm	sandy siltstone; dark reddish brown [5YR3/4]; moderately to well lithified; reddish-brown and green siltstone; trace gypsum; reaction to acid: weak to moderate		platy subangular-angular chips to 0.8 in
210 - 220	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown and green siltstone; gypsum; reaction to acid: moderate to strong		platy subangular-angular chips to 0.9 in
220 - 230	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown and green siltstone; gypsum; reaction to acid: moderate to strong		platy subangular-angular chips to 0.9 in
230 - 240	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown siltstone; dark gray fine-grained sandstone; trace gypsum; reaction to acid: moderate to strong		platy subangular-angular chips to 0.7 in
240 - 250	TRm	sandy siltstone; dark reddish brown [5YR3/3]; well to well lithified; reddish-brown siltstone; dark gray fine-grained sandstone; trace gypsum; reaction to acid: strong		platy subangular-angular chips to 0.8 in
250 - 260	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; reddish-brown siltstone; dark gray fine-grained sandstone; trace gypsum; reaction to acid: strong		platy subangular-angular chips to 0.7 in
260 - 270	TRm	sandy siltstone; dark reddish brown [5YR3/3]; well to well lithified; fine dark reddish brown sandstone; reddish siltstone; trace tan sandstone; reaction to acid: moderate to strong		platy rounded chips to 0.7 in
270 - 280	TRm	sandy siltstone; moderate brown [5YR4/4]; well to well lithified; fine dark reddish brown sandstone; reaction to acid: moderate to strong		platy rounded chips to 0.5 in
280 - 290	TRm	sandy siltstone; moderate brown [5YR4/4]; well to well lithified; fine dark reddish brown sandstone; reaction to acid: weak to moderate		platy rounded chips to 0.6 in

**TABLE A-5. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-54 [55-918646]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
290 - 302	TRm	sandy siltstone; dark reddish brown [5YR3/3], moderate brown [5YR4/4]; weakly to moderately lithified; fine dark reddish brown sandstone; reddish siltstone; trace green siltstone; reaction to acid: moderate to strong		platy subrounded-angular chips to 0.9 in
<b>PERMIAN COCONINO SANDSTONE (Pc)</b>				
302 - 310	Pc	fine sandstone; gray [5YR5/1], dark reddish brown [5YR3/3]; weakly to well lithified; fine reddish brown sandstone; fine gray sandstone; very fine buff sandstone; reaction to acid: weak to moderate		platy subrounded-subangular chips to 0.9 in
310 - 320	Pc	fine sandstone; light reddish brown [5YR6/3]; weakly to weakly lithified; very fine buff/tan sandstone; trace red clay; reaction to acid: weak to moderate		mostly pulverized; rounded chips to 0.4 in
320 - 330	Pc	fine sandstone; light yellowish brown [2.5Y6/3]; weakly to weakly lithified; very fine buff/tan sandstone; reaction to acid: weak to moderate		mostly pulverized; rounded chips to 0.4 in
330 - 340	Pc	fine sandstone; light gray [2.5Y7/2]; weakly to weakly lithified; very fine buff/tan sandstone; reaction to acid: moderate to strong		mostly pulverized; rounded chips to 0.2 in
340 - 350	Pc	fine sandstone; light gray [2.5Y7/2]; weakly to weakly lithified; very fine buff/tan sandstone; reaction to acid: moderate		mostly pulverized; rounded chips to 0.3 in
350 - 360	Pc	fine sandstone; light gray [2.5Y7/1]; weakly to weakly lithified; very fine buff/tan sandstone; reaction to acid: strong		mostly pulverized; rounded chips to 0.3 in
360 - 370	Pc	fine sandstone; light gray [2.5Y7/1]; weakly to weakly lithified; very fine buff/tan sandstone; reaction to acid: strong		mostly pulverized; rounded chips to 0.4 in



**TABLE A-9. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-59 [55-918647]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DRILLING COMPANY: National Exploration Wells Pumps

LOGGED BY: J. Laney

DEPTH DRILLED / LAND SURFACE ELEVATION: 425.0 feet / 5133.863 feet msl

DATE DRILLED: 10/14 - 10/21/2015

CADASTRAL / NAD83 : (A-18-19)13cbb / 1440604.729 N / 664161.355 E

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
<b>QUATERNARY ALLUVIUM (Qal)</b>				
0 - 13	<b>Qal</b>	alluvium; brownish gray [5YR4/1]; 60% sand (subrounded, fine to coarse); 30% gravel (subangular to rounded, consisting of sandstone and chert); 10% silt; reaction to acid: weak		ARCH, Air Rotary; poorly sorted
<b>TRIASSIC MOENKOPI FORMATION (TRm)</b>				
13 - 20	<b>TRm</b>	sandy siltstone; moderate brown [5YR4/4]; non-lithified; 90% reddish brown siltstone; 10% fine-grained gray sandstone; reaction to acid: weak		subangular chips to 1.2 in
20 - 30	<b>TRm</b>	sandy siltstone; moderate brown [5YR4/4]; moderately to well lithified; 90% reddish brown siltstone; 10% fine-grained gray sandstone; reaction to acid: weak		subangular chips to 1.2 in
30 - 40	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3], light greenish gray [5BG7/1]; moderately to well lithified; 60% reddish brown siltstone; 40% blue gray siltstone; platy; reaction to acid: weak		subangular chips to 0.8 in
40 - 50	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3], light greenish gray [5BG7/1]; weakly lithified; 50% reddish brown siltstone; 50% blue gray siltstone; platy; reaction to acid: weak		subangular chips to 0.8 in
50 - 60	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3], light greenish gray [5BG7/1]; weakly lithified; 50% reddish brown siltstone; 50% blue gray siltstone; platy; reaction to acid: weak		subangular chips to 1 in
60 - 70	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3], light greenish gray [5BG7/1]; weakly lithified; 80% reddish brown siltstone; 20% blue gray siltstone; platy; reaction to acid: weak		subangular chips to 1 in
70 - 80	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3]; weakly lithified; 60% reddish brown siltstone; 40% blue gray sandstone; platy; reaction to acid: weak		subrounded to subangular chips to 1.2 in
80 - 90	<b>TRm</b>	sandy siltstone; gray [5YR5/1]; moderately to well lithified; reddish gray medium to fine-grained sandstone; reaction to acid: none		subrounded chips to 0.4 in

**TABLE A-9. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-59 [55-918647]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
90 - 100	TRm	sandy siltstone; gray [5YR5/1], dark reddish brown [5YR3/4]; weakly to well lithified; reddish gray medium to fine-grained sandstone; reddish brown siltstone; trace blue green siltstone; platy; reaction to acid: none		subrounded to subangular chips to 0.8 in
100 - 110	TRm	sandy siltstone; gray [5YR5/1]; moderately to well lithified; reddish gray medium to fine-grained sandstone; reaction to acid: none		subrounded chips to 0.4 in
110 - 120	TRm	sandy siltstone; dark reddish brown [5YR3/3], light greenish gray [5BG7/1]; weakly lithified; 50% reddish brown siltstone; 50% blue gray siltstone; platy; reaction to acid: none		subangular chips to 0.8 in
120 - 130	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; weakly to moderately lithified; 70% reddish brown siltstone; 30% blue gray siltstone; platy; reaction to acid: weak		subangular chips to 0.8 in
130 - 140	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; weakly to moderately lithified; 90% reddish brown siltstone; 10% blue gray siltstone; trace gypsum; platy; reaction to acid: moderate	clayey cuttings	subangular chips to 0.8 in
140 - 150	TRm	sandy siltstone; light greenish gray [5BG7/1], gray [5YR5/1]; weakly to moderately lithified; 60% reddish brown siltstone; 40% blue gray siltstone; trace gypsum; reaction to acid: weak		subangular chips to 0.4 in
150 - 160	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; weakly to moderately lithified; 90% reddish brown siltstone; 5% blue gray siltstone; 5% gypsum; platy; reaction to acid: none		subangular to subrounded chips to 0.8 in
160 - 170	TRm	sandy siltstone; light greenish gray [5BG7/1], dark reddish brown [5YR3/3]; weakly to moderately lithified; 40% reddish brown siltstone; 60% blue gray sandstone; platy; reaction to acid: weak		subangular chips to 0.4 in
170 - 180	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; weakly lithified; 80% reddish brown siltstone; 20% blue gray siltstone; platy; reaction to acid: none	clayey cuttings	subangular chips to 0.6 in

**TABLE A-9. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-59 [55-918647]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
180 - 190	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; weakly to moderately lithified; 80% reddish brown siltstone; 20% blue gray siltstone; platy; reaction to acid: none		subangular chips to 0.4 in
190 - 200	TRm	sandy siltstone; light greenish gray [5BG7/1], dark reddish brown [5YR3/4]; moderately lithified; 80% reddish brown siltstone; 20% blue gray siltstone; trace gypsum; platy; reaction to acid: none		subangular chips to 0.4 in
200 - 210	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; moderately lithified; 80% reddish brown siltstone; 20% blue gray siltstone; trace gypsum; platy; reaction to acid: none		subangular chips to 0.8 in
210 - 220	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; moderately lithified; 80% reddish brown siltstone; 20% blue gray siltstone; trace gypsum; platy; reaction to acid: weak		subangular chips to 0.4 in
220 - 230	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; moderately lithified; 80% reddish brown siltstone; 20% blue gray siltstone; trace gypsum; platy; reaction to acid: none		subangular chips to 0.4 in
230 - 240	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; moderately to well lithified; 80% reddish brown siltstone; 15% blue gray sandstone (very fine to fine-grained); 5% gypsum needle crystals; reaction to acid: weak		subangular to subrounded chips to 0.4 in
240 - 250	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; moderately to well lithified; 70% reddish brown sandstone (very fine to fine-grained); 30% blue gray sandstone (very fine to fine-grained); trace gypsum needle crystals; reaction to acid: weak		subangular chips to 0.4 in
250 - 260	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; moderately to well lithified; 80% reddish brown sandstone (very fine to fine-grained); 15% blue gray sandstone (very fine to fine-grained); 5% gypsum needle crystals; reaction to acid: moderate		subangular chips to 0.4 in
260 - 270	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1]; moderately to well lithified; 45% reddish brown sandstone (very fine to fine-grained); 45% reddish brown siltstone; 10% blue gray sandstone (very fine to fine-grained); trace gypsum; reaction to acid: strong		subangular chips to 0.4 in

**TABLE A-9. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-59 [55-918647]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
270 - 280	TRm	sandy siltstone; dark reddish brown [5YR3/4], light gray [2.5Y7/2]; well lithified; reddish brown siltstone and sandstone; greenish-tan fine-grained sandstone; reaction to acid: moderate		subangular to subrounded chips to 0.4 in
280 - 290	TRm	sandy siltstone; dark reddish brown [5YR3/4], light gray [2.5Y7/2]; moderately to well lithified; 80% reddish brown siltstone; 20% red to green very fine-grained sandstone; reaction to acid: strong		subangular chips to 0.4 in
290 - 300	TRm	sandy siltstone; dark reddish brown [5YR3/4], light gray [2.5Y7/2]; moderately to well lithified; 80% reddish brown siltstone; 20% green-tan grained sandstone (very fine to fine-grained); reaction to acid: strong		subangular chips to 0.4 in
300 - 310	TRm	sandy siltstone; dark reddish brown [5YR3/4]; moderately to well lithified; 50% reddish brown siltstone; 50% reddish brown sandstone (very fine to fine-grained); reaction to acid: weak		subangular chips to 0.4 in
310 - 320	TRm	sandy siltstone; dark reddish brown [5YR3/4], light greenish gray [5BG7/1], light brown [5YR6/4]; moderately to well lithified; 80% reddish brown sandstone (very fine to fine-grained); 15% blue gray sandstone (very fine to fine-grained); 5% tan sandstone (fine-grained); reaction to acid: moderate		subrounded chips to 0.4 in
320 - 330	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; dark reddish brown sandstone (fine-grained); reaction to acid: none		subrounded chips to 0.4 in
330 - 340	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; dark reddish brown sandstone (fine-grained); reaction to acid: none		subrounded chips to 0.4 in
340 - 350	TRm	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; dark reddish brown sandstone (fine-grained); trace light brown sandstone; reaction to acid: none		subrounded chips to 0.4 in
350 - 360	TRm	sandy siltstone; dark reddish brown [5YR3/3], gray [5YR5/1]; moderately to well lithified; dark reddish brown sandstone (very fine to fine-grained); reaction to acid: none		subangular to angular chips to 0.4 in

**TABLE A-9. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-59 [55-918647]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
<b>PERMIAN COCONINO SANDSTONE (Pc)</b>				
360 - 370	<b>Pc</b>	fine sandstone; pale red [2.5YR6/2]; well lithified; greyish tan sandstone (very fine to fine-grained); reaction to acid: weak		subangular chips to 0.6 in
370 - 380	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine to fine-grained, rounded, well sorted quartz grains); reaction to acid: strong		mostly pulverized to fine sand; trace rounded chips to 0.2 in
380 - 390	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine to fine-grained, rounded, well sorted quartz grains); reaction to acid: strong		pulverized; very fine to fine sand
390 - 400	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine to fine-grained, rounded, well sorted quartz grains); reaction to acid: moderate		mostly pulverized to fine sand; trace rounded chips to 0.2 in
400 - 410	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine to fine-grained, rounded, well sorted quartz grains); reaction to acid: weak		mostly pulverized to fine sand; trace rounded chips to 0.2 in
410 - 420	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine to fine-grained, rounded, well sorted quartz grains); reaction to acid: weak		mostly pulverized to fine sand; trace rounded chips to 0.2 in
420 - 425	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine to fine-grained, rounded, well sorted quartz grains); reaction to acid: weak		mostly pulverized to fine sand; trace rounded chips to 0.2 in

**TABLE A-10. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-60 [55-918649]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DRILLING COMPANY: National Exploration Wells Pumps

LOGGED BY: J. Laney

DEPTH DRILLED / LAND SURFACE ELEVATION: 450.0 feet / 5148.694 feet msl

DATE DRILLED: 10/21 - 11/1/2015

CADASTRAL / NAD83 : (A-18-19)13bac / 1441947.886 N / 664249.994 E

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
<b>QUATERNARY ALLUVIUM (Qal)</b>				
0 - 14	<b>Qal</b>	alluvium; grayish orange [10YR7/4]; non-lithified to non lithified; 60% medium to high plasticity clay; 20% very fine to coarse subrounded sand; 20% gravel consisting of sandstone and chert; CL sandy loam clay with gravel; reaction to acid: moderate		ARCH, Air Rotary; subrounded-subangular chips to 0.8 in
<b>TRIASSIC MOENKOPI FORMATION (TRm)</b>				
14 - 20	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; 50% red brown siltstone; 40% blue gray siltstone; 10% gray fine-grained sandstone; reaction to acid: strong		subangular chips to 0.8 in
20 - 30	<b>TRm</b>	sandy siltstone; dark reddish brown [5YR3/3]; moderately to well lithified; 50% red brown siltstone; 40% blue gray siltstone; 10% gray fine-grained sandstone; reaction to acid: strong		subangular chips to 0.8 in
30 - 40	<b>TRm</b>	sandy siltstone; dark reddish brown [2.5YR3/3]; moderately to well lithified; 90% red brown siltstone; 10% blue gray siltstone; platy clayey cuttings; reaction to acid: strong		subangular chips to 0.4 in
40 - 50	<b>TRm</b>	sandy siltstone; dark reddish brown [2.5YR3/3]; weakly to moderately lithified; 70% red brown siltstone; 30% blue gray siltstone; platy; reaction to acid: strong		subangular chips to 0.4 in
50 - 60	<b>TRm</b>	sandy siltstone; dark reddish brown [2.5YR3/3]; weakly to moderately lithified; 70% red brown siltstone; 30% blue gray siltstone; platy; reaction to acid: moderate		subangular chips to 0.6 in
60 - 70	<b>TRm</b>	sandy siltstone; dark reddish brown [2.5YR3/3]; weakly to moderately lithified; 80% red brown siltstone; 20% blue gray siltstone; platy; reaction to acid: moderate		subangular chips to 0.4 in
70 - 80	<b>TRm</b>	sandy siltstone; dark reddish gray [2.5YR4/1]; well lithified; Dark gray fine- to medium-grained sandstone; reaction to acid: moderate		rounded-subrounded chips to 0.8 in
80 - 90	<b>TRm</b>	sandy siltstone; weak red [2.5YR4/2]; moderately to well lithified; Reddish gray fine- to medium-grained sandstone; reaction to acid: moderate		subrounded-subangular chips to 0.4 in



**TABLE A-10. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-60 [55-918649]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
90 - 100	TRm	sandy siltstone; weak red [2.5YR4/2]; moderately to well lithified; 90% red gray to blue gray fine- to medium-grained sandstone; 10% red brown siltstone; reaction to acid: moderate		subrounded-subangular chips to 0.8 in
100 - 110	TRm	sandy siltstone; dark reddish gray [2.5YR4/1]; well lithified; Dark gray fine- to medium-grained sandstone; reaction to acid: moderate		rounded-subrounded chips to 0.4 in
110 - 120	TRm	sandy siltstone; dark reddish gray [2.5YR4/1]; well lithified; Dark gray fine- to medium-grained sandstone; reaction to acid: moderate		rounded-subrounded chips to 0.4 in
120 - 130	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], dark reddish gray [2.5YR4/1]; moderately to well lithified; 80% red brown siltstone; 20% dark gray fine- to medium-grained sandstone; reaction to acid: moderate		subangular-subrounded chips to 0.8 in
130 - 140	TRm	sandy siltstone; dark reddish gray [2.5YR4/1]; well lithified; Dark gray fine- to medium-grained sandstone; reaction to acid: strong		rounded-subrounded chips to 0.6 in
140 - 150	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately to well lithified; 60% red brown / blue gray siltstone; 40% red brown fine-grained sandstone; platy siltstone; reaction to acid: weak		subangular chips to 0.8 in
150 - 160	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately to well lithified; 50% red brown siltstone; 50% red brown / blue gray fine- to medium-grained sandstone; platy siltstone; reaction to acid: weak		subangular chips to 0.8 in
160 - 170	TRm	sandy siltstone; weak red [2.5YR5/2], light blue green [5BG6/6]; moderately to well lithified; 60% red gray / blue gray fine-grained sandstone; 40% red brown siltstone; reaction to acid: weak		subangular chips to 0.6 in
170 - 180	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 90% red siltstone; 10% blue gray fine-grained sandstone; trace gypsum; reaction to acid: moderate		subangular chips to 0.6 in
180 - 190	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], dark reddish gray [2.5YR4/1]; moderately to well lithified; 70% red brown siltstone; 30% dark gray fine- to medium-grained sandstone; reaction to acid: weak		subangular-subrounded chips to 0.4 in

**TABLE A-10. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-60 [55-918649]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
190 - 200	TRm	sandy siltstone; dark reddish gray [2.5YR4/1]; moderately to well lithified; Dark gray / red gray fine to medium-grained sandstone; trace gypsum; reaction to acid: weak		subrounded chips to 0.4 in
200 - 210	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately to well lithified; 60% red brown siltstone; 40% red brown / blue gray fine-grained sandstone; platy siltstone; reaction to acid: none		subangular chips to 0.6 in
210 - 220	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately to well lithified; 60% red brown siltstone; 40% red brown / blue gray fine-grained sandstone; and trace gypsum; reaction to acid: none		subangular chips to 0.6 in
220 - 230	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately to well lithified; 60% red brown siltstone; 40% red brown / blue gray fine-grained sandstone; trace gypsum; reaction to acid: none		subangular chips to 0.6 in
230 - 240	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately to well lithified; 60% red brown / blue gray fine-grained sandstone; 40% red brown siltstone; reaction to acid: none		subangular chips to 0.6 in
240 - 250	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 70% red brown siltstone; 30% blue gray siltstone; trace gypsum; platy; reaction to acid: none		subangular chips to 0.6 in
250 - 260	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 60% blue gray siltstone; 35% red brown siltstone; 5% gypsum needle crystals; platy; reaction to acid: weak		subangular chips to 0.6 in
260 - 270	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 80% red brown siltstone; 15% blue gray siltstone; 5% gypsum needle crystals; platy; reaction to acid: moderate		subangular chips to 0.8 in
270 - 280	TRm	sandy siltstone; dark reddish brown [2.5YR3/3]; moderately lithified; 95% red brown siltstone; 5% gypsum needle crystals; platy; reaction to acid: weak		subangular chips to 0.8 in

**TABLE A-10. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-60 [55-918649]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
280 - 290	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 90% red brown siltstone; 10% blue gray siltstone; trace gypsum; platy; reaction to acid: weak		subangular chips to 0.4 in
290 - 300	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately to well lithified; 80% red brown siltstone; 20% blue gray siltstone; platy; reaction to acid: weak		subangular chips to 0.4 in
300 - 310	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 90% red brown siltstone; 10% blue gray siltstone; platy; reaction to acid: moderate		subangular chips to 0.8 in
310 - 320	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 90% red brown siltstone; 10% blue gray siltstone; platy; reaction to acid: weak		subangular chips to 0.8 in
320 - 330	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], reddish gray [2.5YR6/1]; moderately to well lithified; 90% red brown siltstone; 10% gray fine-grained sandstone; reaction to acid: weak		subangular chips to 0.4 in
330 - 340	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], reddish gray [2.5YR6/1]; moderately to well lithified; 80% red brown siltstone; 20% gray to blue gray fine-grained sandstone; reaction to acid: weak		subangular chips to 0.4 in
340 - 350	TRm	sandy siltstone; reddish brown [2.5YR4/4]; well lithified; Red brown fine- to medium-grained sandstone; reaction to acid: weak		subrounded chips to 0.2 in
350 - 360	TRm	sandy siltstone; reddish brown [2.5YR4/4]; well lithified; Red brown fine- to medium-grained sandstone; reaction to acid: weak		subrounded chips to 0.6 in
360 - 370	TRm	sandy siltstone; light brown [5YR5/6], dark reddish brown [2.5YR3/4]; moderately to well lithified; 60% brown fine-grained sandstone; 40% dark red brown siltstone; reaction to acid: none		subrounded-subangular chips to 0.6 in
370 - 378	TRm	sandy siltstone; dark reddish brown [2.5YR3/4]; moderately to well lithified; Dark red brown very fine- to fine-grained sandstone; reaction to acid: none		subangular chips to 0.4 in

**TABLE A-10. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-60 [55-918649]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
378 - 380	<b>TRm</b>	sandy siltstone; gray [5YR6/1]; moderately to well lithified; Grayish tan very fine- to fine-grained sandstone; reaction to acid: none		subangular chips to 0.6 in
<b>PERMIAN COCONINO SANDSTONE (Pc)</b>				
380 - 390	<b>Pc</b>	fine sandstone; pale yellow [2.5Y7/3]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted quartz grains); reaction to acid: none		pulverized very fine-fine sand size chips
390 - 400	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted quartz grains); reaction to acid: none		mostly pulverized very fine-fine sand size
400 - 410	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted quartz grains); reaction to acid: none		rounded chips to 0.1 in
410 - 420	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted quartz grains); reaction to acid: none		mostly pulverized very fine-fine sand size chips
420 - 430	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted quartz grains); reaction to acid: none		rounded chips to 0.1 in
430 - 440	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted quartz grains); reaction to acid: none		mostly pulverized very fine-fine sand size
440 - 450	<b>Pc</b>	fine sandstone; light gray [2.5Y7/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted quartz grains); reaction to acid: none		rounded chips to 0.1 in

**TABLE A-11. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-61 [55-918648]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DRILLING COMPANY: National Exploration Wells Pumps

LOGGED BY: J. Laney

DEPTH DRILLED / LAND SURFACE ELEVATION: 420.0 feet / 5124.949 feet msl

DATE DRILLED: 11/2 - 11/17/2015

CADASTRAL / NAD83 : (A-18-19)13bca / 1441383.546 N / 664047 E

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
<b>QUATERNARY ALLUVIUM (Qal)</b>				
0 - 5	<b>Qal</b>	alluvium; pink [7.5YR7/3]; non-lithified; 60% fine to coarse-grained sand; 20% rounded to subrounded gravel, up to 2.4 in., consisting of sandstone and chert; 20% low plasticity silt; reaction to acid: moderate		ARCH, Air Rotary
<b>TRIASSIC MOENKOPI FORMATION (TRm)</b>				
5 - 10	<b>TRm</b>	sandy siltstone; reddish brown [2.5YR4/3], light blue green [5BG6/6]; weakly to moderately lithified; 70% red brown sandy siltstone; 30% blue gray sandy siltstone; clayey cuttings; reaction to acid: moderate	weathered Moenkopi Fm.	subangular chips to 1.6 in
10 - 20	<b>TRm</b>	sandy siltstone; light blue green [5BG6/6], reddish brown [2.5YR4/3]; moderately lithified; 80% blue gray sandy siltstone; 20% red brown siltstone; reaction to acid: strong		subangular to subrounded chips to 0.8 in
20 - 30	<b>TRm</b>	sandy siltstone; light blue green [5BG6/6], reddish brown [2.5YR4/3]; moderately lithified; 80% blue gray sandy siltstone; 20% red brown siltstone; reaction to acid: strong		subangular to subrounded chips to 0.8 in
30 - 40	<b>TRm</b>	sandy siltstone; dark reddish brown [2.5YR3/4]; weakly lithified; red brown siltstone; reaction to acid: strong		subangular chips to 0.4 in
40 - 50	<b>TRm</b>	sandy siltstone; weak red [2.5YR4/2]; moderately to well lithified; 60% red brown fine- to medium-grained sandstone; 40% red brown siltstone; reaction to acid: weak		subrounded to subangular chips to 0.4 in
50 - 60	<b>TRm</b>	sandy siltstone; weak red [2.5YR4/2]; moderately to well lithified; reddish gray fine- to medium-grained sandstone; reaction to acid: weak		subrounded to subangular chips to 0.4 in
60 - 70	<b>TRm</b>	sandy siltstone; olive gray [5Y4/2]; moderately to well lithified; olive gray fine- to medium-grained sandstone; reaction to acid: moderate		subrounded to subangular chips to 0.4 in
70 - 80	<b>TRm</b>	sandy siltstone; weak red [2.5YR4/2]; moderately to well lithified; dark red gray fine- to medium-grained sandstone; reaction to acid: weak		subrounded to subangular chips to 0.4 in

**TABLE A-11. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-61 [55-918648]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
80 - 90	TRm	sandy siltstone; reddish brown [2.5YR4/3], light blue green [5BG6/6]; moderately to well lithified; 80% dark red gray / blue gray fine- to medium-grained sandstone; 20% blue gray siltstone; reaction to acid: weak		round to subangular chips to 0.8 in
90 - 100	TRm	sandy siltstone; dark reddish brown [2.5YR3/4]; weakly to moderately lithified; red brown sandy siltstone; reaction to acid: weak		subangular chips to 0.4 in
100 - 110	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], weak red [2.5YR4/2]; moderately to well lithified; 50% red brown siltstone; 50% dark red gray fine- to medium-grained sandstone; reaction to acid: weak		subangular to angular chips to 0.8 in
110 - 120	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately to well lithified; 50% dark red brown fine- to medium-grained sandstone; 40% red brown sandy siltstone; 10% blue gray siltstone; reaction to acid: strong		subangular to subrounded chips to 0.4 in
120 - 130	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 90% red brown siltstone; 10% blue gray siltstone; reaction to acid: strong		subangular chips to 0.4 in
130 - 140	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 60% red brown to red gray siltstone; 40% blue gray siltstone; reaction to acid: strong		subangular chips to 0.4 in
140 - 150	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 80% red brown siltstone; 15% blue gray siltstone; 5% gypsum; reaction to acid: moderate		subrounded to subangular chips to 0.4 in
150 - 160	TRm	sandy siltstone; weak red [2.5YR4/2]; well lithified; dark gray fine- to medium-grained sandstone; reaction to acid: moderate		subrounded chips to 0.8 in
160 - 170	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 90% red brown siltstone; 10% blue gray siltstone; trace gypsum; platy siltstone; reaction to acid: moderate		subangular chips to 0.6 in
170 - 180	TRm	sandy siltstone; dark reddish brown [2.5YR3/3]; moderately lithified; 90% red brown siltstone; 10% blue gray sandy siltstone; platy; reaction to acid: moderate		subangular chips to 0.6 in



**TABLE A-11. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-61 [55-918648]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

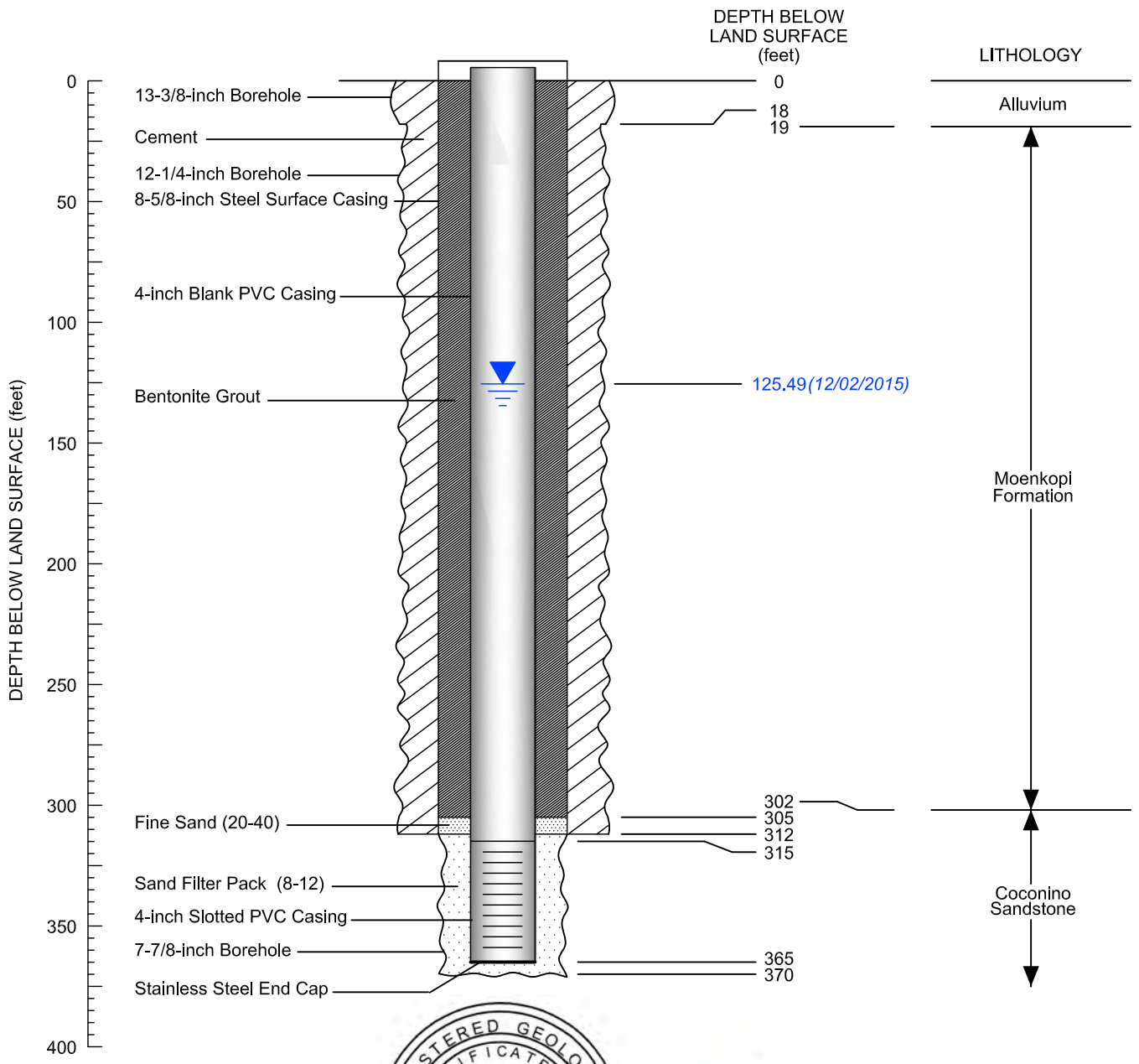
DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
180 - 190	TRm	sandy siltstone; dark reddish brown [2.5YR3/3], light blue green [5BG6/6]; moderately lithified; 60% red brown siltstone; 40% blue gray siltstone; trace gypsum; reaction to acid: moderate		subangular chips to 0.4 in
190 - 200	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 50% red brown siltstone; 50% blue gray siltstone; trace gypsum; platy; reaction to acid: moderate		subangular chips to 0.4 in
200 - 210	TRm	sandy siltstone; weak red [2.5YR4/2]; well lithified; dark red brown fine-grained sandstone; trace gypsum; reaction to acid: moderate		subrounded to subangular chips to 0.6 in
210 - 220	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 80% red brown siltstone; 20% blue gray siltstone; trace gypsum; platy; reaction to acid: moderate		subangular chips to 0.6 in
220 - 230	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 80% red brown siltstone; 20% blue gray siltstone; trace gypsum; reaction to acid: moderate		
230 - 240	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 75% red brown siltstone; 20% blue gray siltstone; 5% gypsum needle crystals; platy; reaction to acid: strong		subangular chips to 0.4 in
240 - 250	TRm	sandy siltstone; light blue green [5BG6/6], dark reddish brown [2.5YR3/4]; moderately lithified; 60% blue gray siltstone; 40% red brown siltstone; trace gypsum; reaction to acid: strong		subangular chips to 0.4 in
250 - 260	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 50% red brown siltstone; 25% blue gray siltstone; 20% blue gray fine-grained sandstone; 5% gypsum; reaction to acid: strong		subangular chips to 0.4 in
260 - 270	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], light blue green [5BG6/6]; moderately lithified; 90% red brown siltstone; 10% blue gray fine-grained sandstone; trace gypsum; reaction to acid: strong		subangular chips to 0.4 in

**TABLE A-11. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-61 [55-918648]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
270 - 280	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], reddish gray [2.5YR6/1]; moderately to well lithified; 80% red brown siltstone; 20% gray fine-grained sandstone; reaction to acid: strong		subangular chips to 0.4 in
280 - 290	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], reddish gray [2.5YR6/1]; moderately to well lithified; 90% red brown siltstone; 10% gray fine-grained sandstone; reaction to acid: moderate		subangular chips to 0.6 in
290 - 300	TRm	sandy siltstone; dark reddish brown [2.5YR3/4], reddish gray [2.5YR6/1]; moderately to well lithified; 90% red brown siltstone; 10% gray fine-grained sandstone; reaction to acid: moderate		subangular chips to 0.6 in
300 - 310	TRm	sandy siltstone; reddish brown [2.5YR4/3], light gray [2.5Y7/2], light blue green [5BG6/6]; moderately to well lithified; 50% red brown sandy siltstone; 40% light brown fine-grained sandstone; 10% blue gray fine-grained sandstone; reaction to acid: moderate		subangular to subrounded chips to 0.4 in
310 - 320	TRm	sandy siltstone; reddish brown [2.5YR4/3]; well lithified; red brown fine-grained sandstone; reaction to acid: none		subrounded chips to 0.3 in
320 - 330	TRm	sandy siltstone; reddish brown [2.5YR4/3]; well lithified; red brown fine-grained sandstone; reaction to acid: none		subrounded chips to 0.3 in
330 - 340	TRm	sandy siltstone; reddish brown [2.5YR4/3]; well lithified; red brown fine-grained sandstone; reaction to acid: none		subrounded chips to 0.4 in
340 - 348	TRm	sandy siltstone; dark reddish brown [2.5YR3/4]; well lithified; dark red brown fine- to very fine-grained sandstone; reaction to acid: none		subangular to subrounded chips to 0.4 in
348 - 350	TRm	sandy siltstone; gray [5YR6/1]; well lithified; grayish tan very fine- to fine-grained sandstone; reaction to acid: none		subangular chips to 0.6 in
<b>PERMIAN COCONINO SANDSTONE (Pc)</b>				
350 - 360	Pc	fine sandstone; pale yellow [2.5Y7/3]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted/uniform quartz grains); reaction to acid: none		mostly pulverized, very fine to fine sand size; round chips to 0.3 in

**TABLE A-11. LITHOLOGIC DESCRIPTIONS FOR  
DRILL CUTTINGS FROM MONITOR WELL M-61 [55-918648]  
CCR MONITOR WELLS  
ARIZONA PUBLIC SERVICE CHOLLA POWER PLANT**

DEPTH INTERVAL (feet)	FORMATION	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
360 - 370	<b>Pc</b>	fine sandstone; white [5Y8/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted/uniform quartz grains); reaction to acid: none		pulverized very fine to fine sand size chips
370 - 380	<b>Pc</b>	fine sandstone; white [5Y8/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted/uniform quartz grains); reaction to acid: none		pulverized very fine to fine sand size chips
380 - 390	<b>Pc</b>	fine sandstone; white [5Y8/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted/uniform quartz grains); reaction to acid: none		mostly pulverized, very fine to fine sand size; round chips to 0.1 in
390 - 400	<b>Pc</b>	fine sandstone; white [5Y8/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted/uniform quartz grains); reaction to acid: none		pulverized very fine to fine sand size chips
400 - 410	<b>Pc</b>	fine sandstone; white [5Y8/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted/uniform quartz grains); reaction to acid: none		pulverized very fine to fine sand size chips
410 - 420	<b>Pc</b>	fine sandstone; white [5Y8/1]; moderately lithified; buff sandstone (very fine- to fine-grained; rounded, well sorted/uniform quartz grains); reaction to acid: none		pulverized very fine to fine sand size chips



**EXPLANATION**

Depth to Water Level

Note: All PVC blank and slotted casing is Schedule 80; slot size is 0.020 inches.

WELL: M-54 (BAM-1U)	NORTHING: 1440088.61
REGISTRATION: 55-918646	EASTING: 665508.13
COUNTY: Navajo, Arizona	MP Elevation: 5070.71 feet amsl
DATE COMPLETED: 10/02/15	DATUM: NAD83, State Plane 1983

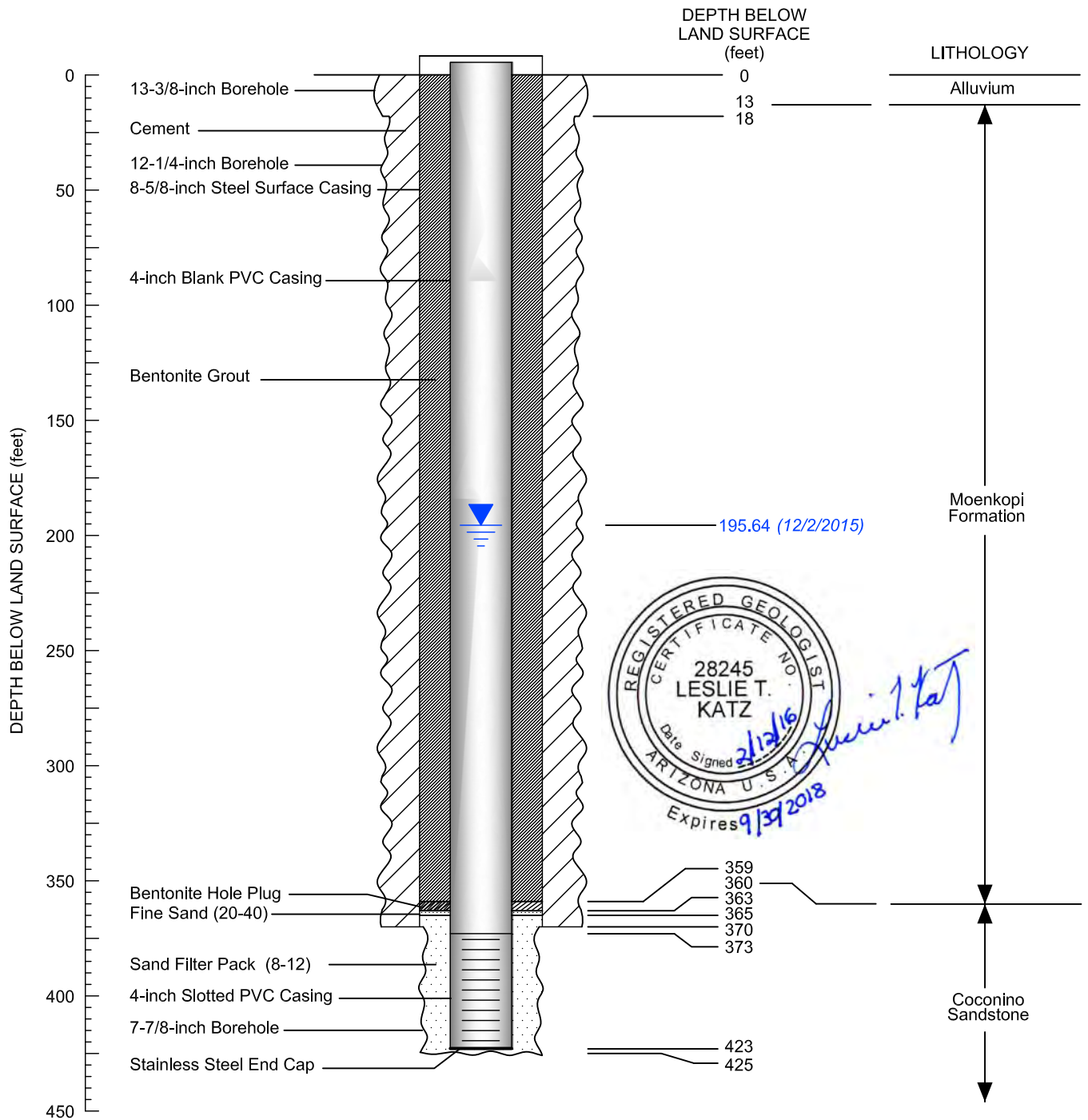
**SCHEMATIC DIAGRAM OF CONSTRUCTION  
FOR COCONINO WELL M-54  
APS CHOLLA POWER PLANT**




2016

FIGURE A-5





### EXPLANATION

 Depth to Water Level

Note: All PVC blank and slotted casing is Schedule 80; slot size is 0.020 inches.

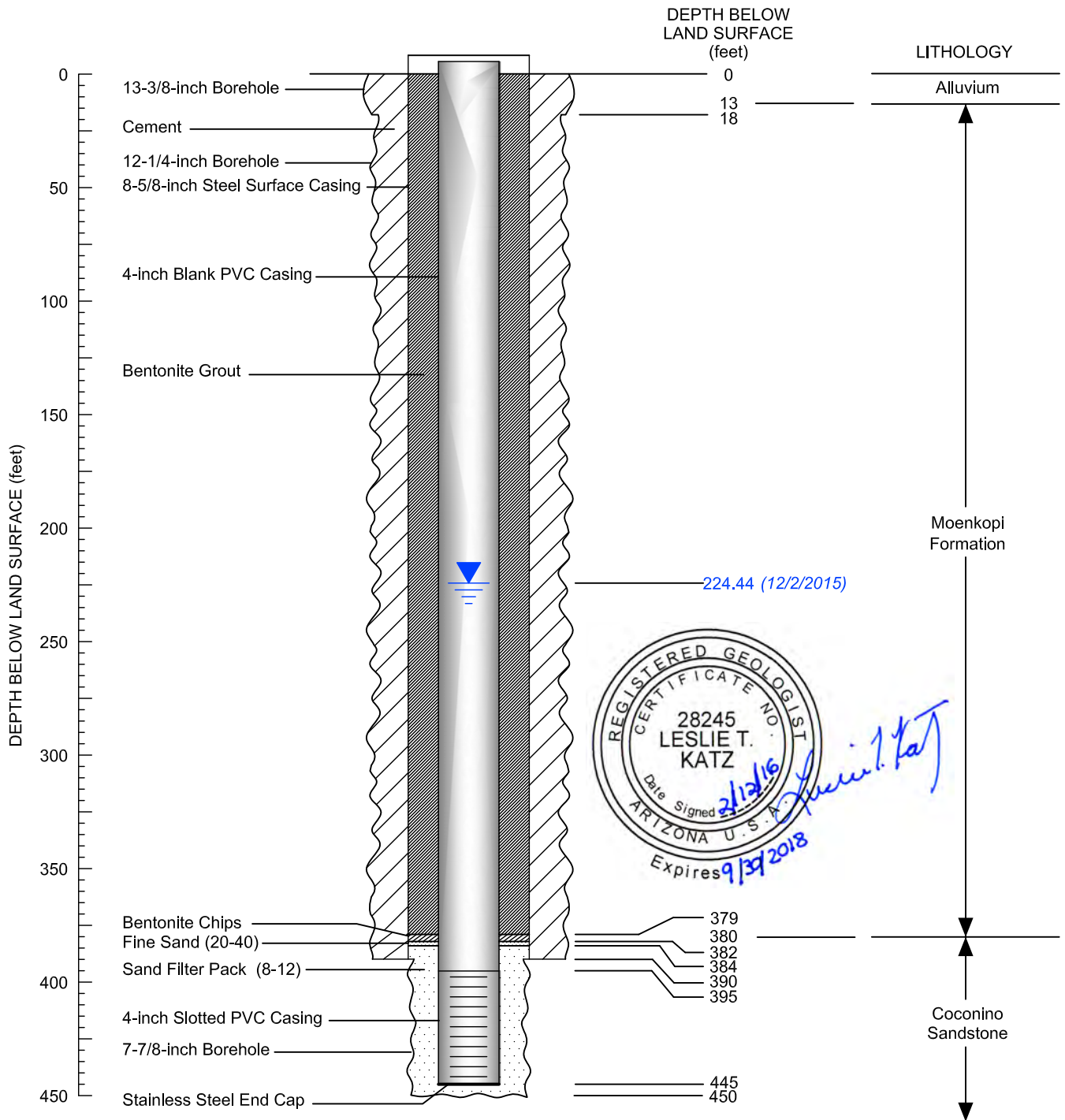
WELL: M-59 (BAM-1D)	NORTHING: 1440604.73
REGISTRATION: 55-918647	EASTING: 664161.36
COUNTY: Navajo, Arizona	MP Elevation: 5136.002 feet amsl
DATE COMPLETED: 10/21/15	DATUM: NAD83, State Plane 1983

### SCHEMATIC DIAGRAM OF CONSTRUCTION FOR COCONINO WELL M-59 APS CHOLLA POWER PLANT



2016

FIGURE A-9



**EXPLANATION**

Depth to Water Level

Note: All PVC blank and slotted casing is Schedule 80; slot size is 0.020 inches.

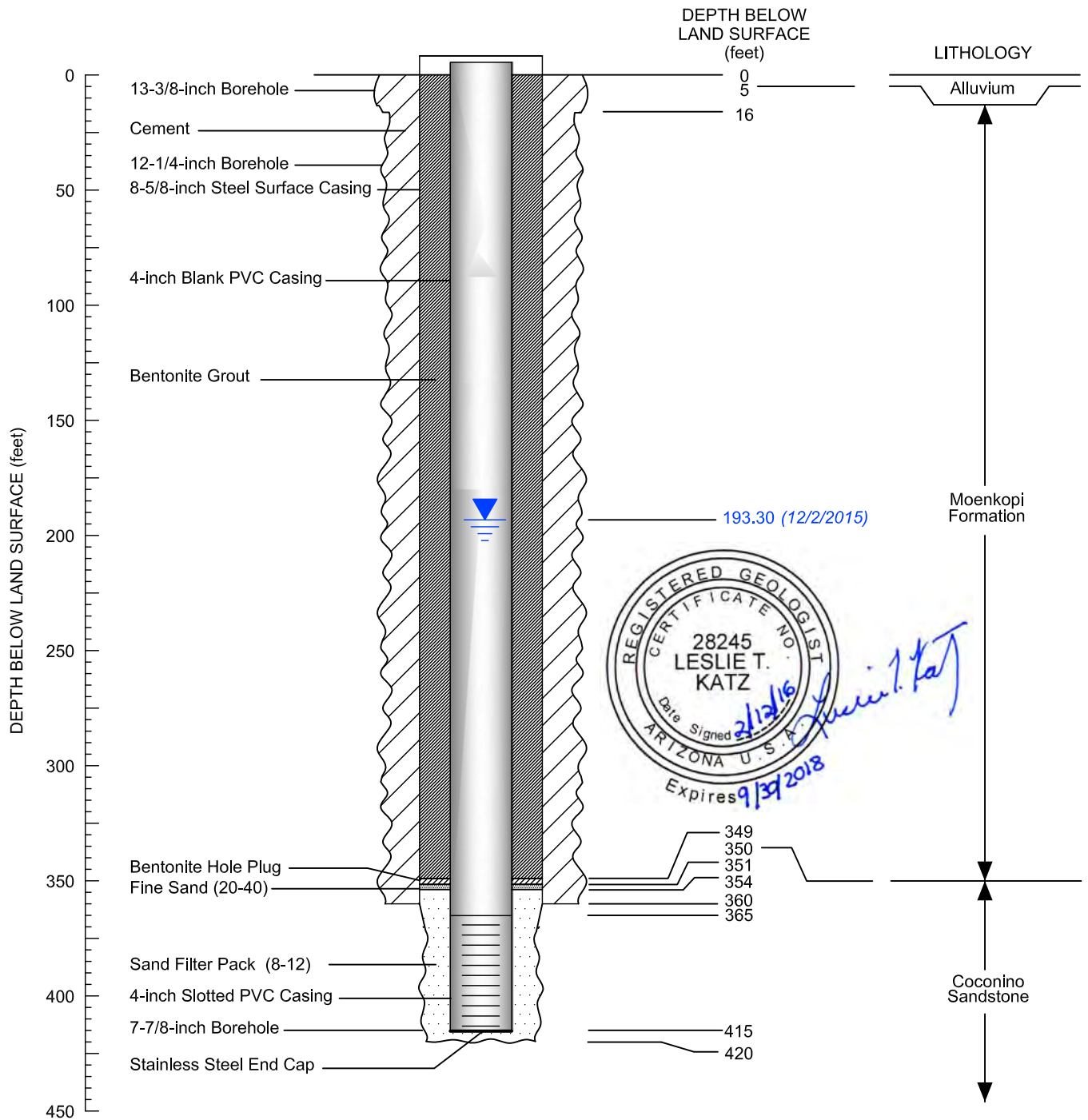
WELL: M-60 (BAM-3D)	NORTHING: 1441947.89
REGISTRATION: 55-918649	EASTING: 664249.99
COUNTY: Navajo, Arizona	MP Elevation: 5151.175 feet amsl
DATE COMPLETED: 11/1/15	DATUM: NAD83, State Plane 1983

**SCHEMATIC DIAGRAM OF CONSTRUCTION FOR COCONINO WELL M-60  
 APS CHOLLA POWER PLANT**




2016

FIGURE A-10



**EXPLANATION**

 Depth to Water Level

Note: All PVC blank and slotted casing is Schedule 80; slot size is 0.020 inches.

WELL: M-61 (BAM-2D)	NORTHING: 1441383.55
REGISTRATION: 55-918648	EASTING: 664047.00
COUNTY: Navajo, Arizona	MP Elevation: 5127.577 feet amsl
DATE COMPLETED: 11/13/15	DATUM: NAD83, State Plane 1983

**SCHEMATIC DIAGRAM OF CONSTRUCTION FOR COCONINO WELL M-61  
APS CHOLLA POWER PLANT**



2016

FIGURE A-11

**APPENDIX B**  
**WOOD TECHNICAL MEMORANDUM DOCUMENTING AN ALTERNATIVE SOURCE**  
**DEMONSTRATION FOR LITHIUM AT THE BAP**





# Technical Memorandum

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**To:** Michele Robertson, RG  
Pamela Norris

**File No:** 14-2018-2040

**From:** Emily LoDolce, PE

**Reviewed by:** Natalie Chrisman Lazarr, PE  
Carla Landrum, PhD

**Date:** June 6, 2019

**Subject:** **ALTERNATIVE SOURCE DEMONSTRATION FOR LITHIUM AT THE BAP**  
**Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

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## 1.0 INTRODUCTION

This technical memorandum (memo) documents an Alternative Source Demonstration (ASD) for lithium in groundwater downgradient of the Bottom Ash Pond (BAP), an existing coal combustion residuals (CCR) unit located at the Arizona Public Service Company (APS) Cholla Power Plant (Site) in Navajo County, Arizona. The memo is an appendix to a report documenting an *Assessment of Corrective Measures for the Fly Ash Pond and Bottom Ash Pond* (the Main Report) prepared by Wood Environment & Infrastructure Solutions, Inc. (Wood).

A full description of the Site location and background, CCR monitoring system, and historical operations is contained within the *2018 Annual Groundwater Monitoring and Corrective Action Report* (Wood, 2019). The BAP is one of four CCR units at the Site. It is a 2,300-acre-foot surface impoundment used to store slurried bottom ash generated at the plant. It was placed into service in 1978. The BAP dam was constructed of earth fill with a central clay core. The BAP is unlined and constructed on alluvium and underlying Moenkopi mudstone (considered an aquitard between the alluvial aquifer and the lower, confined Coconino Sandstone aquifer).

Statistical analyses of Appendix IV constituent data collected from downgradient BAP monitoring wells declare that lithium and cobalt concentrations exhibit exceedances of their respective Groundwater Protection Standards (GWPSs) at statistically significant levels (SSLs). Pursuant to 40 Code of Federal Regulations (CFR) Section (§)257.94(e)(2), the owner/operator is allowed to demonstrate that a source, other than the CCR unit, caused the apparent SSI within 90 days of the official SSI declaration. Potential sources include sampling and analysis errors, statistical method inadequacies and/or natural variation in groundwater quality. Each of these sources are explored within the scope of this memo.

The ASD documented herein only addresses lithium at the BAP and was prepared in association with an assessment of corrective measures; preparation of the ASD within 90 days of declaring an exceedance of the GWPS was not possible because analysis of recently available characterization information was necessary to support this ASD. Cobalt remains a constituent of concern at the BAP.

Wood's approach to conducting the ASD was to systematically review the potential alternative sources noted above to evaluate if any of these causes resulted in the apparent GWPS exceedances of lithium in groundwater downgradient of the BAP.



## **2.0 SAMPLING AND LABORATORY CAUSES**

To assess potential sampling and laboratory causes, Wood reviewed sampling and analysis procedures as well as the results of laboratory data validation.

Based on a review of sampling procedures, Wood concluded that APS has conducted field sampling activities in accordance with the Groundwater Sampling and Analysis Plan (SAP) developed for the Site (Montgomery & Associates, 2015) to comply with the CCR Rule. On the basis that the SAP is sufficiently detailed and contains appropriate procedures for groundwater level measurement, groundwater sample collection, sample control, laboratory analysis, and data validation, no apparent sampling causes for lithium exceedances were noted.

Wood also reviewed laboratory data validation reports for the CCR groundwater monitoring program. Following receipt of final laboratory reports of analysis, APS contracted with Montgomery & Associates to evaluate the reports and associated sample data collected during detection and assessment monitoring for quality assurance purposes. The scope of the effort was a US Environmental Protection Agency Stage 2A validation. On the basis of Wood's review, there are no apparent issues with field forms or laboratory analyses that would explain the GWPS exceedances for lithium downgradient of the BAP.

## **3.0 ANTHROPOGENIC SOURCES**

Wood reviewed surrounding property uses, historical property uses, and upgradient land uses to evaluate any potential anthropogenic sources for lithium exceedances. The surrounding land uses are undeveloped, rural land. On this basis, there is insufficient evidence to conclude that surrounding anthropogenic sources are the source to the GWPS exceedances for lithium downgradient of the BAP.

## **4.0 STATISTICAL EVALUATION CAUSE**

A statistical evaluation cause refers to the possibility that the current statistical method is invalid for performing statistical comparisons, thereby resulting in a falsely declared GWPS exceedance for lithium. Currently, the Cholla BAP groundwater monitoring system is designed to perform interwell statistical comparisons. An interwell comparison is one where samples collected from two different geographic locations within the same water bearing unit are used to perform the statistical evaluation. One geographic location represents background, or baseline groundwater conditions we expect to see if the BAP is not impacting groundwater, and the other geographic location represents compliance monitoring wells downgradient of the BAP. Sample data collected from the two geographic locations are then statistically compared to assess site compliance. In general, interwell comparisons perform poorly in cases where an adequate and representative background location cannot be established for one or more sample constituents. Factors leading to inadequate or non-representative background can include, for example, spatial heterogeneity in groundwater conditions or discontinuous lithologies between background and compliance monitoring well locations. These inadequacies can cause an interwell statistical comparison to be meaningless and result in false positive or false negative statistical results.

The GWPS for lithium was developed using the data collected from the background monitoring well (M-64A) for the BAP, which was installed in February 2017. The baseline monitoring period for this well spans from February 2017 to September 2018 (for both Appendix III and Appendix IV constituents) plus two rounds of assessment monitoring (for Appendix IV constituents) in February 2018 and May 2018 (Wood, 2018a). The statistical evaluation of the lithium data in the background well resulted in a calculated background threshold value equal to 0.31 milligrams per liter (mg/L) and this value represents the GWPS

for this constituent (Wood, 2018a). The statistical methods used to derive this value are detailed in the Statistical Data Analysis Work Plan for the Cholla Power Plant (Wood, 2018b). The background well exhibits lithium concentrations that range between 0.25 mg/L and 0.28 mg/L between February 2017 and May 2018.

The observed lithium concentrations in downgradient compliance wells, which were sampled over a relatively longer period, starting in November 2015 and ending in May 2018, vary by compliance well location and exhibit lithium concentrations ranging between less than 0.2 mg/L (non-detectable concentrations) to 0.78 mg/L. The range of lithium concentrations in the compliance wells are the same order of magnitude as concentrations observed in background.

Several factors can explain the discrepancy in the range of sample concentrations between background and compliance wells at the BAP. For example, previous work underscores that high sampling frequencies (e.g., bi-monthly in some cases) over a relatively shorter sampling period can be one source to the narrow range of lithium concentrations observed in the background well (Wood, 2018b). A high sampling frequency (e.g., less than quarterly) can bias the variability in sample concentrations because each sample is temporally correlated to the next, meaning the sample background data do not represent the true range of variability in background lithium concentrations. Furthermore, the lithium concentrations vary spatially between all monitoring well locations, suggesting that the groundwater system exhibits natural variation in lithium concentrations with respect to geographic location.

The natural variation argument that follows is rooted in the premise that spatial heterogeneity in lithium concentrations at the Site is not adequately represented by data collected from the background well and, as such, the underlying interwell assumptions for lithium are invalid. Therefore, the interwell statistical comparison method for lithium is unreliable in detecting leakage from the BAP. The following section presents statistical and non-statistical lines of evidence that support the conclusion that the lithium concentrations within the alluvial aquifer system beneath the BAP exhibit natural spatial variation and is the cause of the GWPS exceedance for lithium at the BAP.

## **5.0 NATURAL VARIATION CAUSE**

Lithium is naturally present in soil and groundwater, particularly in arid environments, where it is associated with evaporites and precipitates (Cannon et al., 1975). To evaluate natural variation as the cause of the lithium exceedances, three different approaches to reviewing site data were applied. First, a statistical evaluation of lithium and select other constituents was performed to assess variability in observed concentrations. Second, the spatial distribution of lithium was compared to the spatial distribution of a constituent known to be associated with CCR in groundwater downgradient of the BAP (i.e., boron). Finally, the concentration of lithium measured from a surface water sample collected from the BAP was compared to the concentrations of lithium observed in CCR monitoring system groundwater monitoring wells.

### **5.1 Statistical Evaluation of Natural Variation**

The objective of this statistical evaluation was to assess the variability in lithium concentrations, and other constituent concentrations, within the alluvial aquifer downgradient of the BAP. It is hypothesized that the GWPS exceedance declaration for lithium results from the intrinsic spatial variability of naturally-occurring lithium concentrations within the alluvial groundwater.

### 5.1.1 Data Inputs

Data from six groundwater monitoring wells (M-52A, M-53A, M-55A, W-305, W-306, and W-314) and one background well (M-64A) were used to complete this statistical evaluation. The sampling duration begins in the fourth quarter of 2015 and ends in the second quarter of 2019. The sampling duration is shorter, and the relative sample count is therefore lower, for M-64A because it was installed in 2017. The sampling frequency is inconsistent and ranges between monthly to quarterly.

This evaluation includes five constituents: lithium, cobalt, chloride, sulfate, and pH. Not all constituents were sampled concurrently between wells, which results in sampling gaps for this evaluation depending on the well and the constituent. Non-detect concentrations represent the corresponding reporting limit value.

### 5.1.2 Methods

The statistical methods employed to evaluate the variability in the data are a review of basic statistics, development of box and whisker plots, and a principal component analysis.

**Basic Statistics - Table 1** summarizes the basic statistics for each monitoring well and constituent. Basic statistics are useful for assessing sample counts and making relative comparisons between statistical measures, particularly the range in sample concentrations, the central tendencies (mean and median), and sample standard deviation. Constituents with a range and standard deviation close to zero are generally indicative of wells that sample a high frequency of non-detectable concentrations. Except for cobalt, the variability in the central tendencies between constituents and monitoring wells vary on the same order of magnitude.

**Box and Whisker Plots - Figures 1 through 5** illustrate the box and whisker plots for each constituent and well grouping. The box and whisker plots are useful for visually comparing the relative distribution of constituent concentrations between wells and provide a good indication of spatial heterogeneity in constituent concentrations between well locations. For each constituent, except for pH, the box plots generally position uniquely according to their central tendency (thick black line within the box) and the range of observed concentrations (area spanning between whiskers flanking the box) between wells. Unique position and lack of general overlap between box and whisker plots between different wells is an indication of spatial heterogeneity within the aquifer system.

The relative constituent concentrations for monitoring wells M-52A and W-306 are notable, particularly the inverse relationship between pH and chloride and cobalt for M-52A and a positive relationship between lithium and sulfate in W-306. These observations are congruent with lithium being associated with evaporates and precipitates and with increased cobalt solubility at lower pH values.

**Principal Component Analysis** – Principal component analysis (PCA) is a multivariate analysis that integrates all available data to simultaneously study correlations and associations between wells and their constituents (Everitt et al., 2011; James et al., 2013; Jolliffe, 2013). The correlations and associations can lend insight into the spatial heterogeneity of the alluvial aquifer system as it relates to broader geochemistry and other inferential aquifer characteristics that might impact constituent concentrations within the aquifer system (e.g., screened depths and lithologies, etc.).

Since the sample five constituents vary in their magnitude of concentration, the data were standardized prior to performing PCA to account for these differences.



**Figures 6 and 7** present the results of the PCA. PCA plots, in general, illustrate how the sample data cluster. The color-coding is used to indicate which monitoring well the data are derived from. Wells that cluster together exhibit synergies in their underlying statistical variation, suggesting the groundwater observed by these wells derive from, or is influenced by the same in situ properties, mechanisms and/or processes. The vectors (arrows) represent each sample constituent. The constituent groupings and their vector magnitudes help explain the correlations between constituents and their overall importance. Using this information as a collective, it is possible to interpret the sources of statistical variation observed in the monitoring well clusters.

The baseline PCA scenario is shown in **Figure 6**, which includes all constituents and monitoring wells. In the baseline PCA scenario, lithium and sulfate strongly associate with sample data within W-306. Monitoring wells M-53A, M-55A, M-64A, and W-314 plot in gradient order along the same vector line (extrapolated) relative to their sulfate and lithium concentrations in comparison to W-306. It is notable that M-55A and M-64A (the background well) plot closest to W-306. Cobalt and chloride cluster together and are inversely related to pH. This inverse relationship indicates that higher cobalt and chloride concentrations associate with lower pH values and vice versa. Cobalt is known to become more mobile in the presence of lower pH values, which helps explain the inverse relationship observed between these two constituents. Data collected from M-52A dominates in explaining this relationship.

A second PCA scenario excludes W-306 to understand well clustering and constituent groupings in the absence of any masking effects produced by this well. **Figure 7** illustrates the results of this PCA scenario. Lithium and sulfate group together and plot closely to the M-55A and M-64A (background well) clusters. Lithium is known to associate with evaporites and precipitates and the occurrence of these constituents plotting closely to M-64A suggests naturally occurring lithium concentrations should be expected within the alluvial groundwater system. It is possible the lithium concentrations observed in W-306 are due to its proximity to a localized pocket of evaporites and precipitates within the aquifer system. Cobalt plots inversely to pH and associates most with data collected from M-52A. Groundwater monitoring data collected from W-314, M-53A, and W-305 associate with pH and inversely associate with cobalt, and to a degree, chloride. Notably, data collected from M-64A do not strongly associate with cobalt or pH in this scenario, suggesting the mechanism driving this described behavior for pH and cobalt might not be intrinsic to what is observed in background aquifer conditions.

## 5.2 Spatial Distribution

Boron is often used as a potential indicator for CCR because it is typically present in CCR unit leachate, it is non-reactive and mobile in common hydrogeologic environments, and it is not a common anthropogenic contaminant. Boron has been historically present in BAP downgradient monitoring wells at detectable concentrations, and the BAP is suspected to be the source of these concentrations. **Figure 8** shows the spatial distribution of boron concentrations measured in monitoring wells at the site in December 2018. The concentration of boron measured in the BAP in March 2019 was 4.8 mg/L, higher than the concentrations shown in downgradient wells. Wells with the highest concentrations of boron are closest to the BAP, and wells with the lowest concentrations of boron in groundwater tend to be more distant from the BAP.

Lithium is also non-reactive and mobile in common hydrogeologic environments. In contrast to the spatial distribution of boron, the spatial distribution of lithium concentrations measured in monitoring wells at the site in December 2018 (**Figure 9**) show no apparent correlation to proximity to the BAP. Concentrations of lithium in monitoring wells in the Tanner Wash alluvial aquifer (where the BAP is located) are all within the

same order of magnitude, and ranged from less than 0.2 mg/L to 0.43 mg/L with the exception of the sample collected at W-306, which indicated a slightly higher concentration of 0.73 mg/L. The shading in **Figure 9** identifies areas of the alluvial aquifer where the concentration of lithium was above the GWPS of 0.31 mg/L. Notable wells with concentrations below the GWPS include monitoring wells M-53A and M-52A, both located adjacent to the south side of the BAP dam.

### 5.3 Concentrations in the BAP and Downgradient Aquifer

An exceedance of the GWPS is unlikely to be due to release from the facility if the concentration of the constituent in water collected from the CCR unit is not higher than the concentrations in downgradient wells. To evaluate this possibility, APS collected a water sample from the BAP on March 30, 2019 and sent it to TestAmerica Laboratories, Inc. (TestAmerica) located in Phoenix, Arizona, for analysis. TestAmerica is an Arizona Department of Health Services-licensed laboratory (AZ0728). The results of the analysis indicate that the lithium concentration in water collected from the BAP is less than the laboratory reporting limit of 0.20 mg/L, which is lower than the GWPS of 0.31 mg/L and lower than the concentration in many of the monitoring wells shown on **Figure 9**. This is a secondary line of evidence to suggest that the potential exceedance for lithium is not due to a release from the BAP. At this time there is only one water quality sample from the BAP with results for lithium. Including lithium in the list of analytes for future samples collected from the BAP would increase the sample size of representative data and potentially lend confidence to these results.

## 6.0 FINDINGS AND RECOMMENDATIONS

Natural variation in the aquifer is declared to be the cause of the GWPS exceedance for lithium at the BAP. The primary lines of evidence for this conclusion include:

- The multivariate statistical analysis of lithium and other compounds in the alluvial aquifer which points to the existence of spatial heterogeneity within the alluvial system; and
- The spatial distribution of lithium in the Tanner Wash alluvial aquifer is not consistent with a lithium source area located at the BAP.

Secondary lines of evidence include:

- The water quality sampling results that show concentrations of lithium in the BAP may be lower than lithium concentrations in the downgradient monitoring wells.

These lines of evidence support this ASD prepared in accordance with 40 CFR §257.95(g)(3)(ii) and support the position that the GWPS exceedance for lithium declared on November 14, 2018 was not due to a release from the BAP. Therefore, no further action (i.e., corrective measures analysis) is warranted for this constituent.

Wood recommends developing intrawell statistical comparisons for lithium and any other Appendix III and IV constituents that are determined to be influenced by aquifer heterogeneity at the BAP in the future. Intrawell comparisons are an industry accepted and recommended alternative to interwell comparisons (USEPA, 2009). Intrawell statistical comparisons are detailed in the USEPA Unified Guidance (2009) and in the Statistical Data Analysis Work Plan for the Cholla Power Plant (Wood, 2018b).

## 7.0 CERTIFICATION

By means of this certification, I certify that I have reviewed this ASD and find the information presented herein accurate and appropriate and meet the requirements of 40 CFR §257.95(g)(3)(ii).



Natalie Chrisman Lazarr

Printed Name of Registered Professional Engineer

A handwritten signature in blue ink, appearing to read "N. Lazarr", written over a horizontal line.

Signature

31672  
Registration No.

Arizona  
Registration State

14 June 2019  
Date

## 8.0 REFERENCES

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- Wood, 2019. *Annual Groundwater Monitoring and Corrective Action Report for 2018. Coal Combustion Residual Rule Groundwater Monitoring System Compliance*. Prepared on behalf of Arizona Public Service. January 31, 2019.



**TABLES**



Table 1. Basic Statistics for Select Wells and Constituents

M-52A	Monitoring Well							
	Units	Sample Count	Mean	Standard Deviation	Median	Minimum	Maximum	Range
Lithium	mg/L	19	0.26	0.03	0.25	0.21	0.32	0.11
Cobalt	mg/L	19	0.05	0.01	0.05	0.03	0.07	0.04
Chloride	mg/L	17	4058.82	523.28	4000	3200	5100	1900
Sulfate	mg/L	17	2782.35	184.51	2700	2400	3100	700
pH	S.U.	16	7.06	0.19	7	6.8	7.5	0.7

M-53A	Monitoring Well							
	Units	Sample Count	Mean	Standard Deviation	Median	Minimum	Maximum	Range
Lithium	mg/L	19	0.2	0	0.2	0.2	0.21	0.01
Cobalt	mg/L	19	0.02	0	0.02	0.01	0.02	0.01
Chloride	mg/L	17	2435.29	136.66	2400	2200	2800	600
Sulfate	mg/L	17	2976.47	251.32	3000	2500	3400	900
pH	S.U.	16	7.5	0.09	7.5	7.4	7.7	0.3

M-55A	Monitoring Well							
	Units	Sample Count	Mean	Standard Deviation	Median	Minimum	Maximum	Range
Lithium	mg/L	16	0.36	0.03	0.36	0.31	0.43	0.12
Cobalt	mg/L	16	0.001	0.0009	0.0008	0.0005	0.004	0.035
Chloride	mg/L	14	3521.43	540.91	3650	2300	4300	2000
Sulfate	mg/L	14	3571.43	143.73	3500	3400	3800	400
pH	S.U.	13	7.42	0.13	7.4	7.3	7.7	0.4

M-64A	Background Well							
	Units	Sample Count	Mean	Standard Deviation	Median	Minimum	Maximum	Range
Lithium	mg/L	13	0.26	0.01	0.26	0.25	0.29	0.04
Cobalt	mg/L	13	0.0008	0.0005	0.0006	0.0005	0.002	0.0015
Chloride	mg/L	11	4381.82	464.37	4400	3500	5100	1600
Sulfate	mg/L	11	4381.82	289.2	4400	3700	4800	1100
pH	S.U.	11	7.42	0.11	7.4	7.3	7.6	0.3

W-305	Monitoring Well							
	Units	Sample Count	Mean	Standard Deviation	Median	Minimum	Maximum	Range
Lithium	mg/L	19	0.21	0.01	0.21	0.2	0.23	0.03
Cobalt	mg/L	19	0.02	0	0.02	0.01	0.02	0.01
Chloride	mg/L	17	2352.94	162.47	2300	2100	2700	600
Sulfate	mg/L	17	2388.24	131.73	2400	2200	2800	600
pH	S.U.	16	7.41	0.16	7.4	7.05	7.7	0.65

W-306	Monitoring Well							
	Units	Sample Count	Mean	Standard Deviation	Median	Minimum	Maximum	Range
Lithium	mg/L	19	0.66	0.09	0.68	0.43	0.8	0.37
Cobalt	mg/L	19	0	0.01	0	0	0.03	0.03
Chloride	mg/L	17	1941.18	173.42	1900	1800	2400	600
Sulfate	mg/L	17	10982.35	2487.03	12000	3600	13000	9400
pH	S.U.	16	7.82	0.24	7.9	7.02	8.2	1.18

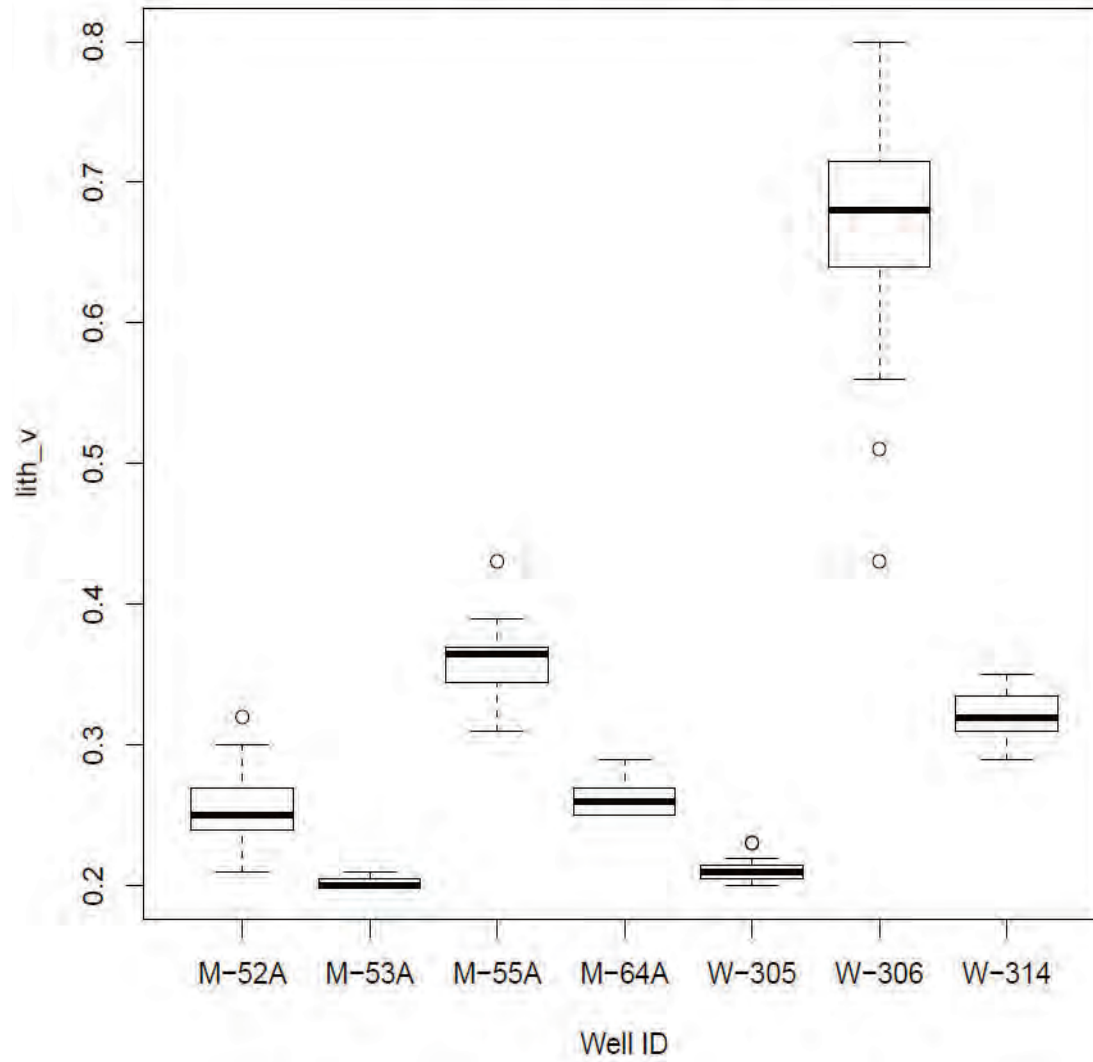
W-314	Monitoring Well							
	Units	Sample Count	Mean	Standard Deviation	Median	Minimum	Maximum	Range
Lithium	mg/L	19	0.32	0.02	0.32	0.29	0.35	0.06
Cobalt	mg/L	19	0.01	0	0.01	0.01	0.02	0.01
Chloride	mg/L	17	2776.47	125.15	2800	2600	3000	400
Sulfate	mg/L	17	2241.18	106.41	2200	2100	2500	400
pH	S.U.	16	7.44	0.13	7.4	7.3	7.7	0.4

wood.

## FIGURES



### Site Box & Whisker Plots



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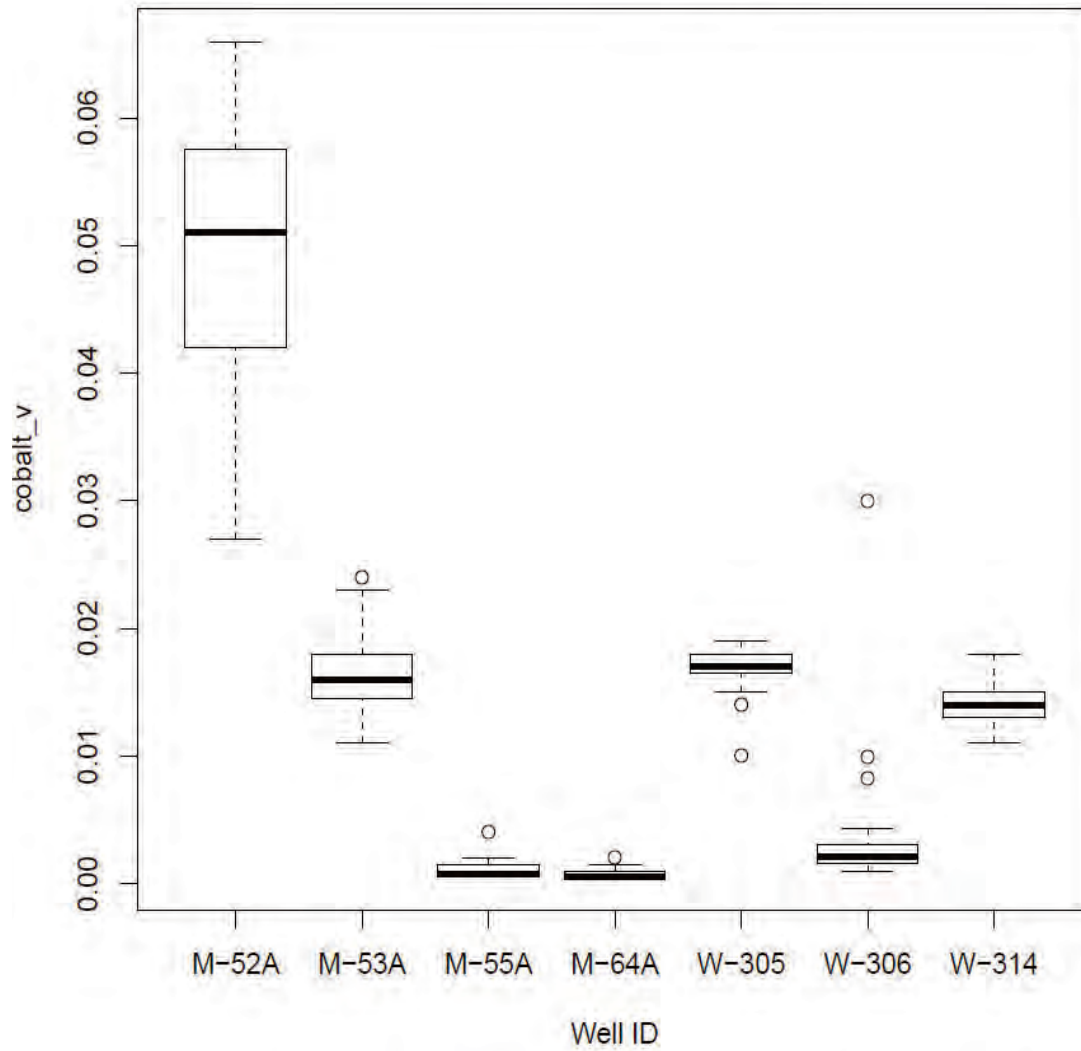
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 Cholla Power Plant  
 Navajo County, Arizona

**Box and Whisker Plots for Lithium**

**FIGURE  
1**



### Site Box & Whisker Plots



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PM: NCL  
Date: 6/3/2019  
Scale: As Shown

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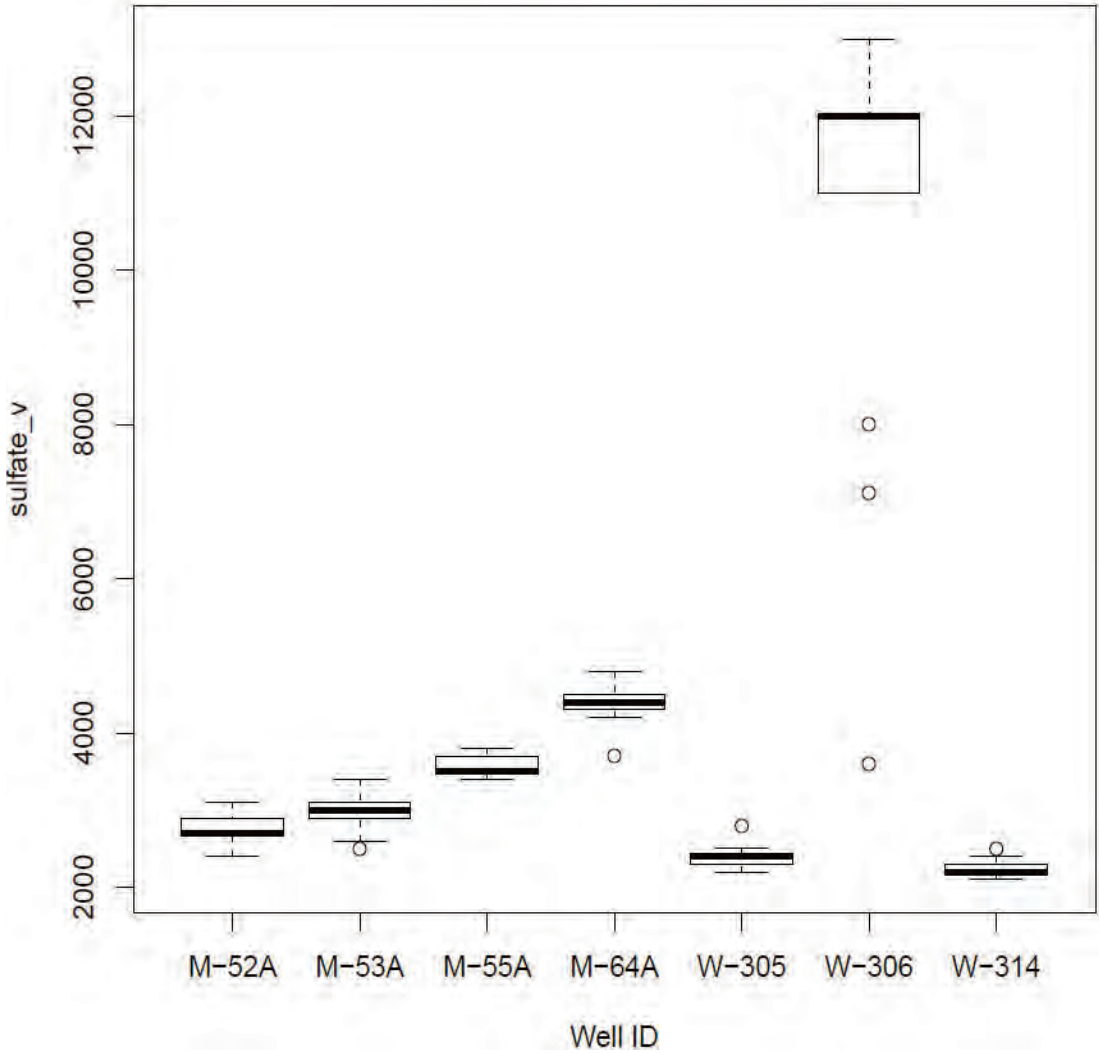
**Box and Whisker Plots for Cobalt**

**FIGURE  
2**





Site Box & Whisker Plots



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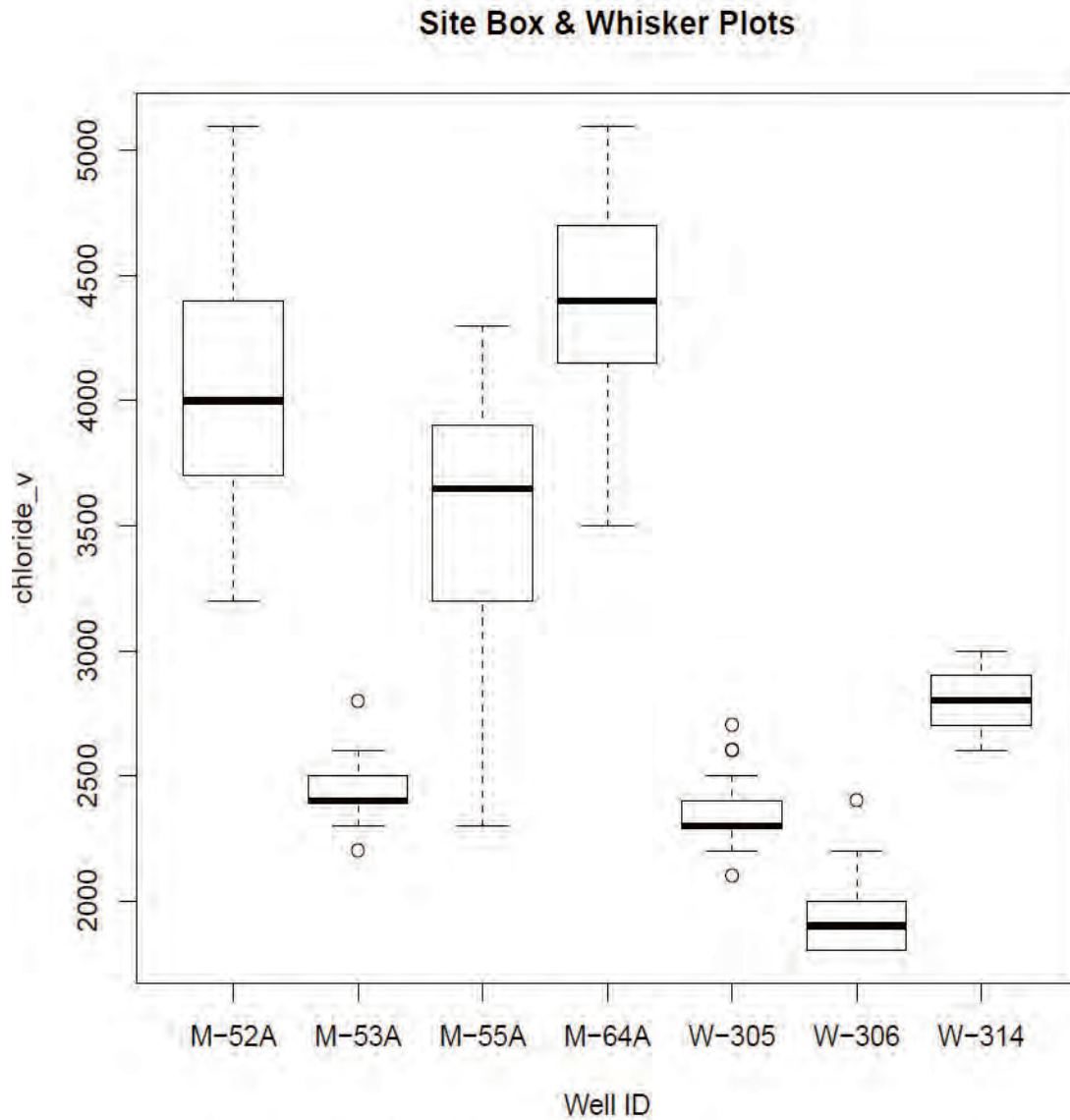
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 Date: 6/3/2019  
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Box and Whisker Plots for Sulfate

FIGURE  
 3





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 Date: 6/3/2019  
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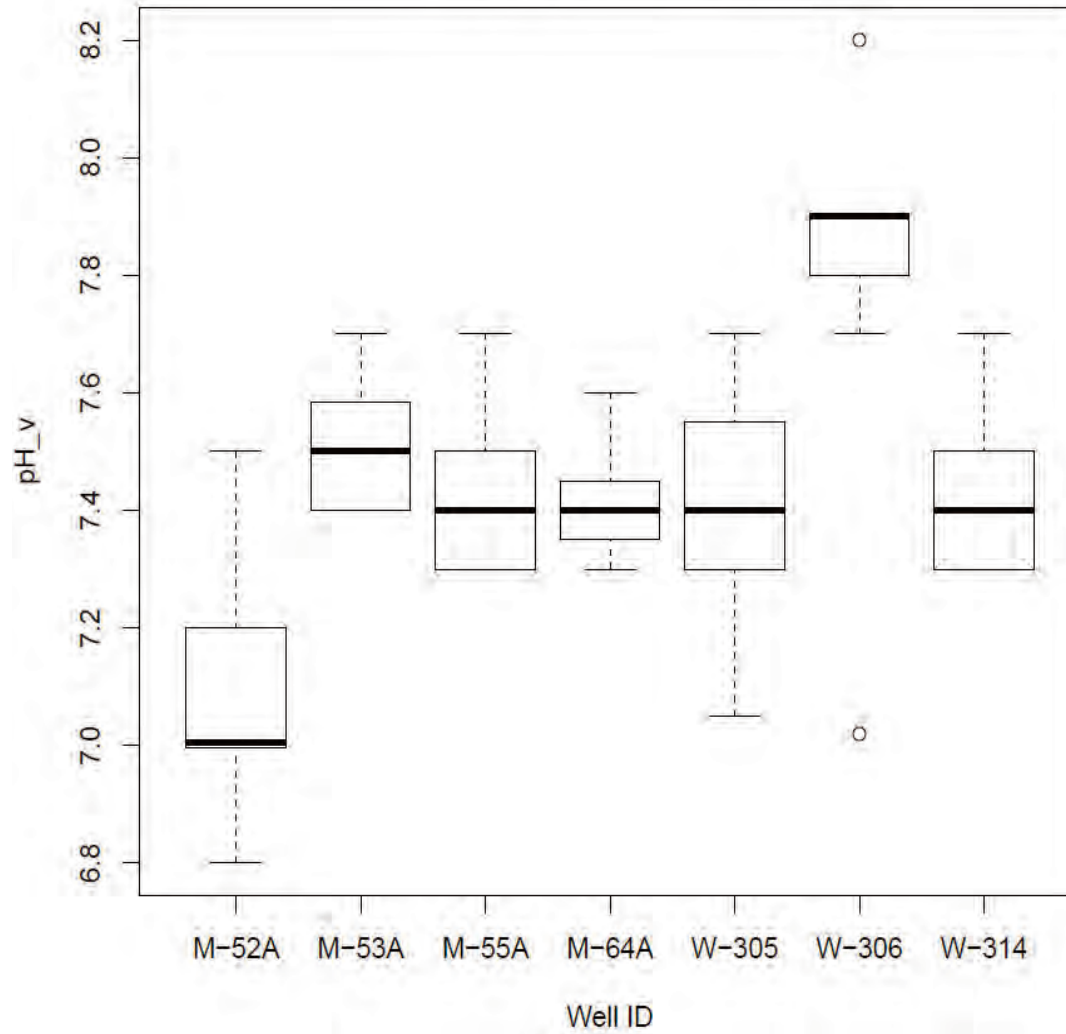
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 Navajo County, Arizona

**Box and Whisker Plots for Chloride**

**FIGURE  
4**



### Site Box & Whisker Plots



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Cholla Power Plant  
Navajo County, Arizona

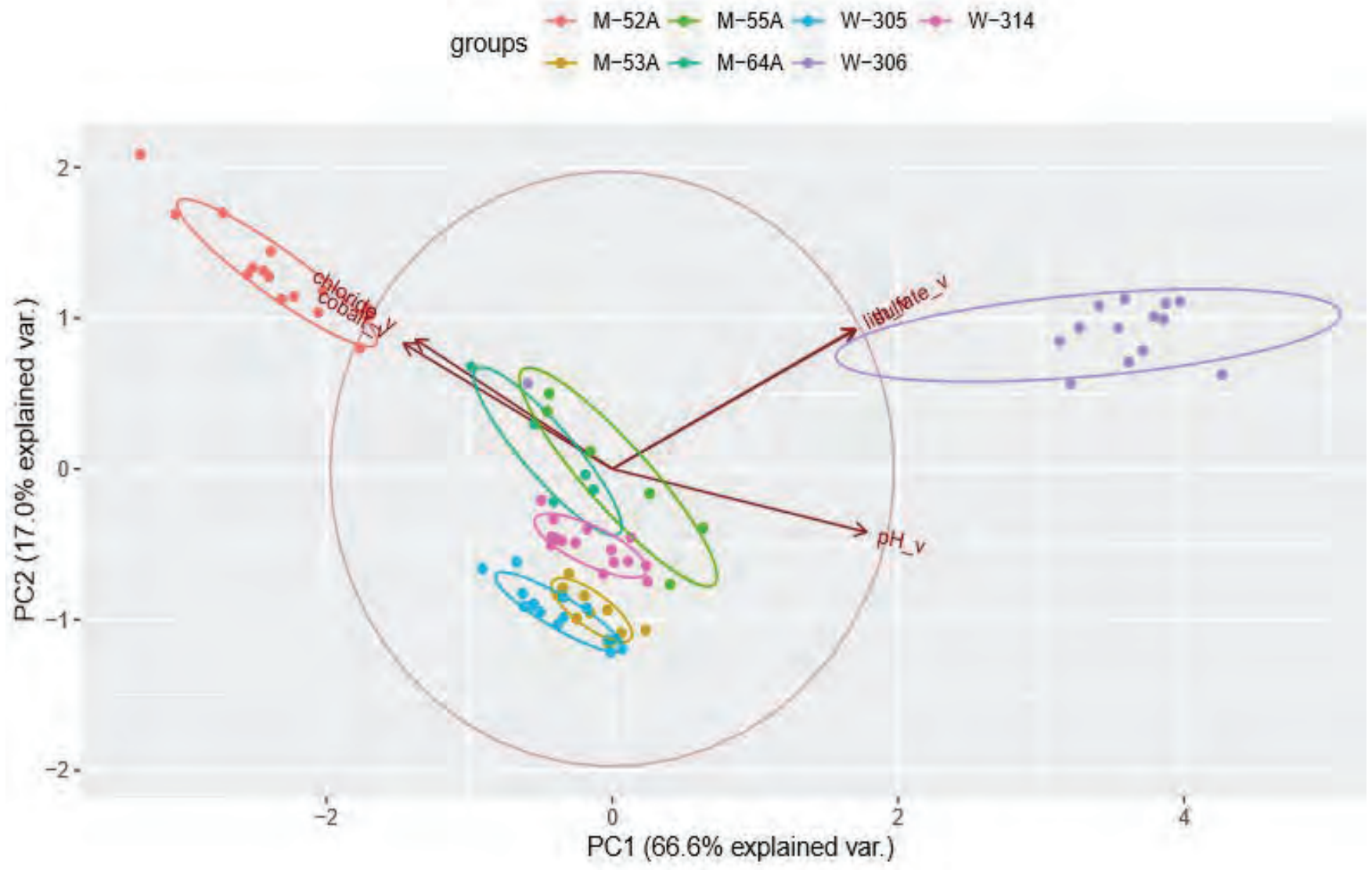


Job No.: 1420182040  
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Date: 6/3/2019  
Scale: As Shown

Box and Whisker Plots for pH

FIGURE  
5

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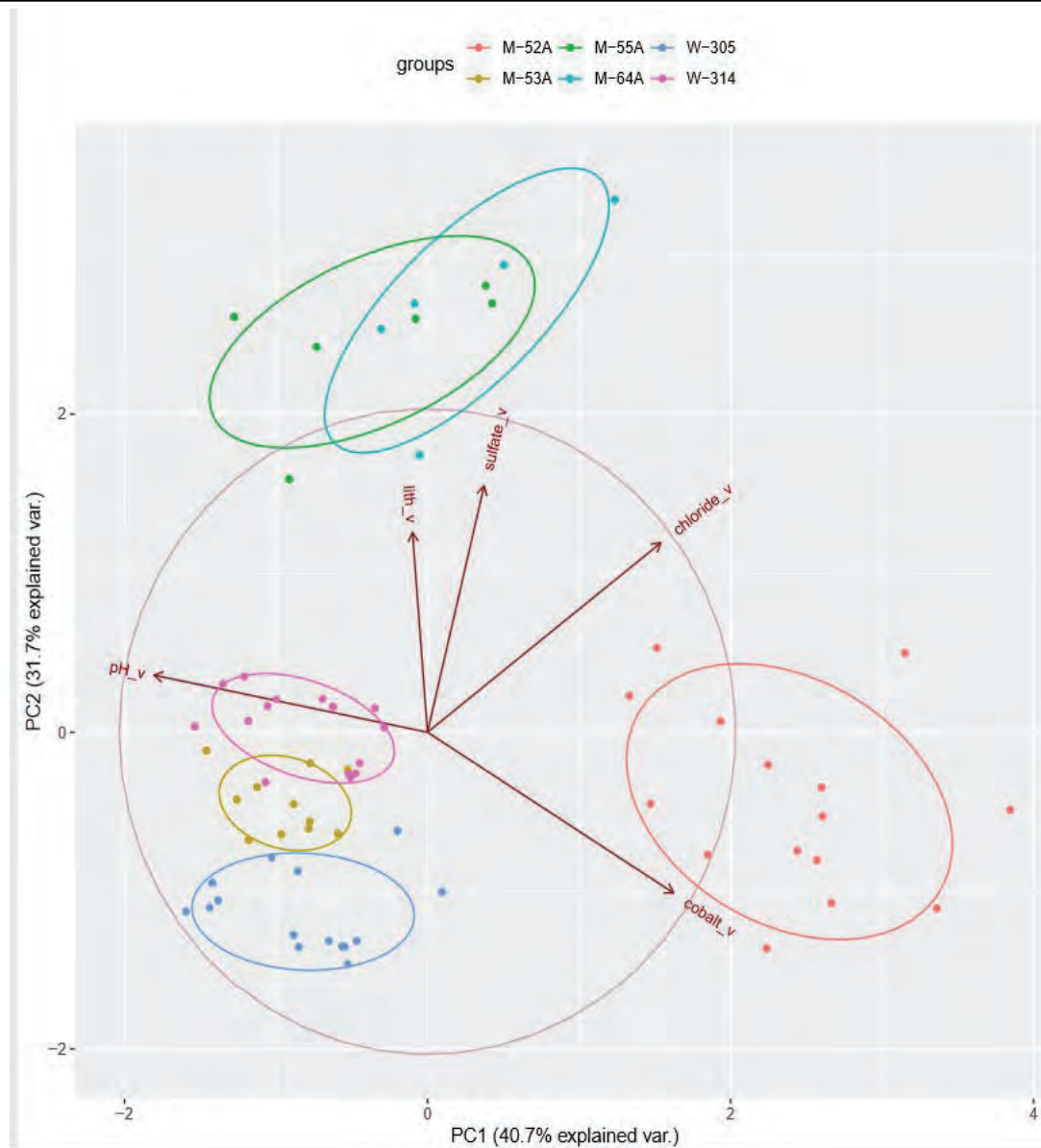
Job No.: 1420182040  
PM: NCL  
Date: 6/3/2019  
Scale: As Shown

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Plot for PCA Baseline Scenario

FIGURE  
6





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Date: 6/3/2019  
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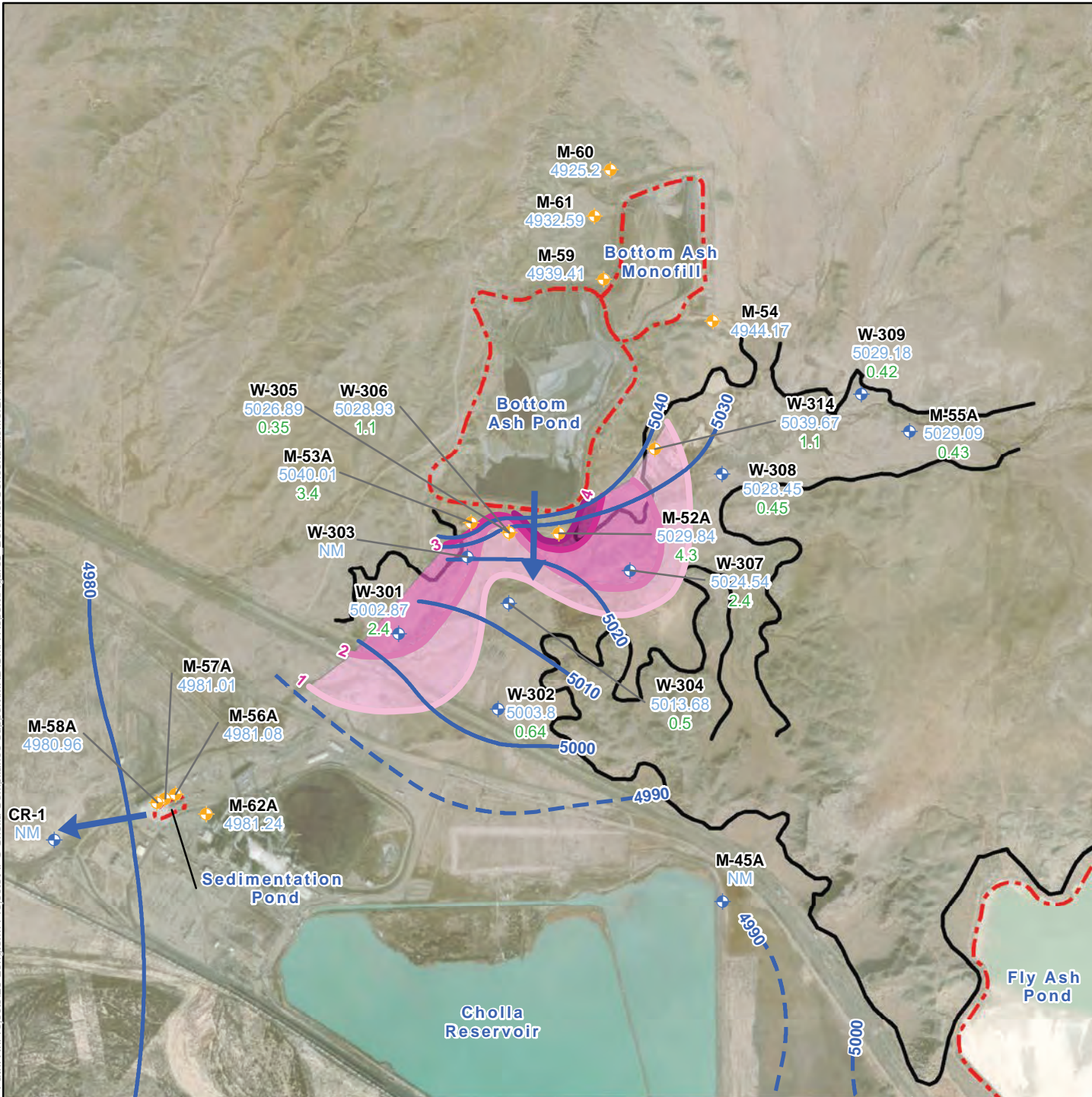
Plot for PCA Baseline Scenario Excluding W-306

FIGURE  
7





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- Legend**
- ◆ CCR Monitoring Well Location
  - ◆ Supplementary Site Monitoring Well Location
  - Estimated Alluvial Extent
  - Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

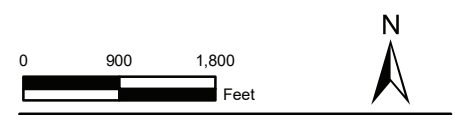
- (Dashed Where Inferred)
- ➔ Groundwater Flow Direction

**Boron Concentration in Alluvial Aquifer (December 2018)**

- >1-2.0 mg/L
- >2-3.0 mg/L
- >3-4.0 mg/L

**Notes:**

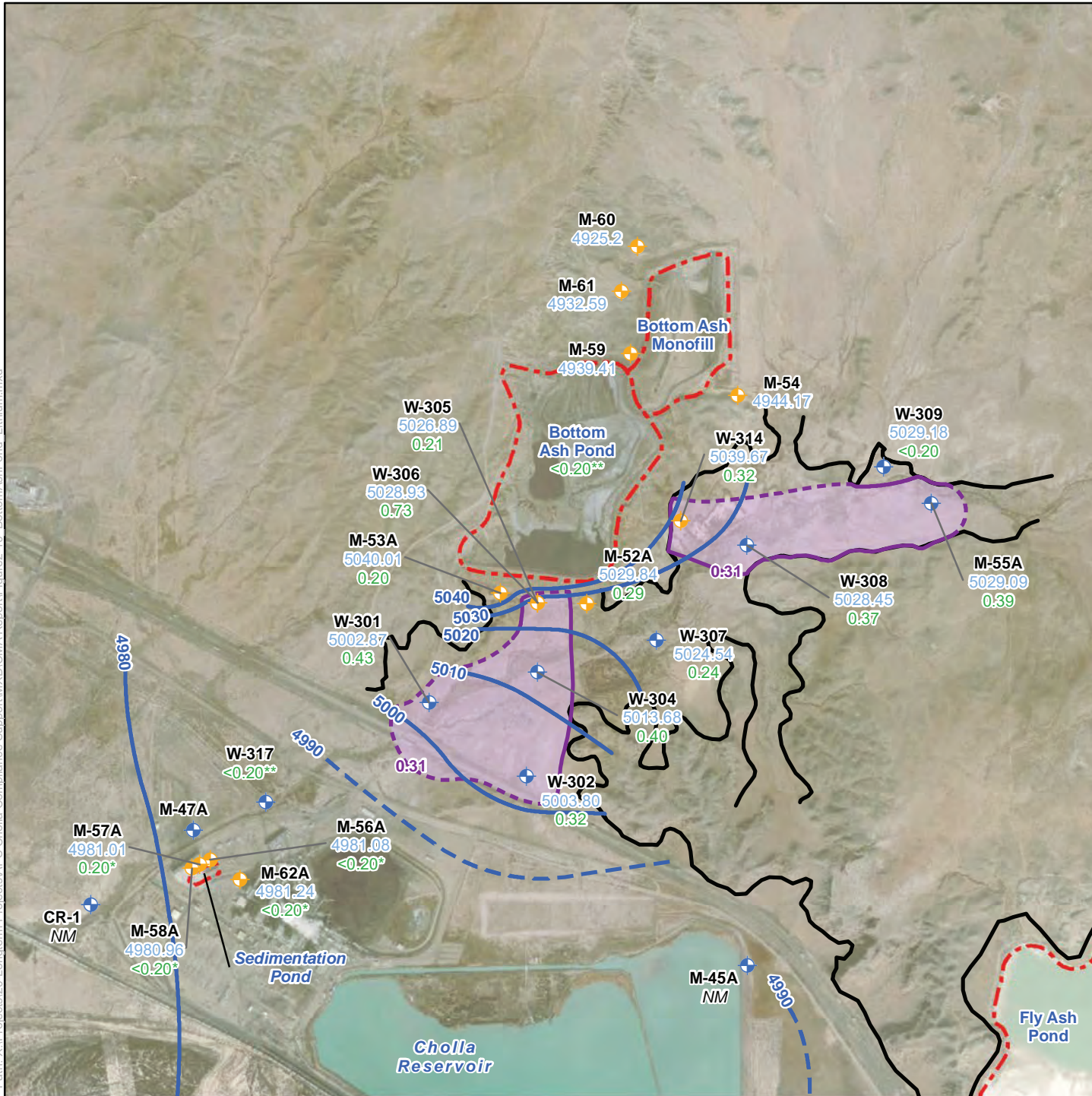
- W-308** Well Identification
- 5028.45** Groundwater elevation (ft amsl) measured in December 2018
- 0.45** Boron concentration (mg/L)
- NM** Not Measured
- ft amsl** Feet above mean sea level
- mg/L** Milligrams per liter



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE 8</b>	<b>Boron Iso-Concentration Map for the Bottom Ash Pond</b>
Job No. 1420182040 PM: NCL Date: 6/4/2019 Scale: 1"= 1800'	
The map shown here has been created with all due and reasonable care and is strictly for use with Wood Environment & Infrastructure Solutions, Inc. Project Number 1420182040. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Wood Environment & Infrastructure Solutions, Inc. assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.	



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**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well
- Estimated Alluvium
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

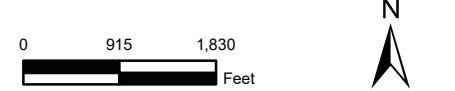
- (Dashed Where Inferred)

**Lithium Concentration in Alluvial Aquifer (December 2018)**

- >0.31 mg/L
- GWPS (0.31 mg/L; Dashed Where Inferred)

**Notes:**

- W-309** Well Identification
- 5029.18** Groundwater elevation (ft amsl) measured in October 2018
- <0.20** Lithium concentration (mg/L)
- \*** Sampled in May 2018
- \*\*** Sampled in March 2019
- ft amsl** Feet above mean sea level
- mg/L** Milligrams per liter
- NM** Not Measured
- GWPS** Groundwater Protection Standard



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Navajo County, Arizona

<b>FIGURE 9</b>	<b>Lithium Iso-Concentration Map for the Bottom Ash Pond</b>
Job No. 1420182040 PM: NCL Date: 6/5/2019 Scale: 1"= 1,830'	
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**APPENDIX C**  
**WOOD TECHNICAL MEMORANDUM DOCUMENTING AN ALTERNATIVE SOURCE**  
**DEMONSTRATION FOR ARSENIC AND COBALT AT THE FAP**



# Technical Memorandum

---

<b>To:</b>	Natalie Chrisman Lazarr, PE Byron Conrad, PE Pamela Norris	<b>File No:</b>	14-2018-2040
<b>From:</b>	Dane Andersen	<b>Reviewed by:</b>	Emily LoDolce, PE Bruce Wielinga
<b>Date:</b>	January 31, 2020		

**Subject:     ALTERNATIVE SOURCE DEMONSTRATION  
                  FOR ARSENIC AND COBALT AT THE FAP  
                  Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

---

## 1.0 INTRODUCTION

This technical memorandum (Tech Memo) documents an Alternative Source Demonstration (ASD) for the Fly Ash Pond (FAP) located at the Arizona Public Service Company (APS) Cholla Power Plant (Cholla) in Navajo County, Arizona (the Site). The ASD was prepared pursuant to Coal Combustion Residuals (CCR) Rule requirements for groundwater monitoring and corrective action detailed in 40 Code of Federal Regulations (CFR) Sections (§) 257.90 through 257.98 (Federal Register, 2018).

Site background, CCR groundwater monitoring system, and historical operational information is presented in the *Annual Groundwater Monitoring and Corrective Action Report for 2018* (Wood Environment & Infrastructure Solutions, Inc. [Wood], 2019a). The FAP is one of four CCR units at the Site. The FAP is a surface impoundment that receives fly ash slurry from Cholla. The FAP is approximately 438 acres in aerial extent and was placed into service in 1978. The FAP was constructed by damming an ephemeral tributary to the Little Colorado River. The unlined impoundment is primarily underlain by the Moqui member of the Moenkopi Formation, although alluvial sediments are present both upgradient and downgradient of the FAP dam. The uppermost aquifer downgradient of the FAP occurs in these localized, shallow alluvial sediments. The predominant groundwater flow direction through the alluvial sediments at the toe of the FAP dam is along the direction of surface water flow in the former wash, i.e., to the west-southwest. Farther downgradient, groundwater merges with the Little Colorado River alluvial aquifer, where the predominant groundwater flow direction follows the direction of surface water flow, i.e., to the west.

A statistical evaluation of Appendix IV constituent data collected from FAP compliance monitoring wells (i.e., M-50A, M-51A, W-123, and M-64A) declared exceedances at statistically significant levels (SSLs) over the respective groundwater protection standards (GWPSs) for lithium in M-50A, M-51A, and W-123; for arsenic and cobalt in M-51A; and for molybdenum in W-123 (Wood 2018b). The periods of evaluation for the statistical evaluation that declared the SSLs are December 2015 through May 2018 for M-50A, M-51A, and W-123 and February 2017 through May 2018 for M-64A.

To address these exceedances and satisfy CCR Rule requirements, a Corrective Measures Assessment (CMA) was prepared by Wood in 2019. Groundwater characterization efforts conducted as part of the CMA concluded that the distributions of cobalt and arsenic in the alluvial aquifer downgradient of the FAP are not consistent with other FAP COCs (i.e. fluoride, lithium, molybdenum) or boron, a CCR indicator constituent (Wood 2019c). Accordingly, the CMA recommended performing an ASD to determine if a source



other than the FAP is responsible for the declared cobalt and arsenic GWPS exceedances at site CCR well M-51A.

Pursuant to 40 CFR §257.95(g)(3)(ii) of the CCR Rule, the owner/operator of a CCR unit can demonstrate that a source other than the CCR unit caused the apparent exceedance over the GWPS. Potential sources include sampling and laboratory errors, statistical method inadequacies, and/or natural variation in groundwater quality. Wood's approach to this ASD was to systematically review these potential alternative sources to evaluate if any of these causes resulted in the GWPS exceedances declared at M-51A.

The ASD documented herein addresses the cobalt and arsenic exceedances at the FAP and was prepared in association with the CMA for the FAP. Preparation of the ASD within 90 days of declaring exceedances of the GWPSs was not possible because analysis of recently available characterization information was necessary to support this ASD.

## **2.0 EVALUATION OF POTENTIAL ALTERNATIVE SOURCES**

### **2.1 Alternative Source Evaluation of the Cobalt Exceedance**

As documented in the *CCR Groundwater Assessment Monitoring Statistical Analysis and Results for the Fly Ash Pond* (Wood, 2018b), the GWPS exceedance for cobalt was associated with an elevated laboratory reporting limit that was used in the non-parametric method required to evaluate the subject data set in accordance with established statistical methods. The elevated laboratory reporting limit exceeded the alternative risk based GWPS for cobalt of 0.006 milligrams per liter (mg/L). Given that all reportable concentrations of cobalt detected in groundwater downgradient of the FAP have been less than the GWPS, the exceedance is attributable to the inadequate maintenance of sufficiently low and consistent laboratory reporting limits. It is recommended that to the extent practicable, the analytical laboratory achieve reporting limits below the GWPS for Appendix IV constituents and maintain a constant reporting limit for each analyte over time for all monitoring wells.

### **2.2 Alternative Source Evaluation of the Arsenic Exceedance**

#### **2.2.1 Sampling and Laboratory Causes**

To assess potential sampling and laboratory causes for the arsenic exceedance, Wood reviewed sampling and analysis procedures, the results of laboratory data validation, and laboratory data qualifiers.

Based on a review of sampling procedures, Wood concluded that APS has conducted field sampling activities in accordance with the groundwater Sampling and Analysis Plan (SAP) developed for the Site (Montgomery & Associates, 2015) to comply with the CCR Rule. On the basis that the SAP is sufficiently detailed and contains appropriate procedures for groundwater level measurement, groundwater sample collection, sample control, laboratory analysis, and data validation, no apparent sampling causes for the arsenic exceedance were noted.

Wood also reviewed the results of laboratory report data validation for FAP compliance monitoring well samples collected during the period of interest. The scope of data validation activities was a US Environmental Protection Agency (USEPA) Stage 2A validation. Based on Wood's review, field and laboratory quality control data did not indicate an issue that would contribute to the exceedance of arsenic over the GWPS at M-51A.



### **2.2.2 Statistical Method Cause**

A statistical method cause refers to the possibility that the method used to statistically evaluate collected data is inappropriate for the statistical comparisons performed. The method is generally inappropriate for making a defensible statistical comparison in instances where the sample data violate the method assumption(s).

Currently, the FAP groundwater monitoring system is designed to perform interwell statistical comparisons (Wood, 2018a). An interwell comparison is one where samples collected from two different geographic locations within the same water bearing unit are used to perform the statistical evaluation. One geographic location represents background, or expected, groundwater conditions if the FAP is not impacting groundwater, and the other geographic location represents groundwater conditions downgradient of the FAP. Sample data collected from the two geographic locations are then statistically compared to assess site compliance. The interwell comparison method assumes that background groundwater conditions are representative of groundwater conditions observed by the compliance wells. In general, interwell comparisons perform poorly in cases where it is not possible to establish an adequate and representative background location for one or more sample constituents. Factors leading to inadequate or non-representative background can include, for example, spatial heterogeneity in groundwater conditions or discontinuous lithologies between background and compliance monitoring well locations. These inadequacies can cause an interwell statistical comparison to be meaningless and result in false positive or false negative statistical results. The USEPA's Unified Guidance presents the basis for implementing the interwell statistical comparison method (USEPA, 2009).

Spatial heterogeneity in groundwater is a recognized phenomenon at the Site and has been used as a line of evidence for ASDs for fluoride at the Bottom Ash Monofill (Wood, 2019d) and lithium at the Bottom Ash Pond (BAP) (Wood, 2019b). Arsenic concentrations measured during the April 2019 sampling event in compliance wells downgradient of the FAP vary by location and range between 0.0017 and 0.032 mg/L (the GWPS for arsenic at the FAP is the USEPA's maximum contaminant level for arsenic of 0.010 mg/L).

The concentrations of arsenic at the compliance wells show a distribution pattern inconsistent with the expected pattern if the source of arsenic was the water in the FAP. Arsenic concentrations decrease by an order of magnitude along the inferred groundwater flow path from M-51A towards downgradient well MW-65A, then increase by an order of magnitude from MW-65A to downgradient well MW-67A (Figure 1). In comparison, concentrations of boron (a constituent used to indicate the presence of CCR in groundwater at the Site) decline along the same inferred groundwater flow path. If the source of arsenic was the FAP, it is expected that arsenic concentrations would decrease along the inferred groundwater flow path, similar to boron. The observed distribution pattern suggests that the groundwater system downgradient of the FAP exhibits spatial heterogeneity with respect to arsenic, which could render the interwell statistical comparison invalid. Potential causes of spatial heterogeneity are examined in Section 2.2.3.

### **2.2.3 Natural Variation Cause**

The natural variation cause examines if natural variations in groundwater chemistry could cause the exceedance for arsenic at M-51A and/or the unexpected distribution of arsenic along the inferred groundwater flow path. Two separate lines of evidence are examined: groundwater chemistry and alluvial spatial heterogeneity.

### *Groundwater Chemistry*

Arsenic is a naturally-occurring element whose solubility and mobility can be affected by groundwater pH and redox conditions. A primary mechanism for increased arsenic concentrations in groundwater is the dissolution/desorption of arsenic from oxide minerals in the aquifer matrix (Smedley and Kinniburgh, 2001). Dissolution/desorption of arsenic is promoted in:

- Groundwater with high pH (e.g. >8.5 Standard Unit [SU]) under oxidizing conditions; or
- Reduced groundwater environments.

The unexpected distribution of arsenic along the inferred groundwater flow path suggests that natural variations in pH and/or redox conditions may be affecting arsenic concentrations at wells downgradient of the FAP, especially when compared to the spatial distribution of boron, which is not sensitive to pH or redox conditions. Concentrations of both constituents are depicted on Figure 1.

To determine if natural variations in groundwater chemistry are responsible for the arsenic exceedance at M-51A and/or the observed arsenic distribution at wells downgradient of the FAP, pH and redox conditions were compared to arsenic concentrations measured from groundwater samples collected from M-51A, MW-65A, and MW-67A. The period of examination for M-51A is from February 2018 through November 2019, while the period of examination for MW-65A and MW-67A is from February 2019 through November 2019.

Redox conditions were assessed by reviewing field parameter data such as dissolved oxygen (DO) and oxidation-reduction potential (ORP). Typically, reducing conditions correlate to lower DO and ORP values, while oxidizing conditions correlate to higher DO and ORP values. It should be noted that field parameter data is collected in the field during the groundwater sampling event, and as such, the data quality of field parameters (in particular DO and ORP) is not subject to the rigorous quality assurance/quality control procedures used to evaluate laboratory analytical data. However, these data can provide a rough approximation of the groundwater redox conditions assuming proper field instrument calibration and operation.

Table 1 summarizes the arsenic, pH, and field parameter data from the samples in question. Values of pH range from 6.7 to 7.3 SU, indicating circumneutral pH groundwater conditions that are not likely affecting arsenic mobility. DO and ORP measurements collected at M-51A range from 1.7 mg/L to 4.5 mg/L and 31.5 millivolts (mV) to 236.6 mV, respectively. The DO measurement from the November 2019 sampling event reported as percent oxygen was 0.45%.

The DO and ORP measurements from the May 2018 and February 2019 sampling events at M-51A appear contradictory. For instance, the DO concentration from the May 2018 sampling event was recorded as 4.4 mg/L, while the corresponding ORP value was recorded as 31.5 mV. In contrast, the April 2019 sampling event recorded DO and ORP as 1.7 mg/L and 190.1 mV, respectively. DO and ORP values should vary proportionally as indicators of oxidizing or reducing conditions, and the discrepancy reinforces the fact that field parameter data should not be solely relied upon as indicators of redox conditions in groundwater.

Regardless of the discrepancy, the majority of field parameter data collected at M-51A from February 2018 to November 2019 do not suggest reducing conditions are present in groundwater at this well. Additionally, concentrations of arsenic in FAP water sampled in March 2019 were reported at 0.17 mg/L, an order of magnitude greater than concentrations measured at M-51A. On this basis, it is more likely that seepage from the FAP is causing the arsenic exceedance at M-51A.

Field parameter data collected at MW-65A and MW-67A during the period of examination suggest slight differences in redox conditions at the two wells. DO and ORP concentrations measured at MW-65A ranged from 3.7 to 4.2 mg/L and 93.2 to 162.2 mV, respectively. At MW-67A, the DO and ORP values are lower, ranging from 2.0 to 2.6 mg/L and 38.8 to 82.5 mV, respectively. DO measurements from the November 2019 sampling event reported as percent oxygen were 0.33% and 0.19% at MW-65A and MW-67A, respectively. The lower redox indicators measured at MW-67A may indicate that groundwater at MW-67A is reduced relative to MW-65A, which could explain the anomalous arsenic concentrations observed at MW-67A. However, as noted above, field parameters often do not provide a robust analysis of groundwater redox conditions, and recommendations for analytical testing that could support a more definitive evaluation of groundwater redox conditions are provided in Section 3.0.

#### *Alluvial Spatial Heterogeneity*

To evaluate if the unusual distributions of arsenic along the groundwater flow path are the result of spatial heterogeneity in the alluvium, results of the MW-65A and MW-68M well installations were examined.

Alluvial monitoring well MW-65A was installed in November 2018 to help define the extent of CCR constituents downgradient of the FAP. A review of the MW-65A boring log and well construction diagram indicates that the well screen was installed from 9 to 19 feet (ft) below ground surface (bgs), approximately 1.5 ft above the Moqui member. Alluvial deposits adjacent to the well screen consist of silty clay (5.5 to 13.5 ft bgs) and sandy elastic silt (13.5 to 20.5 ft bgs). Lenses of coarse-grained sand were noted at 16.5, 17.5, and 19 ft bgs. The boring log and well construction diagram for MW-65A is presented in Appendix A.

During the attempted development of MW-65A, groundwater production from the well was minimal; water level recovery after bailing approximately 4 gallons from the well was too slow to allow for continued development. The poor groundwater production indicates that the MW-65A well screen is not in communication with relatively transmissive zones in the alluvial aquifer.

MW-68M was installed approximately 60 ft northeast of MW-65A in September 2019 to investigate potential groundwater migration in the Moqui (Wood, 2019e). The MW-68M well screen was installed from approximately 30 to 50 ft bgs in the Moqui member, which was observed to be dry from 26 ft bgs to 50 ft bgs. Observations made during the MW-68M borehole advancement suggest that groundwater migration at this location occurs primarily within a 2-ft thick deposit of poorly graded sand with gravel and silty sand located directly above the Moqui member (Wood, 2019e). The boring log and well construction diagram for MW-68M is presented in Appendix A.

Following well installation, MW-68M was pumped to remove the alluvial groundwater introduced into the Moqui member during borehole advancement and well installation. The well was pumped for 199 minutes at flow rates ranging from 0.8 to 2.4 gallons per minute. A total of approximately 303 gallons were removed and the pumping water level stabilized at approximately 34 ft bgs. During the pumping activities, it became apparent that the annular seal failed to prevent the migration of alluvial groundwater to the well screen, which necessitated immediate well abandonment.

A comparison of the volume of water produced during the MW-68M pumping activities to the volume produced during the attempted development of MW-65A indicates that MW-68M was in communication with a more transmissive zone than MW-65A. Due to its proximity to MW-68M, it is feasible that the transmissive zone encountered at the base of the alluvium in MW-68M extends laterally to the MW-65A location. However, because the bottom of the MW-65A well screen is located approximately 1.5 ft above the contact between the alluvium and the Moqui, MW-65A may not be in communication with this zone, which may explain the lower arsenic concentrations observed at this well. Alternatively, it is possible that

the transmissive zone encountered at MW-68M does not extend laterally to MW-65A as a result of spatial heterogeneity in the alluvium. Recommendations for assessing both possibilities are discussed in Section 3.0.

#### **2.2.4 Anthropogenic Sources**

Wood reviewed historical property uses, surrounding property uses, and upgradient land uses to evaluate whether there are any potential anthropogenic sources (including and other than the FAP) for the arsenic exceedance declared at M-51A or the unusual arsenic concentrations along the inferred groundwater flow path. The surrounding land uses are undeveloped, rural land with the exception of the power plant and associated infrastructure. Surface irrigation and a stock pond are present on privately-owned land southwest of Interstate 40 (Figure 2), creating a localized area with relatively shallow depth-to-groundwater and increased vegetation, similar to a wetland. Organic matter associated with wetland environments can promote reducing conditions and increased arsenic mobility in alluvial groundwater within the wetland (LANL, 2014). If alluvial groundwater beneath the irrigated land/stock pond southwest of the FAP is reduced, mobilization of naturally occurring arsenic sorbed to oxide minerals and clay minerals in the aquifer matrix could occur, thus resulting in the increased arsenic concentrations at wells located within or downgradient of this area.

The irrigated land/stock pond is located hydraulically downgradient of M-51A. Therefore, any infiltration from this area does not have the potential to influence geochemical conditions or arsenic concentrations at this well. On this basis, there is adequate evidence to eliminate anthropogenic sources as the cause of the GWPS exceedance for arsenic at M-51A. However, the irrigated land/stock pond is located upgradient of CCR well MW-67A, which, as described in Section 2.2, shows arsenic concentrations inconsistent with the expected pattern if the source of arsenic was water from the FAP. Additionally, arsenic concentrations measured at well MW-66A (located directly upgradient of the irrigated land/stock pond) are an order of magnitude less than concentrations measured at MW-67A, further suggesting that the wetland may be affecting the redox conditions and arsenic mobility in alluvial groundwater at MW-67A. If this is the case, the arsenic concentrations observed at MW-67A may be attributable to infiltration from the irrigated land/stock pond, and the lateral extent of arsenic due to seepage from the FAP may be defined by existing CCR wells downgradient of the FAP. Recommendations for analytical testing that could assess this possibility are provided in Section 3.0.

### **3.0 FINDINGS AND RECOMMENDATIONS**

The analysis documented herein concludes that the exceedance declared at the FAP for cobalt is not attributable to the FAP. Rather, the exceedance is a false positive resulting from the inadequate maintenance of sufficiently low and consistent laboratory reporting limits. This primary line of evidence supports this ASD prepared in accordance with 40 CFR §257.95(g)(3)(ii) and supports the position that the GWPS exceedance for cobalt declared on October 15, 2018 was not due to a release from the FAP.

The ASD for the arsenic exceedance over the GWPS at M-51A is currently inconclusive. Wood did not identify a line of evidence supporting an alternative source for the arsenic exceedance at M-51A. However, delineation of the downgradient extent of arsenic attributable to the FAP may be supported by assessing redox conditions in wells downgradient of the FAP. The redox indicators examined in this ASD indicate that natural variations in groundwater chemistry could be affecting arsenic concentrations downgradient of the FAP, particularly at MW-67A. On this basis, Wood recommends the following:

- Laboratory analyses of groundwater samples collected at wells M-46A, M-51A, MW-65A, MW-66A, and MW-67A for ammonia, nitrate, dissolved manganese, dissolved iron, total organic carbon, and dissolved organic carbon, and field analysis for iron(II) and iron(III) using colorimetric field sampling methods. These parameters can indicate the presence of redox conditions and the speciation of trace metals relevant to arsenic mobilization.

Depending on the results of the proposed redox analysis, the wetland-like conditions at the downgradient privately-owned property may warrant further characterization, as this area has the potential to impact both the delineation of the arsenic exceedance attributable to the FAP and the effectiveness of a future remedy. Additionally, further investigation may be warranted to assess the possibility that MW-65A is not in communication with a potential preferential pathway for arsenic transport in the alluvial aquifer. However, Wood recommends evaluation of the proposed redox investigation to guide any further characterization efforts for arsenic at the FAP.

Because the ASD for arsenic is currently inconclusive, the lateral extent of arsenic downgradient of the FAP remains undefined pending the results of the analyses recommended above. Wood recommends monitoring groundwater for arsenic at downgradient supplementary wells DM-04R, M-43A, M-46A, and M-63A to provide delineation of the arsenic concentrations above the GWPS.



#### 4.0 CERTIFICATION

By means of this certification, I certify that I have reviewed this ASD and find the information presented herein accurate and appropriate and meet the requirements of 40 CFR §257.95(g)(3)(ii).



Emily LoDolce, PE  
Printed Name of Registered Professional Engineer

Emily LoDolce  
Signature

63610                      Arizona                      January 31, 2020  
Registration No.                      Registration State                      Date

## 5.0 REFERENCES

- Federal Register, 2018. *40 Code of Federal Regulations Part 257 – Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule promulgated April 17, 2015 with Amendments to the National Minimum Criteria (Phase One, Part One) effective August 29, 2018.*
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- Wood, 2019b. *Alternative Source Demonstration for Lithium at the BAP.* Arizona Public Service Cholla Power Plant – Navajo County, Arizona. Technical Memorandum. Prepared on behalf of Arizona Public Service. June 6, 2019.
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- Wood, 2019d. *Alternative Source Demonstration for Fluoride at the BAM.* Arizona Public Service Cholla Power Plant – Navajo County, Arizona. Technical Memorandum. Prepared on behalf of Arizona Public Service. August 14, 2019.
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## TABLES



**Table 1  
Comparison of Arsenic Concentrations to pH and Field Parameters**

Constituent/Field Parameter	M-51A						MW-65A			MW-67A		
	2/14/2018	5/21/2018	10/24/2018	2/13/2019	4/10/2019	11/25/2019	2/14/2019	4/11/2019	11/26/2019	2/14/2019	4/11/2019	11/26/2019
Arsenic (mg/L)	0.015	0.022	0.032	0.025	0.032	0.018	0.0017	0.0018	<0.00099	0.016	0.016	0.015
pH (SU)	7.3*	7.1	7.3	7.1*	7.2	7.2	7.2	7.2	7.1	6.7*	6.9	6.8
DO (mg/L or % oxygen)	4.5	4.4	2.7	1.7	3.1	0.45**	4.2	3.7	0.33**	2.6	2.0	0.19**
ORP (mV)	100.2	31.5	211.4	190.1	236.6	170.5	139	93.2	162.2	38.8	82.5	45.8

**Notes:**

\* pH measured in field

\*\* DO reported in percent oxygen

DO - dissolved oxygen

mg/L - milligrams per liter

mV - millivolts

ORP - oxidation/reduction potential

SU - Standard Unit

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## FIGURES





**Legend**

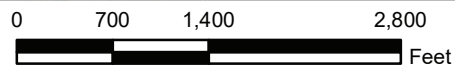
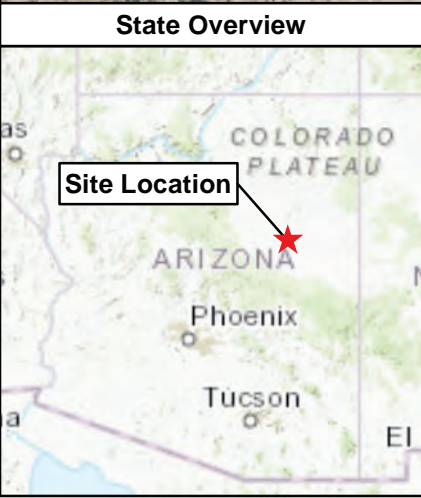
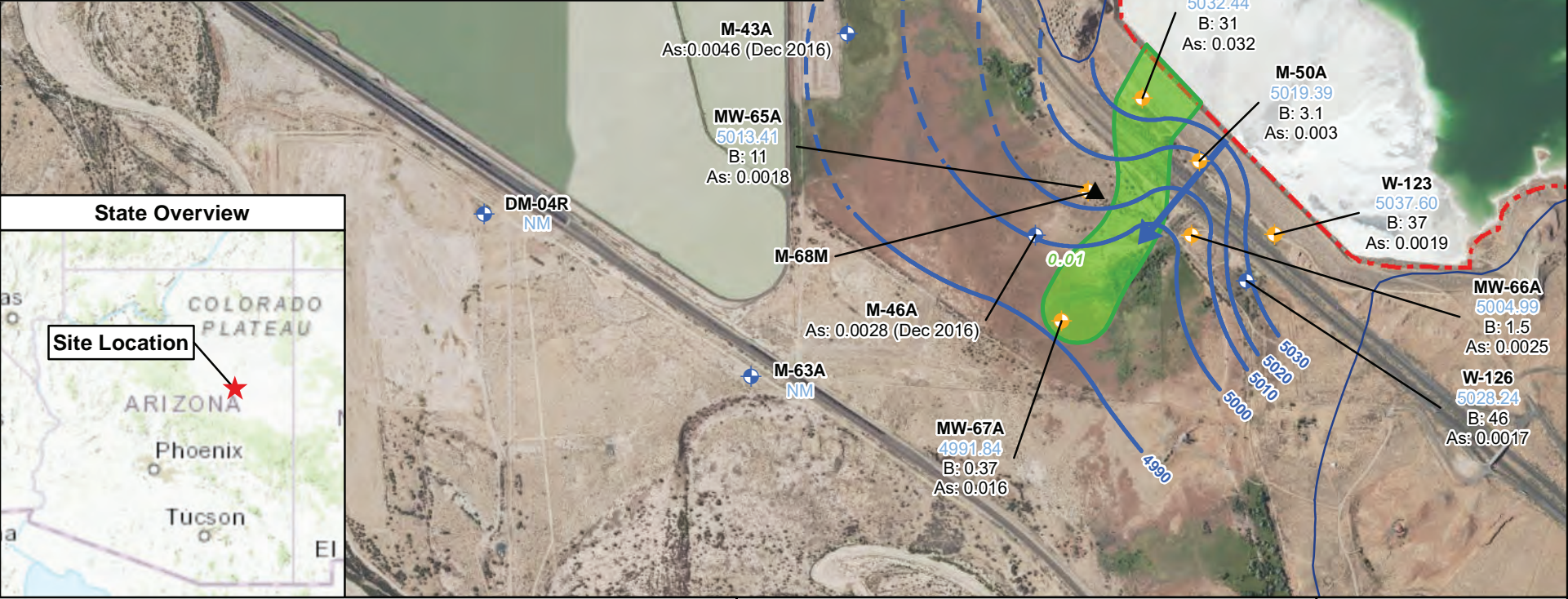
- ▲ Abandoned Monitoring Well
- ⊕ CCR Monitoring Well Location
- ⊕ Supplementary Site Monitoring Well Location
- Groundwater Elevation Contour (ft amsl)  
Alluvial Aquifer; dashed where inferred
- ➔ Groundwater Flow Direction
- Extent of Alluvial Material
- ⬠ Approximate Extent of CCR Unit

**Arsenic Concentrations in Alluvial Aquifer (April 2019)**

- >0.01 mg/L
- GWPS (0.010 mg/L)

**Notes and Abbreviations:**  
**MW-65A** Well Identification  
 5013.41 Groundwater Elevation (ft amsl)  
 Measured in April 2019  
 B: 11 Boron concentration in mg/L  
 As: 0.0018 Arsenic concentration in mg/L  
 CCR Coal Combustion Residuals  
 ft amsl feet above mean sea level  
 GWPS Groundwater Protection Standard  
 mg/L milligrams per liter  
 NM Not Monitored

- Unless otherwise noted, arsenic and boron concentrations were measured in April 2019  
 - Only wells with groundwater elevations were used in contouring



Job No. 14-2018-2040  
 PM: EHL  
 Date: 1/31/2020  
 Scale: 1" = 1,400'



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 Cholla Power Plant  
 Navajo County, Arizona

**Arsenic and Boron Concentration Map**

FIGURE  
**1**



Path: X:\Projects\20-L\Conform\Projects\APS\_Cholla\_Compliance\_Support\Map\Alternative\_Sources\_Demonstration\Figure1\_ArsenicBoronConcentrationMap.mxd

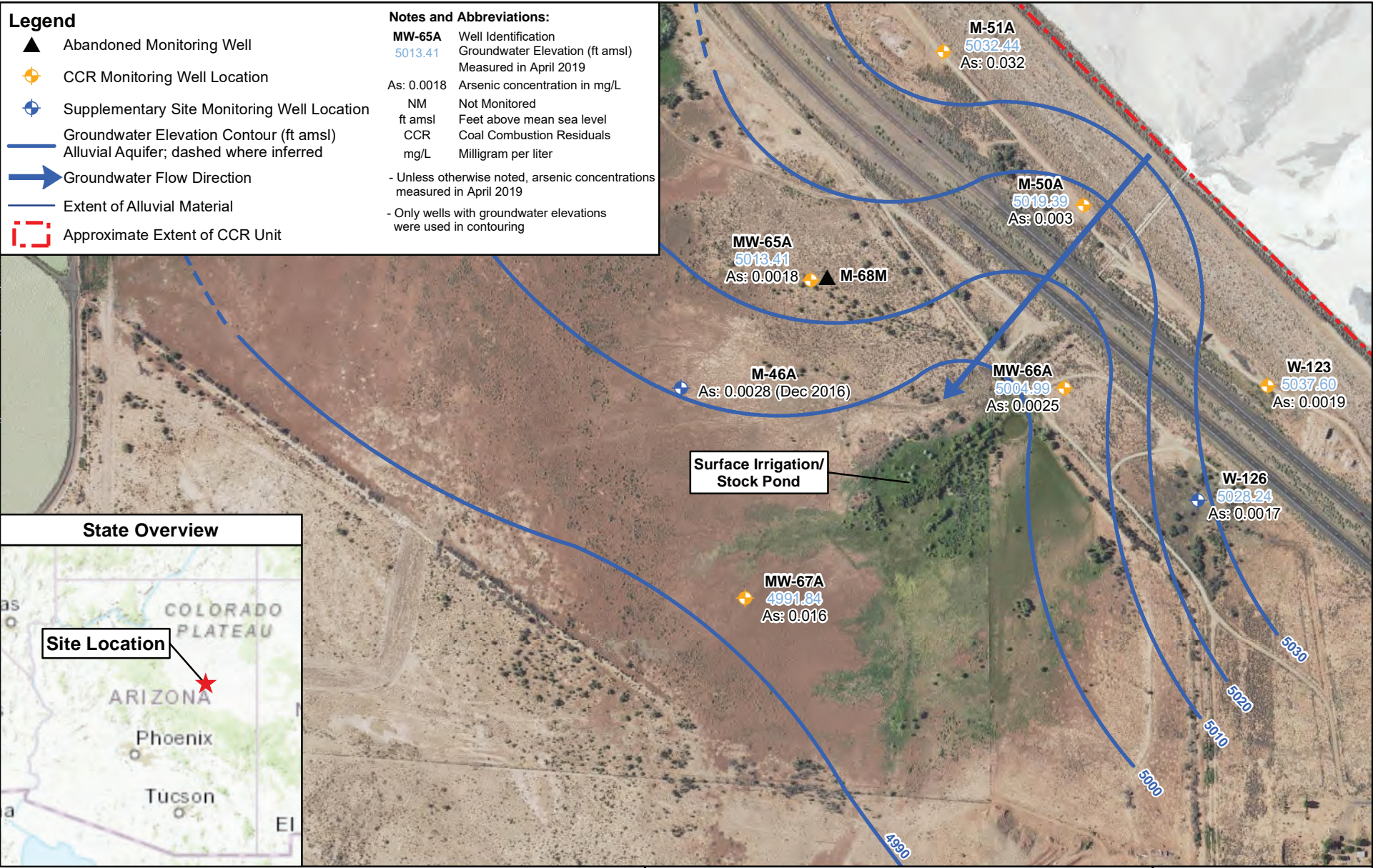


**Legend**

- ▲ Abandoned Monitoring Well
- ⬢ CCR Monitoring Well Location
- ⊕ Supplementary Site Monitoring Well Location
- Groundwater Elevation Contour (ft amsl)  
Alluvial Aquifer; dashed where inferred
- ➔ Groundwater Flow Direction
- Extent of Alluvial Material
- ⬢ Approximate Extent of CCR Unit

**Notes and Abbreviations:**

- MW-65A** Well Identification  
5013.41 Groundwater Elevation (ft amsl)  
Measured in April 2019
- As: 0.0018 Arsenic concentration in mg/L
- NM Not Monitored  
ft amsl Feet above mean sea level  
CCR Coal Combustion Residuals  
mg/L Milligram per liter
- Unless otherwise noted, arsenic concentrations measured in April 2019
- Only wells with groundwater elevations were used in contouring



**State Overview**



Job No.	14-2018-2040
PM:	EHL
Date:	1/31/2020
Scale:	1" = 500'



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Navajo County, Arizona

**Surface Irrigation Map**

FIGURE  
**2**



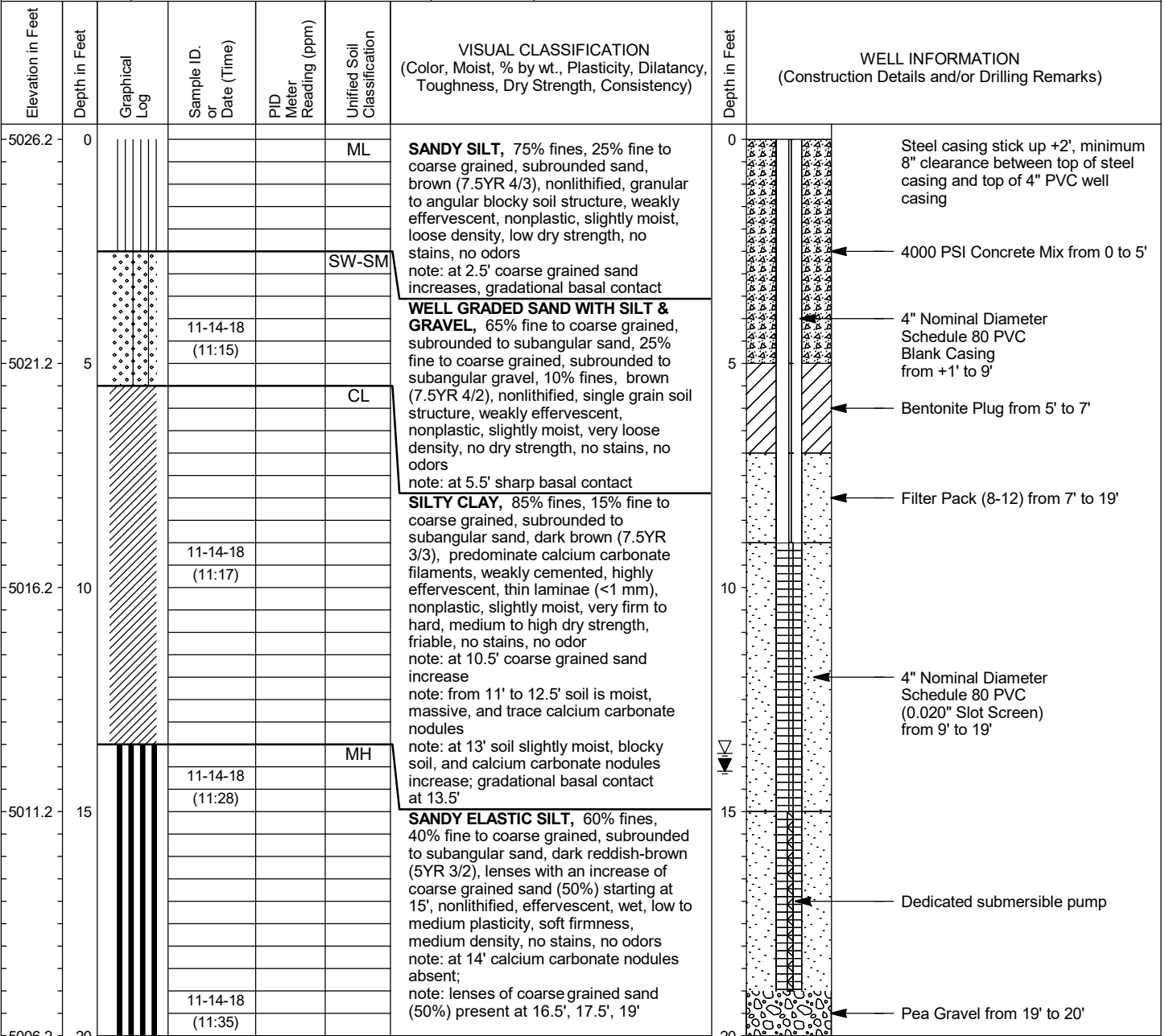
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**APPENDIX A**

**LITHOLOGIC LOGS AND WELL CONSTRUCTION DIAGRAMS**



<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>LOGGED BY:</b>	Isaac Torres	<b>PROJECT FEATURE:</b>	Fly Ash Pond
<b>DRILLER:</b>	Darius Cervantez	<b>WOOD PROJECT #:</b>	14-2018-2040
<b>DRILLER FIRM:</b>	Boart Longyear	<b>ADWR REG. #:</b>	55-922299
<b>RIG I.D.:</b>	---	<b>COORDINATES:</b>	N1429134.06, E669178.50
<b>RIG TYPE:</b>	Rotosonic	<b>COORDINATE SYS:</b>	Arizona State Plane East Zone 0201, International Feet
<b>BORING TYPE:</b>	---	<b>BORING DIA.:</b>	8"
<b>ORIENTATION:</b>	90°	<b>SURFACE ELEV. (FT):</b>	5026.21'
<b>HAMMER TYPE:</b>	Not Applicable	<b>MEAS. PT. ELEV. (FT):</b>	5027.86'
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>		N/A	<b>COMPLETION DATE:</b> 11-14-2018
<b>START DATE:</b>	11-14-2018	<b>START TIME:</b>	11:15
		<b>COMPLETION TIME:</b>	11:45



**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
13.7	11:55	11/14/18
14.1	10:30	11/17/18

METHOD Not Applicable

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-922299	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
5006.2	20				MH	note: at 20.5' olive brown staining near basal gradational contact <b>SANDY ELASTIC SILT</b> , continued <b>Trmhm - Moqui Member of Moenkopi Formation (mid-unit), mudstone</b> , 60% clay, 30% silt, 10% fine grained sand, dark reddish brown (5YR 3/4) with considerable olive brown staining (2.5Y 4/4), thin laminae (<0.5 mm), effervescent, wet, medium plasticity, medium stiff, ductile, no odors note: from 20.5' to 23' core sample is more compact in diameter note: from 22' to 23' gypsum nodules (<5 mm) present near sharp basal contact	20	(Continued)
5001.2	25		11-14-18 (11:45)			<b>Trmhm - Moqui Member of Moenkopi Formation (mid-unit), silty mudstone</b> , 55% clay, 40% silt, 5% fine grained sand, dark reddish-brown (5YR 4/4), some filaments of gypsum (at about 23'), predominant lenses of gypsum (23.5' to 25'), thin laminae (<1 mm), weakly cemented, slightly moist, low to medium plasticity, hard, medium dry strength, friable, no odors	25	Bentonite Chips from 20' to 25' Total Depth = 25'
4996.2	30					Total Depth = 25'	30	
4991.2	35						35	
4986.2	40						40	
4981.2	45						45	

**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
13.7	11:55	11/14/18
14.1	10:30	11/17/18

METHOD Not Applicable

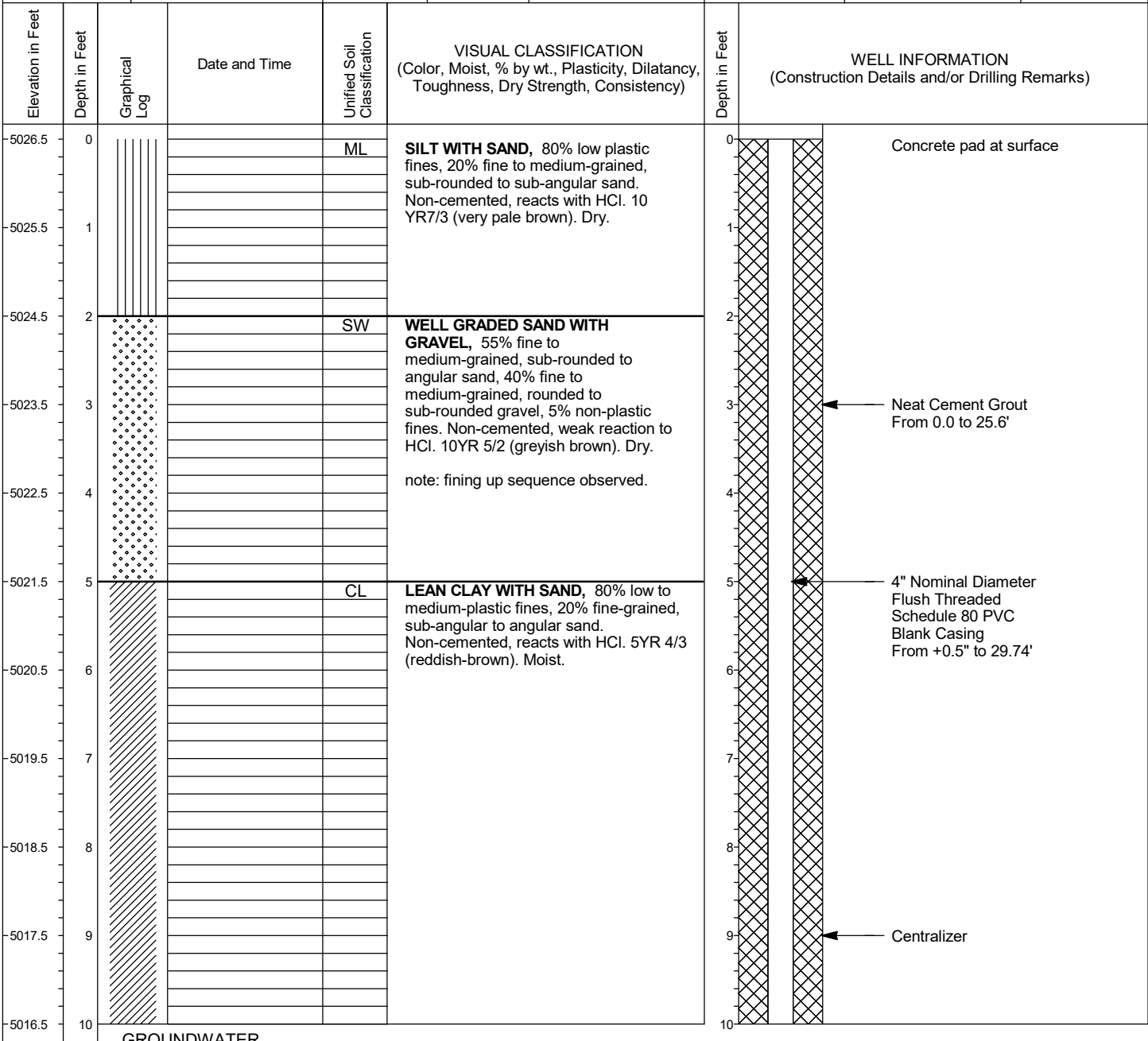




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Phoenix, Arizona 85034

# BORING LOG I.D.: MW-68M (abandoned)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation		<b>PROJECT LOCATION:</b>	APS Cholla Power Plant	
<b>LOGGED BY:</b>	D. Andersen		<b>PROJECT FEATURE:</b>	Fly Ash Pond	
<b>DRILLER:</b>	D. Cervantez		<b>WOOD PROJECT #:</b>	14-2018-2040	
<b>DRILLER FIRM:</b>	Boart Longyear		<b>ADWR REG. #:</b>	55-923346	
<b>RIG I.D.:</b>	LT4634		<b>STATION/OFFSET:</b>	N/A	
<b>RIG TYPE:</b>	Sonic		<b>REFERENCE:</b>	N/A	
<b>BORING TYPE:</b>	N/A	<b>BORING DIA.:</b>	8"	<b>COORDINATES:</b>	N1429535.367, E668309.992
<b>ORIENTATION:</b>	90°		<b>COORDINATE SYS:</b>	NAD83	
<b>HAMMER TYPE:</b>	N/A		<b>SURFACE ELEV. (FT):</b>	5026.45	
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>			N/A	<b>VERTICAL DATUM:</b>	NAVD88
<b>START DATE:</b>	9/16/2019	<b>START TIME:</b>	12:20	<b>COMPLETION DATE:</b>	9/16/2019
				<b>COMPLETION TIME:</b>	17:32



**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD     N/A    

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
-5016.5	10			CL	<b>LENA CLAY WITH SAND</b> , continued	10	(Continued)
-5015.5	11					11	
-5014.5	12					12	
-5013.5	13			CL	<b>SANDY LEAN CLAY WITH GRAVEL</b> , 60% low to medium plastic fines, 20% fine to medium-grained, sub-rounded to sub-angular sand, 20% fine-grained, sub-rounded to rounded gravel. Non-cemented, weak HCl reaction. 5YR 4/3 (reddish-brown). Moist.  note: Lens of wet, medium-grained, sub-rounded to rounded sand from 14' to 14.5'.	13	4" Nominal Diameter Flush Threaded Schedule 80 PVC Blank Casing From +0.5" to 29.74'
-5012.5	14					14	
-5011.5	15					15	
-5010.5	16			CL	<b>LEAN CLAY</b> , 90% low to medium-plastic fines, 10% medium-grained, sub-angular to angular sand. Non-cemented, weak reaction with HCl. 5YR 4/3 (reddish-brown). Minor calcite throughout. Moist.	16	Centralizer
-5009.5	17			SM	<b>SILTY SAND WITH GRAVEL</b> , 50% fine to medium-grained, sub-rounded to well-rounded sand, 30% non-plastic fines, 20% fine-grained, well-rounded gravel. Non-cemented, strong HCL reaction. 10 YR 6/2 (light brownish gray). Dry.	17	
-5008.5	18			SP	<b>POORLY GRADED SAND WITH GRAVEL</b> , 80% fine to medium-grained, sub-rounded to well-rounded sand, 15% medium-grained, well-rounded gravel, 5% non-plastic fines. Non-cemented, no reaction with HCL. 2.5YR 5/3 (reddish-brown). Wet.	18	
-5007.5	19			SM	note: free water observed. Fining up sequence observed.	19	Neat Cement Grout From 0.0 to 25.6'
-5006.5	20				<b>SILTY SAND</b> , 60% fine-grained, sub-rounded to well-rounded sand, 40% non-plastic fines. Non-cemented, no HCl reaction. 5YR 4/2 (dark reddish-gray). Wet.	20	
-5005.5	21				<b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b> , highly-weathered, maroon-red colored mudstone and claystone with 1-2 inch sub-rounded fragments of competent, fine-grained, yellow-green colored siltstone. Mudstone and claystone	21	
-5004.5	22					22	

**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD N/A

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)	
-5003.5	23				<p>weathered to clay consistency, competent siltstone fragments present in clay matrix. Trace gypsum. No HCl reaction on fresh surfaces. Wet.</p> <p><b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b>, weathered maroon-red colored mudstone and claystone mixed with weathered, fine-grained, yellow-green colored siltstone. Mixture of mudstone, claystone, and siltstone has "swirled" appearance, possibly representing deformation structures or weathering. Reacts w/ HCl on fresh surfaces. Moist, though much less so than previous interval. Decreasing moisture with depth.</p> <p><b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b>, maroon-red colored mudstone and claystone alternating with fine-grained, yellow-green colored siltstone. Decreased weathering. Gypsum stringers throughout. Strong HCl reaction on fresh surfaces. Slightly moist.</p> <p><b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b>, competent, unweathered, maroon-red colored mudstone and claystone alternating with fine-grained, yellow-green colored siltstone. Gypsum stringers throughout. Strong HCl reaction on fresh surfaces. Dry. Hard drilling at 35'.</p> <p>note: rig shutdown for 1.5 hours at 35' interval. Upon resuming drilling, moisture present from 35' to 36' interval and dry underneath. Moisture likely due to introduced alluvial groundwater.</p>	23	(Continued)	
-5002.5	24						24	Neat Cement Grout From 0.0 to 25.6'
-5001.5	25						25	
-5000.5	26						26	Bentonite Hole Plug From 25.6' to 27.7'
-4999.5	27						27	
-4998.5	28						28	Transition Sand 20/40 Silica Sand From 27.7' to 28.5'
-4997.5	29						29	Centralizer
-4996.5	30						30	Filter Pack 8/12 Silica Sand From 28.5' to 50.27'
-4995.5	31						31	4" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 29.74' to 49.84'
-4994.5	32						32	
-4993.5	33						33	
-4992.5	34						34	
-4991.5	35						35	

**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD N/A

(Continued Next Page)



Environment & Infrastructure Solutions, Inc.  
4600 East Washington Street, Suite 600  
Phoenix, Arizona 85034

# BORING LOG I.D.: MW-68M (abandoned)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
-4991.5	35				<b>MOQUI MEMBER OF THE MOENKOPI FORMATION, continued</b>	35	(Continued)
-4990.5	36		36	4" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 29.74' to 49.84'			
-4989.5	37		37				
-4988.5	38		38	Filter Pack 8/12 Silica Sand From 27.7' to 50.27'			
-4987.5	39		39				
-4986.5	40		40				
-4985.5	41		41				
-4984.5	42		42				
-4983.5	43		43				
-4982.5	44		44				
-4981.5	45		45				
-4980.5	46		46				
-4979.5	47		47				

**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD     N/A    

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
-4978.5	48				<b>MOQUI MEMBER OF THE MOENKOPI FORMATION, continued</b>	48	(Continued) 4" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 29.74' to 49.84' Filter Pack 8/12 Silica Sand From 27.7' to 50.27' End Cap Total Depth = 50.27'
-4977.5	49					49	
-4976.5	50					50	
					Total Depth = 50.35'		
-4975.5	51					51	
-4974.5	52					52	
-4973.5	53					53	
-4972.5	54					54	
-4971.5	55					55	
-4970.5	56					56	
-4969.5	57					57	
-4968.5	58					58	
-4967.5	59					59	
-4966.5	60					60	

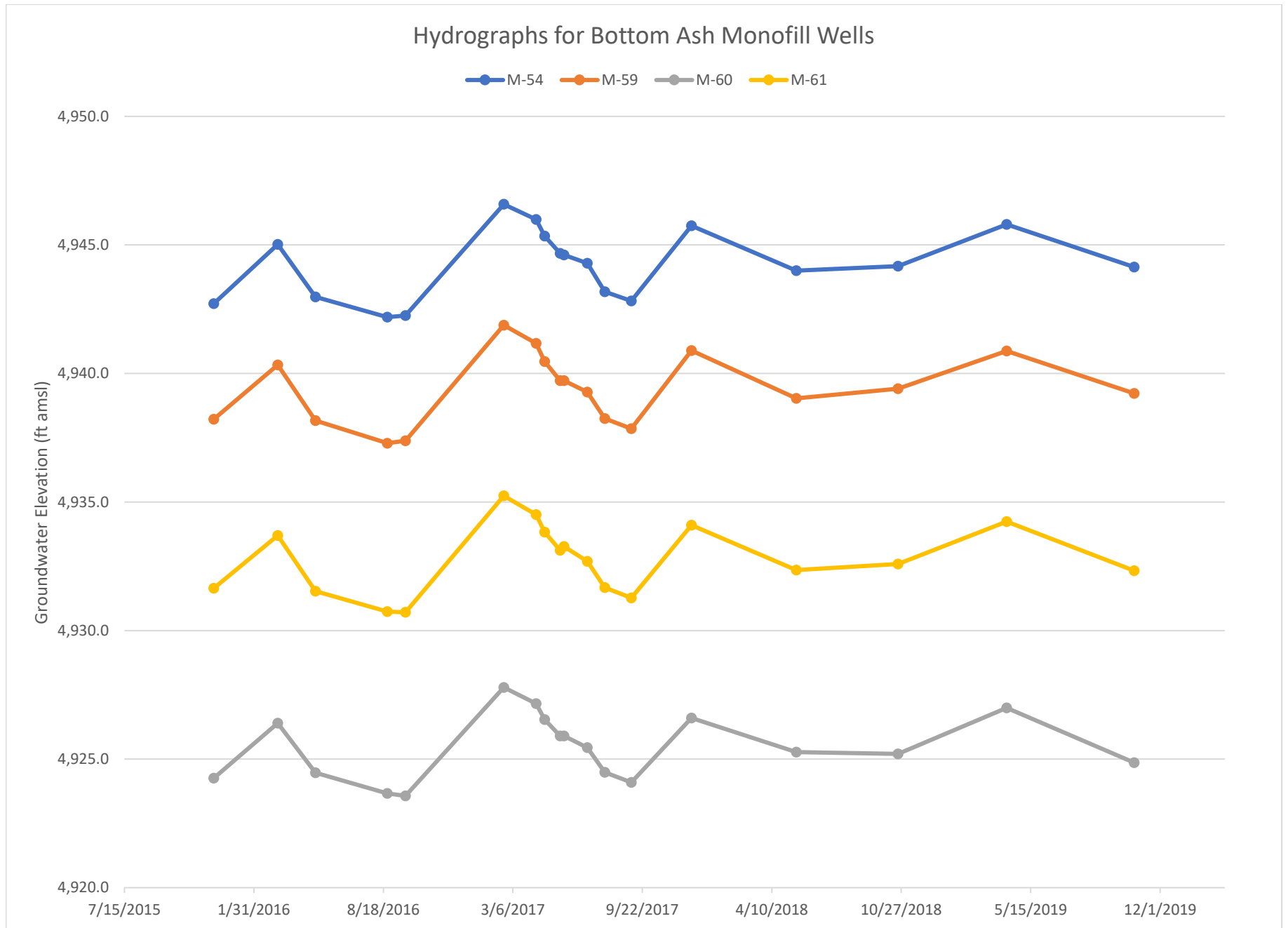
**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD     N/A



**APPENDIX D**  
**GROUNDWATER ELEVATION DATA AND HYDROGRAPHS**



Appendix D - Groundwater Elevation Data and Hydrographs

M-54				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5070.71	127.99	4942.72	
3/8/2016	5070.71	125.69	4945.02	
5/5/2016	5070.71	127.73	4942.98	
8/24/2016	5070.71	128.52	4942.19	
9/21/2016	5070.71	128.46	4942.25	
2/20/2017	5070.71	124.13	4946.58	
4/11/2017	5070.71	124.72	4945.99	
4/24/2017	5070.71	125.37	4945.34	
5/18/2017	5070.71	126.04	4944.67	
5/24/2017	5070.71	126.10	4944.61	
6/29/2017	5070.71	126.42	4944.29	
7/26/2017	5070.71	127.53	4943.18	
9/5/2017	5070.71	127.89	4942.82	
12/7/2017	5070.71	124.96	4945.75	
5/18/2018	5070.71	126.71	4944.00	
10/22/2018	5070.71	126.54	4944.17	
4/8/2019	5070.71	124.91	4945.80	
10/22/2019	5070.71	126.57	4944.14	

Maximum Observed: 4946.58 ft AMSL

Minimum Observed: 4942.19 ft AMSL

Range: 4.39 ft

Appendix D - Groundwater Elevation Data and Hydrographs

M-59				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5136.00	197.78	4938.22	
3/8/2016	5136.00	195.67	4940.33	
5/5/2016	5136.00	197.83	4938.17	
8/24/2016	5136.00	198.71	4937.29	
9/21/2016	5136.00	198.62	4937.38	
2/20/2017	5136.00	194.12	4941.88	
4/11/2017	5136.00	194.83	4941.17	
4/24/2017	5136.00	195.54	4940.46	
5/18/2017	5136.00	196.28	4939.72	
5/24/2017	5136.00	196.28	4939.72	
6/29/2017	5136.00	196.72	4939.28	
7/26/2017	5136.00	197.75	4938.25	
9/5/2017	5136.00	198.15	4937.85	
12/7/2017	5136.00	195.11	4940.89	
5/18/2018	5136.00	196.97	4939.03	
10/22/2018	5136.00	196.59	4939.41	
4/8/2019	5136.00	195.13	4940.87	
10/22/2019	5136.00	196.78	4939.22	

Maximum Observed: 4941.88 ft AMSL

Minimum Observed: 4937.29 ft AMSL

Range: 4.59 ft

Appendix D - Groundwater Elevation Data and Hydrographs

M-60				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5151.18	226.92	4924.26	
3/8/2016	5151.18	224.78	4926.40	
5/5/2016	5151.18	226.71	4924.47	
8/24/2016	5151.18	227.51	4923.67	
9/21/2016	5151.18	227.61	4923.57	
2/20/2017	5151.18	223.39	4927.79	
4/11/2017	5151.18	224.02	4927.16	
4/24/2017	5151.18	224.64	4926.54	
5/18/2017	5151.18	225.28	4925.90	
5/24/2017	5151.18	225.28	4925.90	
6/29/2017	5151.18	225.73	4925.45	
7/26/2017	5151.18	226.69	4924.49	
9/5/2017	5151.18	227.09	4924.09	
12/7/2017	5151.18	224.58	4926.60	
5/18/2018	5151.18	225.91	4925.27	
10/22/2018	5151.18	225.98	4925.20	
4/8/2019	5151.18	224.19	4926.99	
10/22/2019	5151.18	226.32	4924.86	

Maximum Observed: 4927.79 ft AMSL

Minimum Observed: 4923.57 ft AMSL

Range: 4.22 ft



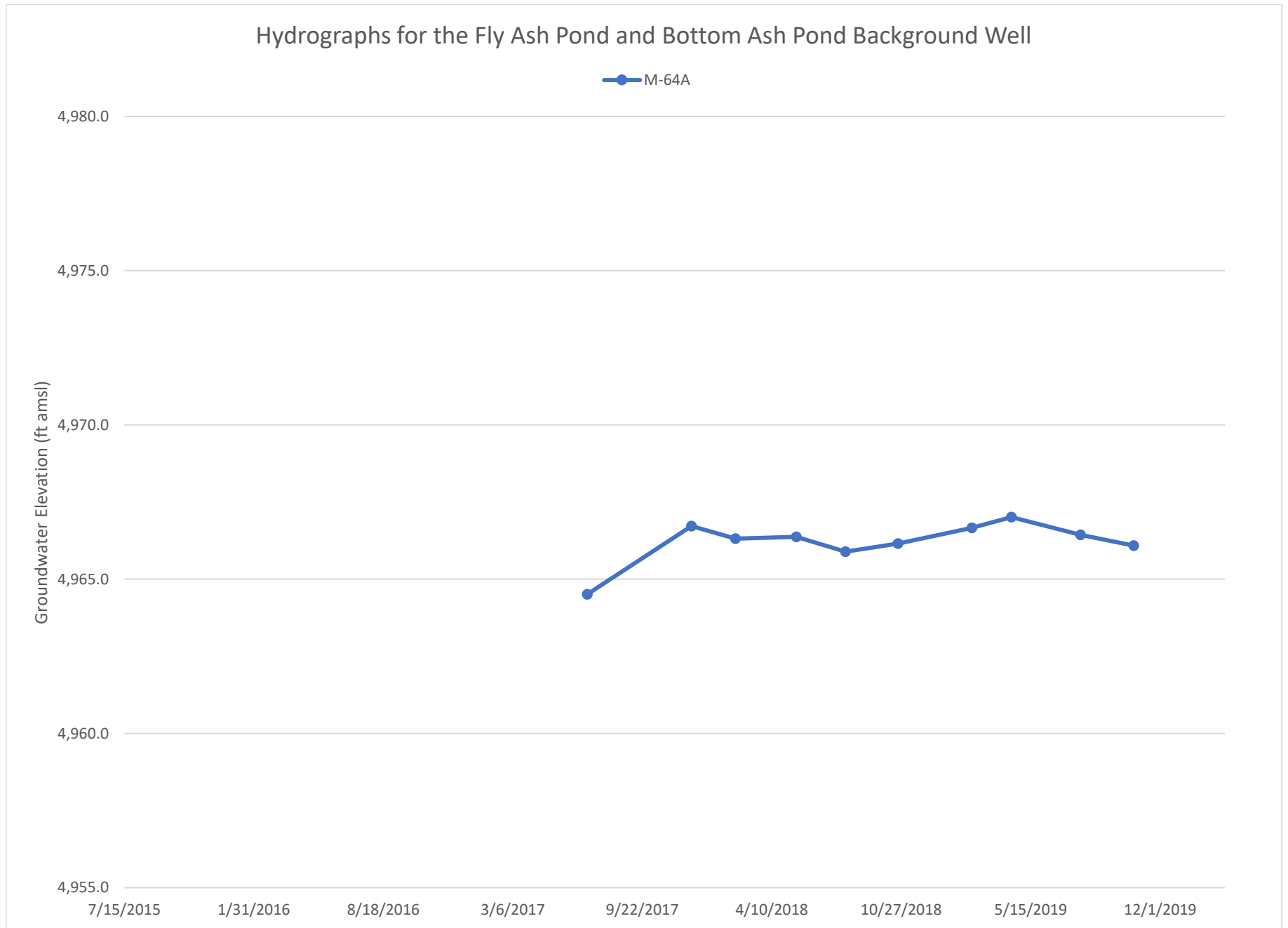
Appendix D - Groundwater Elevation Data and Hydrographs

M-61				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5127.58	195.93	4931.65	
3/8/2016	5127.58	193.88	4933.70	
5/5/2016	5127.58	196.05	4931.53	
8/24/2016	5127.58	196.84	4930.74	
9/21/2016	5127.58	196.87	4930.71	
2/20/2017	5127.58	192.34	4935.24	
4/11/2017	5127.58	193.07	4934.51	
4/24/2017	5127.58	193.75	4933.83	
5/18/2017	5127.58	194.46	4933.12	
5/24/2017	5127.58	194.31	4933.27	
6/29/2017	5127.58	194.89	4932.69	
7/26/2017	5127.58	195.91	4931.67	
9/5/2017	5127.58	196.31	4931.27	
12/7/2017	5127.58	193.48	4934.10	
5/18/2018	5127.58	195.23	4932.35	
10/22/2018	5127.58	194.99	4932.59	
4/8/2019	5127.58	193.34	4934.24	
10/22/2019	5127.58	195.25	4932.33	

Maximum Observed: 4935.24 ft AMSL

Minimum Observed: 4930.71 ft AMSL

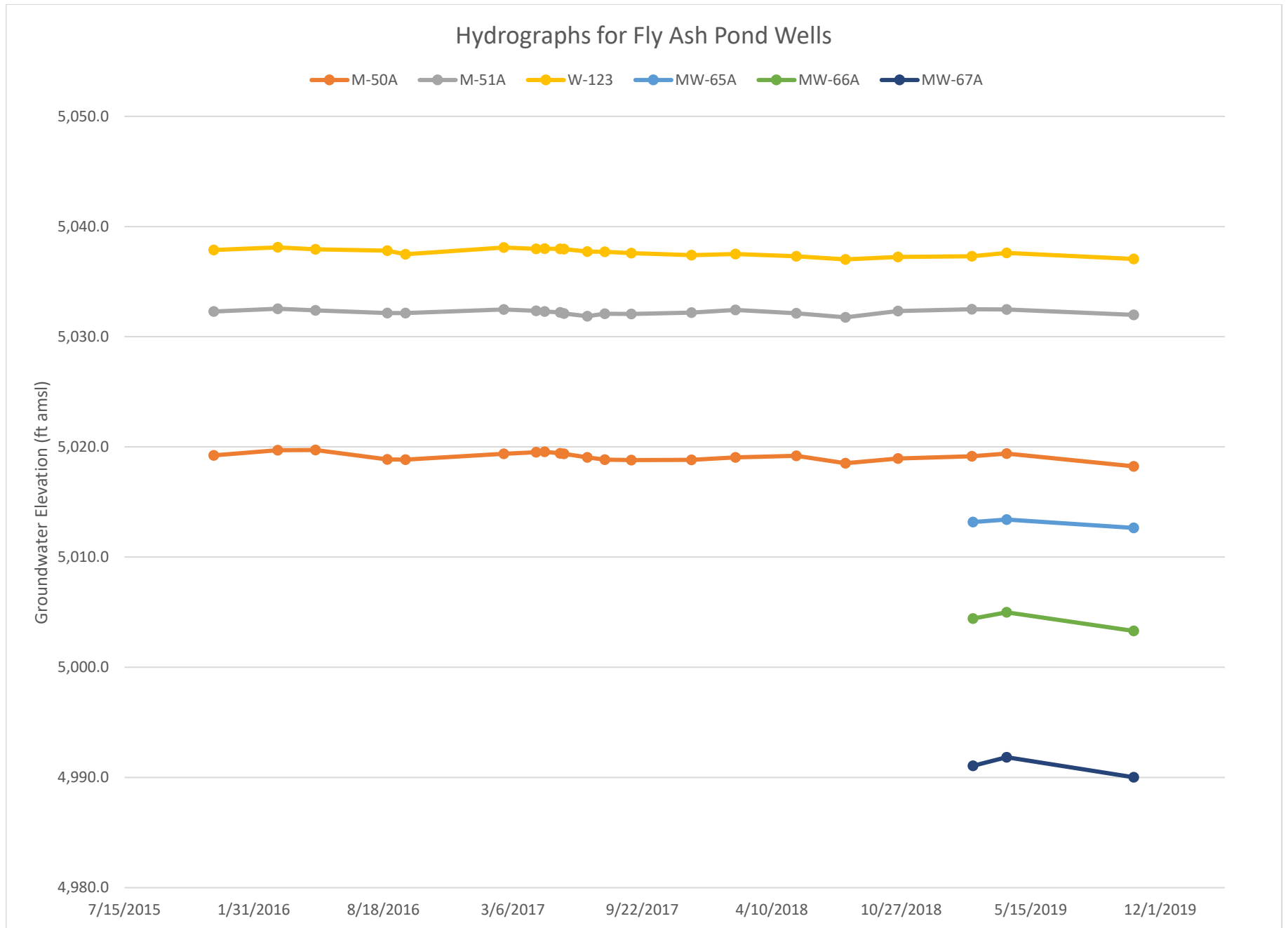
Range: 4.53 ft



Appendix D - Groundwater Elevation Data and Hydrographs

M-64A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
6/29/2017	4991.90	27.39	4964.51	
12/7/2017	4991.90	25.18	4966.72	
2/13/2018	4991.90	25.59	4966.31	
5/18/2018	4991.90	25.53	4966.37	
8/2/2018	4991.90	26.01	4965.89	
10/22/2018	4991.90	25.75	4966.15	
2/13/2019	4991.90	25.24	4966.66	
4/15/2019	4991.90	24.89	4967.01	
7/31/2019	4991.90	25.46	4966.44	
10/21/2019	4991.90	25.81	4966.09	

*Maximum Observed:* 4967.01 ft AMSL  
*Minimum Observed:* 4964.51 ft AMSL  
*Range:* 2.50 ft



Appendix D - Groundwater Elevation Data and Hydrographs

M-50A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5038.18	18.95	5019.23	
3/8/2016	5038.18	18.47	5019.71	
5/5/2016	5038.18	18.46	5019.72	
8/24/2016	5038.18	19.32	5018.86	
9/21/2016	5038.18	19.33	5018.85	
2/20/2017	5038.18	18.81	5019.37	
4/11/2017	5038.18	18.66	5019.52	
4/24/2017	5038.18	18.62	5019.56	
5/18/2017	5038.18	18.77	5019.41	
5/24/2017	5038.18	18.81	5019.37	
6/29/2017	5038.18	19.13	5019.05	
7/26/2017	5038.18	19.33	5018.85	
9/5/2017	5038.18	19.37	5018.81	
12/7/2017	5038.18	19.36	5018.82	
2/13/2018	5038.18	19.13	5019.05	
5/18/2018	5038.18	18.99	5019.19	
8/2/2018	5038.18	19.65	5018.53	
10/22/2018	5038.18	19.23	5018.95	
2/13/2019	5038.18	19.03	5019.15	
4/8/2019	5038.18	18.79	5019.39	
10/21/2019	5038.18	19.94	5018.24	

Maximum Observed: 5019.72 ft AMSL

Minimum Observed: 5018.24 ft AMSL

Range: 1.48 ft



Appendix D - Groundwater Elevation Data and Hydrographs

M-51A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5041.77	9.47	5032.30	
3/8/2016	5041.77	9.23	5032.54	
5/5/2016	5041.77	9.37	5032.40	
8/24/2016	5041.77	9.62	5032.15	
9/21/2016	5041.77	9.63	5032.14	
2/20/2017	5041.77	9.29	5032.48	
4/11/2017	5041.77	9.42	5032.35	
4/24/2017	5041.77	9.48	5032.29	
5/18/2017	5041.77	9.57	5032.20	
5/24/2017	5041.77	9.66	5032.11	
6/29/2017	5041.77	9.91	5031.86	
7/26/2017	5041.77	9.68	5032.09	
9/5/2017	5041.77	9.7	5032.07	
12/7/2017	5041.77	9.58	5032.19	
2/13/2018	5041.77	9.33	5032.44	
5/18/2018	5041.77	9.64	5032.13	
8/2/2018	5041.77	10.01	5031.76	
10/22/2018	5041.77	9.44	5032.33	
2/13/2019	5041.77	9.28	5032.49	
4/8/2019	5041.77	9.3	5032.47	
10/21/2019	5041.77	9.78	5031.99	

Maximum Observed: 5032.54 ft AMSL

Minimum Observed: 5031.76 ft AMSL

Range: 0.78 ft

Appendix D - Groundwater Elevation Data and Hydrographs

W-123				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5039.84	1.97	5037.87	
3/8/2016	5039.84	1.73	5038.11	
5/5/2016	5039.84	1.90	5037.94	
8/24/2016	5039.84	2.02	5037.82	
9/21/2016	5039.84	2.35	5037.49	
2/20/2017	5039.84	1.74	5038.10	
4/11/2017	5039.84	1.86	5037.98	
4/24/2017	5039.84	1.85	5037.99	
5/18/2017	5039.84	1.87	5037.97	
5/24/2017	5039.84	1.88	5037.96	
6/29/2017	5039.84	2.11	5037.73	
7/26/2017	5039.84	2.12	5037.72	
9/5/2017	5039.84	2.25	5037.59	
12/7/2017	5039.84	2.43	5037.41	
2/13/2018	5039.84	2.34	5037.50	
5/18/2018	5039.84	2.53	5037.31	
8/2/2018	5039.84	2.82	5037.02	
10/22/2018	5039.84	2.60	5037.24	
2/13/2019	5039.84	2.53	5037.31	
4/8/2019	5039.84	2.24	5037.60	
10/21/2019	5039.84	2.78	5037.06	

Maximum Observed: 5038.11 ft AMSL

Minimum Observed: 5037.02 ft AMSL

Range: 1.09 ft

Appendix D - Groundwater Elevation Data and Hydrographs

MW-65A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
2/15/2019	5027.86	14.67	5013.19	
4/8/2019	5027.86	14.45	5013.41	
10/21/2019	5027.86	15.21	5012.65	

*Maximum Observed: 5013.41 ft AMSL*

*Minimum Observed: 5012.65 ft AMSL*

*Range: 0.76 ft*

Appendix D - Groundwater Elevation Data and Hydrographs

MW-66A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
2/15/2019	5033.35	28.93	5004.42	
4/8/2019	5033.35	28.36	5004.99	
10/21/2019	5033.35	30.05	5003.30	

*Maximum Observed: 5004.99 ft AMSL*

*Minimum Observed: 5004.42 ft AMSL*

*Range: 0.57 ft*

Appendix D - Groundwater Elevation Data and Hydrographs

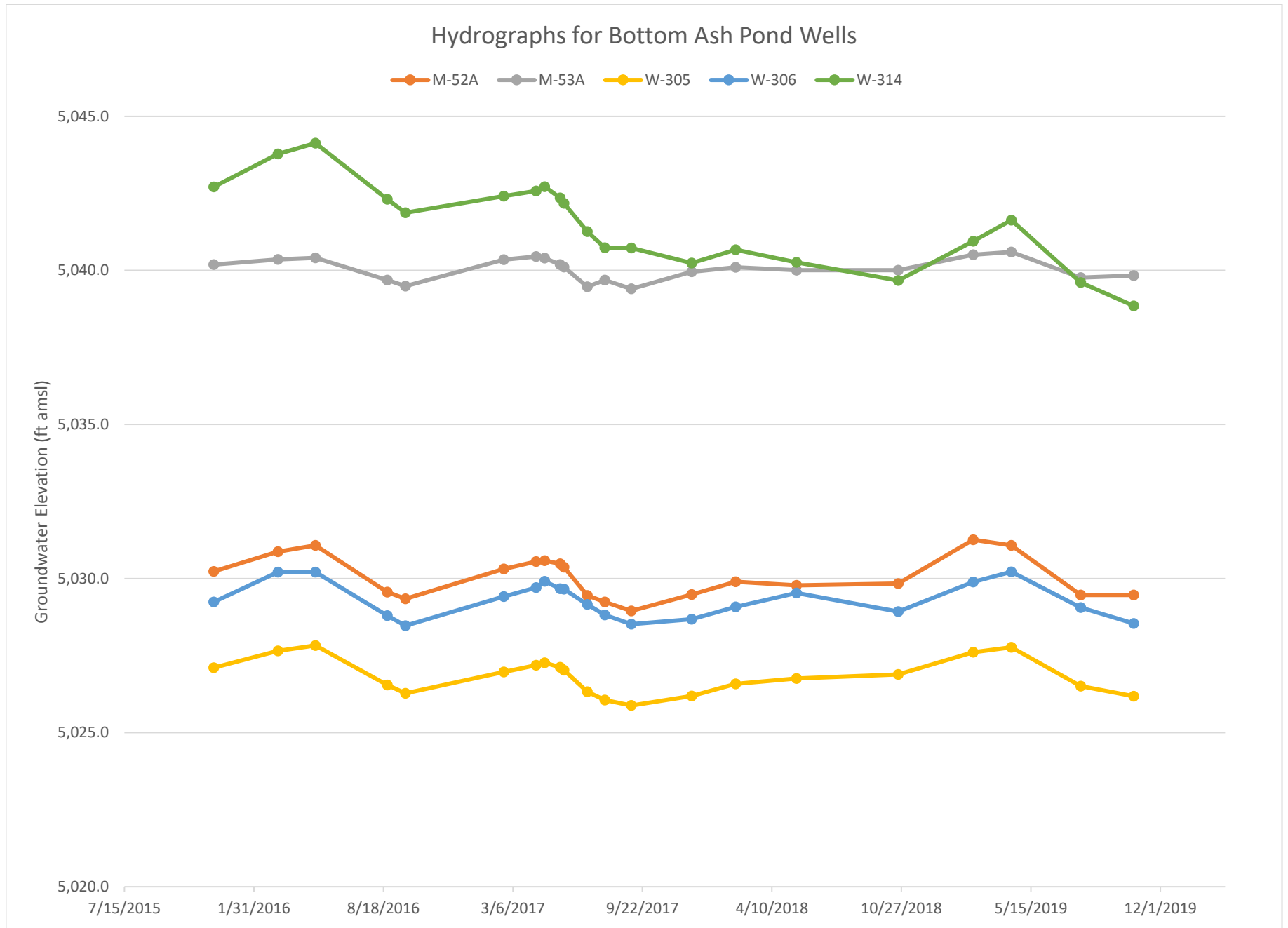
MW-67A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
2/15/2019	5025.38	34.32	4991.06	
4/8/2019	5025.38	33.54	4991.84	
10/21/2019	5025.38	35.36	4990.02	

*Maximum Observed: 4991.84 ft AMSL*

*Minimum Observed: 4991.06 ft AMSL*

*Range: 0.78 ft*





Appendix D - Groundwater Elevation Data and Hydrographs

M-52A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5049.36	19.13	5030.23	
3/8/2016	5049.36	18.49	5030.87	
5/5/2016	5049.36	18.28	5031.08	
8/24/2016	5049.36	19.80	5029.56	
9/21/2016	5049.36	20.02	5029.34	
2/20/2017	5049.36	19.05	5030.31	
4/11/2017	5049.36	18.81	5030.55	
4/24/2017	5049.36	18.78	5030.58	
5/18/2017	5049.36	18.88	5030.48	
5/24/2017	5049.36	18.99	5030.37	
6/29/2017	5049.36	19.91	5029.45	
7/26/2017	5049.36	20.12	5029.24	
9/5/2017	5049.36	20.41	5028.95	
12/7/2017	5049.36	19.88	5029.48	
2/13/2018	5049.36	19.46	5029.90	
5/18/2018	5049.36	19.58	5029.78	
10/22/2018	5049.36	19.52	5029.84	
2/15/2019	5049.36	18.10	5031.26	
4/15/2019	5049.36	18.28	5031.08	
7/31/2019	5049.36	19.89	5029.47	
10/21/2019	5049.36	19.89	5029.47	

Maximum Observed: 5031.26 ft AMSL

Minimum Observed: 5028.95 ft AMSL

Range: 2.31 ft

Appendix D - Groundwater Elevation Data and Hydrographs

M-53A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5044.68	4.49	5040.19	
3/8/2016	5044.68	4.32	5040.36	
5/5/2016	5044.68	4.27	5040.41	
8/24/2016	5044.68	4.99	5039.69	
9/21/2016	5044.68	5.19	5039.49	
2/20/2017	5044.68	4.33	5040.35	
4/11/2017	5044.68	4.23	5040.45	
4/24/2017	5044.68	4.28	5040.40	
5/18/2017	5044.68	4.49	5040.19	
5/24/2017	5044.68	4.57	5040.11	
6/29/2017	5044.68	5.21	5039.47	
7/26/2017	5044.68	4.99	5039.69	
9/5/2017	5044.68	5.28	5039.40	
12/7/2017	5044.68	4.72	5039.96	
2/13/2018	5044.68	4.58	5040.10	
5/18/2018	5044.68	4.67	5040.01	
10/22/2018	5044.68	4.67	5040.01	
2/15/2019	5044.68	4.17	5040.51	
4/15/2019	5044.68	4.08	5040.60	
7/31/2019	5044.68	4.91	5039.77	
10/21/2019	5044.68	4.85	5039.83	

Maximum Observed: 5040.60 ft AMSL

Minimum Observed: 5039.40 ft AMSL

Range: 1.20 ft

Appendix D - Groundwater Elevation Data and Hydrographs

W-305				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5046.80	19.69	5027.11	
3/8/2016	5046.80	19.15	5027.65	
5/5/2016	5046.80	18.97	5027.83	
8/24/2016	5046.80	20.25	5026.55	
9/21/2016	5046.80	20.52	5026.28	
2/20/2017	5046.80	19.83	5026.97	
4/11/2017	5046.80	19.61	5027.19	
4/24/2017	5046.80	19.53	5027.27	
5/18/2017	5046.80	19.68	5027.12	
5/24/2017	5046.80	19.77	5027.03	
6/29/2017	5046.80	20.47	5026.33	
7/26/2017	5046.80	20.74	5026.06	
9/5/2017	5046.80	20.92	5025.88	
12/7/2017	5046.80	20.61	5026.19	
2/13/2018	5046.80	20.22	5026.58	
5/18/2018	5046.80	20.04	5026.76	
10/22/2018	5046.80	19.91	5026.89	
2/15/2019	5046.80	19.19	5027.61	
4/15/2019	5046.80	19.03	5027.77	
7/31/2019	5046.80	20.29	5026.51	
10/21/2019	5046.80	20.62	5026.18	

Maximum Observed: 5027.83 ft AMSL

Minimum Observed: 5025.88 ft AMSL

Range: 1.95 ft

Appendix D - Groundwater Elevation Data and Hydrographs

W-306				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5046.74	17.50	5029.24	
3/8/2016	5046.74	16.53	5030.21	
5/5/2016	5046.74	16.53	5030.21	
8/24/2016	5046.74	17.94	5028.80	
9/21/2016	5046.74	18.27	5028.47	
2/20/2017	5046.74	17.32	5029.42	
4/11/2017	5046.74	17.03	5029.71	
4/24/2017	5046.74	16.83	5029.91	
5/18/2017	5046.74	17.07	5029.67	
5/24/2017	5046.74	17.08	5029.66	
6/29/2017	5046.74	17.58	5029.16	
7/26/2017	5046.74	17.92	5028.82	
9/5/2017	5046.74	18.22	5028.52	
12/7/2017	5046.74	18.06	5028.68	
2/13/2018	5046.74	17.66	5029.08	
5/18/2018	5046.74	17.21	5029.53	
10/22/2018	5046.74	17.81	5028.93	
2/15/2019	5046.74	16.85	5029.89	
4/15/2019	5046.74	16.52	5030.22	
7/31/2019	5046.74	17.68	5029.06	
10/21/2019	5046.74	18.2	5028.54	

Maximum Observed: 5030.22 ft AMSL

Minimum Observed: 5028.47 ft AMSL

Range: 1.75 ft

Appendix D - Groundwater Elevation Data and Hydrographs

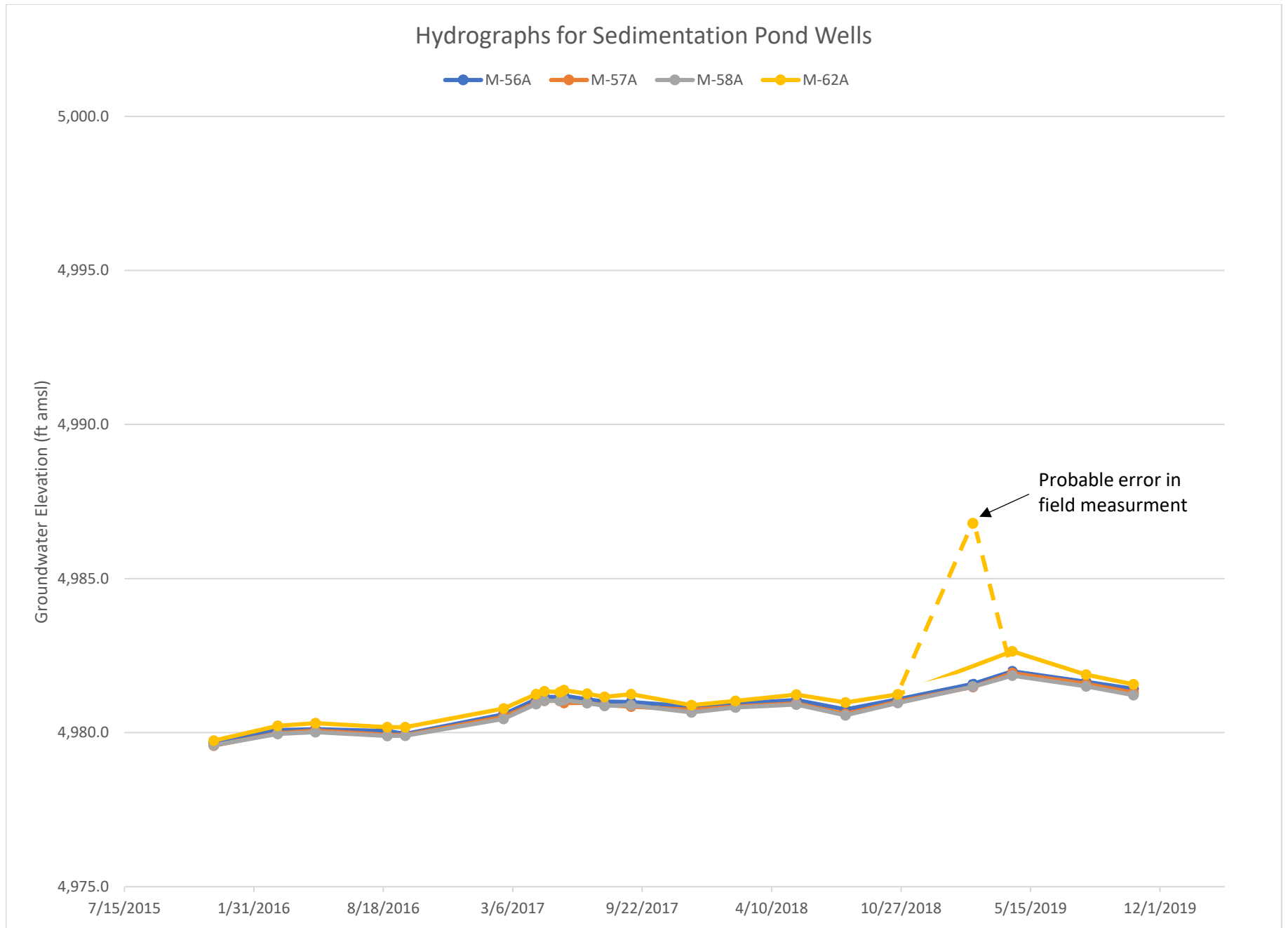
W-314				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5051.10	8.39	5042.71	
3/8/2016	5051.10	7.32	5043.78	
5/5/2016	5051.10	6.97	5044.13	
8/24/2016	5051.10	8.79	5042.31	
9/21/2016	5051.10	9.23	5041.87	
2/20/2017	5051.10	8.69	5042.41	
4/11/2017	5051.10	8.52	5042.58	
4/24/2017	5051.10	8.38	5042.72	
5/18/2017	5051.10	8.75	5042.35	
5/24/2017	5051.10	8.92	5042.18	
6/29/2017	5051.10	9.84	5041.26	
7/26/2017	5051.10	10.36	5040.74	
9/5/2017	5051.10	10.37	5040.73	
12/7/2017	5051.10	10.86	5040.24	
2/13/2018	5051.10	10.43	5040.67	
5/18/2018	5051.10	10.84	5040.26	
10/22/2018	5051.10	11.43	5039.67	
2/15/2019	5051.10	10.15	5040.95	
4/15/2019	5051.10	9.47	5041.63	
7/31/2019	5051.10	11.49	5039.61	
10/21/2019	5051.10	12.25	5038.85	

Maximum Observed: 5044.13 ft AMSL

Minimum Observed: 5038.85 ft AMSL

Range: 5.28 ft





Appendix D - Groundwater Elevation Data and Hydrographs

M-56A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5023.17	43.52	4979.65	
3/8/2016	5023.17	43.09	4980.08	
5/5/2016	5023.17	43.06	4980.11	
8/24/2016	5023.17	43.12	4980.05	
9/21/2016	5023.17	43.21	4979.96	
2/20/2017	5023.17	42.58	4980.59	
4/11/2017	5023.17	42.09	4981.08	
4/24/2017	5023.17	42.01	4981.16	
5/18/2017	5023.17	42.02	4981.15	
5/24/2017	5023.17	41.97	4981.20	
6/29/2017	5023.17	42.09	4981.08	
7/26/2017	5023.17	42.16	4981.01	
9/5/2017	5023.17	42.18	4980.99	
12/7/2017	5023.17	42.32	4980.85	
2/13/2018	5023.17	42.23	4980.94	
5/18/2018	5023.17	42.11	4981.06	
8/2/2018	5023.17	42.42	4980.75	
10/22/2018	5023.17	42.09	4981.08	
2/15/2019	5023.17	41.59	4981.58	
4/17/2019	5023.17	41.18	4981.99	
8/9/2019	5023.17	41.52	4981.65	
10/21/2019	5023.17	41.75	4981.42	

Maximum Observed: 4981.99 ft AMSL

Minimum Observed: 4979.65 ft AMSL

Range: 2.34 ft

Appendix D - Groundwater Elevation Data and Hydrographs

M-57A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5023.82	44.24	4979.58	
3/8/2016	5023.82	43.84	4979.98	
5/5/2016	5023.82	43.75	4980.07	
8/24/2016	5023.82	43.89	4979.93	
9/21/2016	5023.82	43.90	4979.92	
2/20/2017	5023.82	43.31	4980.51	
4/11/2017	5023.82	42.86	4980.96	
4/24/2017	5023.82	42.78	4981.04	
5/18/2017	5023.82	42.79	4981.03	
5/24/2017	5023.82	42.86	4980.96	
6/29/2017	5023.82	42.86	4980.96	
7/26/2017	5023.82	42.93	4980.89	
9/5/2017	5023.82	42.97	4980.85	
12/7/2017	5023.82	43.08	4980.74	
2/13/2018	5023.82	42.97	4980.85	
5/18/2018	5023.82	42.87	4980.95	
8/2/2018	5023.82	43.21	4980.61	
10/22/2018	5023.82	42.81	4981.01	
2/15/2019	5023.82	42.34	4981.48	
4/17/2019	5023.82	41.89	4981.93	
8/9/2019	5023.82	42.24	4981.58	
10/21/2019	5023.82	42.52	4981.30	

Maximum Observed: 4981.93 ft AMSL

Minimum Observed: 4979.58 ft AMSL

Range: 2.35 ft

Appendix D - Groundwater Elevation Data and Hydrographs

M-58A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5023.84	44.25	4979.59	
3/8/2016	5023.84	43.88	4979.96	
5/5/2016	5023.84	43.82	4980.02	
8/24/2016	5023.84	43.95	4979.89	
9/21/2016	5023.84	43.94	4979.90	
2/20/2017	5023.84	43.39	4980.45	
4/11/2017	5023.84	42.91	4980.93	
4/24/2017	5023.84	42.8	4981.04	
5/18/2017	5023.84	42.81	4981.03	
5/24/2017	5023.84	42.78	4981.06	
6/29/2017	5023.84	42.88	4980.96	
7/26/2017	5023.84	42.97	4980.87	
9/5/2017	5023.84	42.95	4980.89	
12/7/2017	5023.84	43.18	4980.66	
2/13/2018	5023.84	43.02	4980.82	
5/18/2018	5023.84	42.93	4980.91	
8/2/2018	5023.84	43.28	4980.56	
10/22/2018	5023.84	42.88	4980.96	
2/15/2019	5023.84	42.35	4981.49	
4/17/2019	5023.84	41.99	4981.85	
8/9/2019	5023.84	42.34	4981.50	
10/21/2019	5023.84	42.62	4981.22	

Maximum Observed: 4981.85 ft AMSL

Minimum Observed: 4979.59 ft AMSL

Range: 2.26 ft

Appendix D - Groundwater Elevation Data and Hydrographs

M-62A				
Date of Measurement	Measuring Pt Elevation [ft AMSL]	Water Level [ft bmp]	GW Elevation [ft AMSL]	Well TD
11/30/2015	5020.87	41.13	4979.74	
3/8/2016	5020.87	40.65	4980.22	
5/5/2016	5020.87	40.56	4980.31	
8/24/2016	5020.87	40.69	4980.18	
9/21/2016	5020.87	40.69	4980.18	
2/20/2017	5020.87	40.09	4980.78	
4/11/2017	5020.87	39.62	4981.25	
4/24/2017	5020.87	39.53	4981.34	
5/18/2017	5020.87	39.56	4981.31	
5/24/2017	5020.87	39.49	4981.38	
6/29/2017	5020.87	39.61	4981.26	
7/26/2017	5020.87	39.71	4981.16	
9/5/2017	5020.87	39.62	4981.25	
12/7/2017	5020.87	39.98	4980.89	
2/13/2018	5020.87	39.84	4981.03	
5/18/2018	5020.87	39.64	4981.23	
8/2/2018	5020.87	39.89	4980.98	
10/22/2018	5020.87	39.63	4981.24	
2/15/2019	5020.87	34.08	4986.79	
4/17/2019	5020.87	38.23	4982.64	
8/9/2019	5020.87	38.99	4981.88	
10/21/2019	5020.87	39.30	4981.57	

Maximum Observed: 4982.64 ft AMSL

Minimum Observed: 4979.74 ft AMSL

Range: 2.90 ft

Note: 2/15/2019 reading not included in maximum observed due to probable error in field measurement

**APPENDIX E**  
**ANALYTICAL LABORATORY REPORTS**



## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-118120-1

Client Project/Site: APS - Cholla CCR

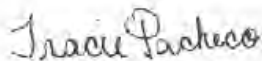
For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

3/13/2019 10:21:16 AM

Tracie Pacheco, Project Manager I

(602)659-7629

[tracie.pacheco@testamericainc.com](mailto:tracie.pacheco@testamericainc.com)

Designee for

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
R6	LFB/LFBD RPD exceeded method control limit. Recovery met acceptance criteria.
V1	CCV recovery was above method acceptance limits. This target analyte was not detected in the sample.
D1	Sample required dilution due to matrix.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Job ID: 550-118120-1**

**Laboratory: TestAmerica Phoenix**

## Narrative

### Job Narrative 550-118120-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 2/18/2019 8:38 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.8° C and 2.0° C.

#### Receipt Exceptions

Sample sites are not in TALs.

CH-CCR-M65A-21419 (550-118120-4), CH-CCR-M66A-21419 (550-118120-5) and CH-CCR-M67A-21419 (550-118120-6)

#### HPLC/IC

Method(s) 300.0: The following sample was diluted for Fluoride by method EPA 300.0 due to the abundance of Chloride and Sulfate analytes: CH-CCR-M64A-21319 (550-118120-3). Fluoride was not detected in the diluted sample. As such, an elevated reporting limit (RL) has been provided and the data has been qualified with D1 and D5 flags.

Method(s) 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the abundance of Chloride and Sulfate analytes: CH-CCR-M67A-21419 (550-118120-6) and CH-CCR-FD01-21319 (550-118120-8). Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method(s) 245.1: The RPD of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for batch preparation batch 550-170410 and analytical batch 550-170880 recovered outside control limits for the following analytes: Mercury.

The matrix spike / matrix spike duplicate / sample duplicate (MS/MSD/DUP) met acceptance criteria and can be used for batch precision.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-118120-1	CH-CCR-M50A-21319	Water	02/13/19 17:09	02/18/19 08:38
550-118120-2	CH-CCR-M51A-21319	Water	02/13/19 16:20	02/18/19 08:38
550-118120-3	CH-CCR-M64A-21319	Water	02/13/19 14:47	02/18/19 08:38
550-118120-4	CH-CCR-M65A-21419	Water	02/14/19 12:12	02/18/19 08:38
550-118120-5	CH-CCR-M66A-21419	Water	02/14/19 13:33	02/18/19 08:38
550-118120-6	CH-CCR-M67A-21419	Water	02/14/19 11:18	02/18/19 08:38
550-118120-7	CH-CCR-W123-21319	Water	02/13/19 17:44	02/18/19 08:38
550-118120-8	CH-CCR-FD01-21319	Water	02/13/19 14:47	02/18/19 08:38



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Client Sample ID: CH-CCR-M50A-21319

## Lab Sample ID: 550-118120-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	2.2	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.46		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0028		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0086		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0014		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00069		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0070		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0027		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M51A-21319

## Lab Sample ID: 550-118120-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	4.5	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.49		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.025	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.0070		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.013	D1	0.0040	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.082		0.00050	mg/L	1		200.8 LL	Total/NA
Thallium	0.00013		0.00010	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M64A-21319

## Lab Sample ID: 550-118120-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.29		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00089		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0049		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00052		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M65A-21419

## Lab Sample ID: 550-118120-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.7	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.58		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0017		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.015		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0028		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0033		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.059		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0022		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M66A-21419

## Lab Sample ID: 550-118120-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.1	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.55		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0021		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.016		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00027		0.00010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0013		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Client Sample ID: CH-CCR-M66A-21419 (Continued)

Lab Sample ID: 550-118120-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Molybdenum	0.014		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.027		0.00050	mg/L	1		200.8 LL	Total/NA
Thallium	0.00012		0.00010	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M67A-21419

Lab Sample ID: 550-118120-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.016		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.022		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0012		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0037		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0050		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00066		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W123-21319

Lab Sample ID: 550-118120-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	3.7	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.75		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0024		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.010		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.12		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.37		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0063		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-FD01-21319

Lab Sample ID: 550-118120-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.29		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00076		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0048		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Client Sample ID: CH-CCR-M50A-21319**

**Lab Sample ID: 550-118120-1**

Date Collected: 02/13/19 17:09

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.2	D1	0.80	mg/L			03/02/19 01:03	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:15	1
Lithium	0.46		0.20	mg/L		02/20/19 06:57	02/22/19 02:15	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:57	1
Arsenic	0.0028		0.00050	mg/L		02/19/19 08:51	02/20/19 02:57	1
Barium	0.0086		0.00050	mg/L		02/19/19 08:51	02/20/19 02:57	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 02:57	1
Chromium	0.0014		0.0010	mg/L		02/19/19 08:51	02/20/19 02:57	1
Cobalt	0.00069		0.00050	mg/L		02/19/19 08:51	02/20/19 02:57	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:57	1
Molybdenum	0.0070		0.00050	mg/L		02/19/19 08:51	02/20/19 02:57	1
Selenium	0.0027		0.00050	mg/L		02/19/19 08:51	02/28/19 02:22	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 02:57	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 19:54	1

**Client Sample ID: CH-CCR-M51A-21319**

**Lab Sample ID: 550-118120-2**

Date Collected: 02/13/19 16:20

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	4.5	D1	0.80	mg/L			03/02/19 01:22	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:21	1
Lithium	0.49		0.20	mg/L		02/20/19 06:57	02/22/19 02:21	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:59	1
Arsenic	0.025	D1	0.0020	mg/L		02/19/19 08:51	03/05/19 02:32	4
Barium	0.0070		0.00050	mg/L		02/19/19 08:51	02/20/19 02:59	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 02:59	1
Chromium	0.013	D1	0.0040	mg/L		02/19/19 08:51	03/05/19 02:32	4
Cobalt	ND	D1	0.0020	mg/L		02/19/19 08:51	03/05/19 02:32	4
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:59	1
Molybdenum	0.082		0.00050	mg/L		02/19/19 08:51	02/20/19 02:59	1
Selenium	ND	D1	0.0020	mg/L		02/19/19 08:51	03/05/19 02:32	4
Thallium	0.00013		0.00010	mg/L		02/19/19 08:51	02/20/19 02:59	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Client Sample ID: CH-CCR-M51A-21319

Date Collected: 02/13/19 16:20

Date Received: 02/18/19 08:38

## Lab Sample ID: 550-118120-2

Matrix: Water

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 19:56	1

## Client Sample ID: CH-CCR-M64A-21319

Date Collected: 02/13/19 14:47

Date Received: 02/18/19 08:38

## Lab Sample ID: 550-118120-3

Matrix: Water

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 01:58	2

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:27	1
Lithium	0.29		0.20	mg/L		02/20/19 06:57	02/22/19 02:27	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:01	1
Arsenic	0.00089		0.00050	mg/L		02/19/19 08:51	02/20/19 03:01	1
Barium	0.012		0.00050	mg/L		02/19/19 08:51	02/20/19 03:01	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:01	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:01	1
Cobalt	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:01	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:01	1
Molybdenum	0.0049		0.00050	mg/L		02/19/19 08:51	02/20/19 03:01	1
Selenium	0.00052		0.00050	mg/L		02/19/19 08:51	03/05/19 01:44	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:01	1

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 19:57	1

## Client Sample ID: CH-CCR-M65A-21419

Date Collected: 02/14/19 12:12

Date Received: 02/18/19 08:38

## Lab Sample ID: 550-118120-4

Matrix: Water

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.7	D1	0.80	mg/L			03/02/19 02:54	2

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:33	1
Lithium	0.58		0.20	mg/L		02/20/19 06:57	02/22/19 02:33	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:03	1
Arsenic	0.0017		0.00050	mg/L		02/19/19 08:51	02/20/19 03:03	1
Barium	0.015		0.00050	mg/L		02/19/19 08:51	02/20/19 03:03	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:03	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Client Sample ID: CH-CCR-M65A-21419**

**Lab Sample ID: 550-118120-4**

Date Collected: 02/14/19 12:12

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	0.0028		0.0010	mg/L		02/19/19 08:51	02/20/19 03:03	1
Cobalt	0.0033		0.00050	mg/L		02/19/19 08:51	02/20/19 03:03	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:03	1
Molybdenum	0.059		0.00050	mg/L		02/19/19 08:51	02/20/19 03:03	1
Selenium	0.0022		0.00050	mg/L		02/19/19 08:51	02/28/19 02:28	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:03	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 19:59	1

**Client Sample ID: CH-CCR-M66A-21419**

**Lab Sample ID: 550-118120-5**

Date Collected: 02/14/19 13:33

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.1	D1	0.80	mg/L			03/02/19 03:12	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:39	1
Lithium	0.55		0.20	mg/L		02/20/19 06:57	02/22/19 02:39	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:45	1
Arsenic	0.0021		0.00050	mg/L		02/19/19 08:51	02/20/19 02:45	1
Barium	0.016		0.00050	mg/L		02/19/19 08:51	02/20/19 02:45	1
Cadmium	0.00027		0.00010	mg/L		02/19/19 08:51	02/20/19 02:45	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:45	1
Cobalt	0.0013		0.00050	mg/L		02/19/19 08:51	02/20/19 02:45	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:45	1
Molybdenum	0.014		0.00050	mg/L		02/19/19 08:51	02/20/19 02:45	1
Selenium	0.027		0.00050	mg/L		02/19/19 08:51	02/28/19 02:10	1
Thallium	0.00012		0.00010	mg/L		02/19/19 08:51	02/20/19 02:45	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 19:53	1

**Client Sample ID: CH-CCR-M67A-21419**

**Lab Sample ID: 550-118120-6**

Date Collected: 02/14/19 11:18

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 04:26	2

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Client Sample ID: CH-CCR-M67A-21419**

**Lab Sample ID: 550-118120-6**

Date Collected: 02/14/19 11:18

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:45	1
Lithium	ND		0.20	mg/L		02/20/19 06:57	02/22/19 02:45	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:06	1
Arsenic	0.016		0.00050	mg/L		02/19/19 08:51	02/20/19 03:06	1
Barium	0.022		0.00050	mg/L		02/19/19 08:51	02/20/19 03:06	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:06	1
Chromium	0.0012		0.0010	mg/L		02/19/19 08:51	02/20/19 03:06	1
Cobalt	0.0037		0.00050	mg/L		02/19/19 08:51	02/20/19 03:06	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:06	1
Molybdenum	0.0050		0.00050	mg/L		02/19/19 08:51	02/20/19 03:06	1
Selenium	0.00066		0.00050	mg/L		02/19/19 08:51	03/05/19 01:48	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:06	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 20:04	1

**Client Sample ID: CH-CCR-W123-21319**

**Lab Sample ID: 550-118120-7**

Date Collected: 02/13/19 17:44

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	3.7	D1	0.80	mg/L			03/02/19 05:02	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:51	1
Lithium	0.75		0.20	mg/L		02/20/19 06:57	02/22/19 02:51	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:08	1
Arsenic	0.0024		0.00050	mg/L		02/19/19 08:51	02/20/19 03:08	1
Barium	0.010		0.00050	mg/L		02/19/19 08:51	02/20/19 03:08	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:08	1
Chromium	0.12		0.0010	mg/L		02/19/19 08:51	02/20/19 03:08	1
Cobalt	0.0018		0.00050	mg/L		02/19/19 08:51	02/20/19 03:08	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:08	1
Molybdenum	0.37		0.00050	mg/L		02/19/19 08:51	02/20/19 03:08	1
Selenium	0.0063		0.00050	mg/L		02/19/19 08:51	03/05/19 01:50	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:08	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 20:05	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Client Sample ID: CH-CCR-FD01-21319**

**Lab Sample ID: 550-118120-8**

Date Collected: 02/13/19 14:47

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 05:21	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 02:57	1
Lithium	0.29		0.20	mg/L		02/20/19 06:57	02/22/19 02:57	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:14	1
Arsenic	0.00076		0.00050	mg/L		02/19/19 08:51	02/20/19 03:14	1
Barium	0.012		0.00050	mg/L		02/19/19 08:51	02/20/19 03:14	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:14	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:14	1
Cobalt	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:14	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:14	1
Molybdenum	0.0048		0.00050	mg/L		02/19/19 08:51	02/20/19 03:14	1
Selenium	ND		0.00050	mg/L		02/19/19 08:51	03/05/19 01:57	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:14	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	R6 V1	0.00020	mg/L		02/25/19 17:58	02/28/19 20:07	1



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-171003/2**  
**Matrix: Water**  
**Analysis Batch: 171003**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			03/01/19 15:33	1

**Lab Sample ID: LCS 550-171003/5**  
**Matrix: Water**  
**Analysis Batch: 171003**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	4.10		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-171003/6**  
**Matrix: Water**  
**Analysis Batch: 171003**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	4.12		mg/L		103	90 - 110	0	20

**Lab Sample ID: 550-118702-J-8 MS**  
**Matrix: Water**  
**Analysis Batch: 171003**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	2.1		4.00	6.16		mg/L		101	80 - 120

**Lab Sample ID: 550-118702-J-8 MSD**  
**Matrix: Water**  
**Analysis Batch: 171003**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	2.1		4.00	6.13		mg/L		100	80 - 120	1	20

**Lab Sample ID: 550-118702-J-8 DU**  
**Matrix: Water**  
**Analysis Batch: 171003**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	DU Result	DU Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	2.1		4.00	2.18		mg/L				3	20

**Lab Sample ID: MB 550-171004/1037**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			03/02/19 02:35	1

**Lab Sample ID: LCS 550-171004/59**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	4.17		mg/L		104	90 - 110

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Lab Sample ID: LCSD 550-171004/60**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	4.17		mg/L		104	90 - 110	0	20

**Lab Sample ID: 550-118120-5 MS**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.1	D1	8.00	9.01	D1	mg/L		99	80 - 120

**Lab Sample ID: 550-118120-5 MSD**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.1	D1	8.00	9.00	D1	mg/L		99	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-169946/1-A**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 01:55	1
Lithium	ND		0.20	mg/L		02/20/19 06:57	02/22/19 01:55	1

**Lab Sample ID: LCS 550-169946/2-A**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	1.00	1.04		mg/L		104	85 - 115
Lithium	1.00	1.05		mg/L		105	85 - 115

**Lab Sample ID: LCSD 550-169946/3-A**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	1.00	1.05		mg/L		105	85 - 115	1	20
Lithium	1.00	1.05		mg/L		105	85 - 115	0	20

**Lab Sample ID: 550-118120-1 MS**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: CH-CCR-M50A-21319**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	ND		1.00	1.01		mg/L		101	70 - 130
Lithium	0.46		1.00	1.56		mg/L		109	70 - 130

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-118120-1 MSD**

**Matrix: Water**

**Analysis Batch: 170187**

**Client Sample ID: CH-CCR-M50A-21319**

**Prep Type: Total/NA**

**Prep Batch: 169946**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		1.00	1.03		mg/L		103	70 - 130	1	20
Lithium	0.46		1.00	1.58		mg/L		111	70 - 130	2	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-169827/1-A**

**Matrix: Water**

**Analysis Batch: 170835**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.00050	mg/L		02/19/19 08:51	02/28/19 02:04	1

**Lab Sample ID: LCS 550-169827/2-A**

**Matrix: Water**

**Analysis Batch: 170031**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.0998		mg/L		100	85 - 115
Arsenic	0.100	0.0982		mg/L		98	85 - 115
Barium	0.100	0.105		mg/L		105	85 - 115
Cadmium	0.100	0.0980		mg/L		98	85 - 115
Chromium	0.100	0.0974		mg/L		97	85 - 115
Cobalt	0.100	0.0968		mg/L		97	85 - 115
Lead	0.100	0.0939		mg/L		94	85 - 115
Molybdenum	0.100	0.0969		mg/L		97	85 - 115
Thallium	0.100	0.0970		mg/L		97	85 - 115

**Lab Sample ID: LCS 550-169827/2-A**

**Matrix: Water**

**Analysis Batch: 170835**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Selenium	0.100	0.0995		mg/L		100	85 - 115

**Lab Sample ID: LCSD 550-169827/3-A**

**Matrix: Water**

**Analysis Batch: 170031**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.0999		mg/L		100	85 - 115	0	20
Arsenic	0.100	0.0988		mg/L		99	85 - 115	1	20
Barium	0.100	0.102		mg/L		102	85 - 115	2	20
Cadmium	0.100	0.0975		mg/L		98	85 - 115	0	20
Chromium	0.100	0.0985		mg/L		98	85 - 115	1	20
Cobalt	0.100	0.0990		mg/L		99	85 - 115	2	20
Lead	0.100	0.0942		mg/L		94	85 - 115	0	20
Molybdenum	0.100	0.0962		mg/L		96	85 - 115	1	20
Thallium	0.100	0.0990		mg/L		99	85 - 115	2	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCSD 550-169827/3-A**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.100	0.0981		mg/L		98	85 - 115	1	20

**Lab Sample ID: 550-118120-5 MS**  
**Matrix: Water**  
**Analysis Batch: 170031**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Antimony	ND		0.100	0.0984		mg/L		98	70 - 130
Arsenic	0.0021		0.100	0.110		mg/L		108	70 - 130
Barium	0.016		0.100	0.124		mg/L		109	70 - 130
Cadmium	0.00027		0.100	0.0860		mg/L		86	70 - 130
Chromium	ND		0.100	0.103		mg/L		103	70 - 130
Cobalt	0.0013		0.100	0.0953		mg/L		94	70 - 130
Lead	ND		0.100	0.0803		mg/L		80	70 - 130
Molybdenum	0.014		0.100	0.114		mg/L		100	70 - 130
Thallium	0.00012		0.100	0.0840		mg/L		84	70 - 130

**Lab Sample ID: 550-118120-5 MS**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Selenium	0.027		0.100	0.139		mg/L		113	70 - 130

**Lab Sample ID: 550-118120-5 MSD**  
**Matrix: Water**  
**Analysis Batch: 170031**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	ND		0.100	0.0991		mg/L		99	70 - 130	1	20
Arsenic	0.0021		0.100	0.111		mg/L		109	70 - 130	1	20
Barium	0.016		0.100	0.133		mg/L		117	70 - 130	7	20
Cadmium	0.00027		0.100	0.0857		mg/L		85	70 - 130	0	20
Chromium	ND		0.100	0.104		mg/L		103	70 - 130	0	20
Cobalt	0.0013		0.100	0.0960		mg/L		95	70 - 130	1	20
Lead	ND		0.100	0.0808		mg/L		81	70 - 130	1	20
Molybdenum	0.014		0.100	0.115		mg/L		102	70 - 130	1	20
Thallium	0.00012		0.100	0.0832		mg/L		83	70 - 130	1	20

**Lab Sample ID: 550-118120-5 MSD**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.027		0.100	0.144		mg/L		117	70 - 130	3	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-118121-B-4-B MS**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Selenium	0.0084		0.100	0.122		mg/L		113	70 - 130

**Lab Sample ID: 550-118121-B-4-C MSD**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.0084		0.100	0.129		mg/L		121	70 - 130	6	20

## Method: 245.1 - Mercury (CVAA)

**Lab Sample ID: MB 550-170410/1-A**  
**Matrix: Water**  
**Analysis Batch: 170880**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 170410**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	V1	0.00020	mg/L		02/25/19 17:58	02/28/19 19:45	1

**Lab Sample ID: LCS 550-170410/2-A**  
**Matrix: Water**  
**Analysis Batch: 170880**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 170410**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Hg	0.00500	0.00435	V1	mg/L		87	85 - 115

**Lab Sample ID: LCSD 550-170410/3-A**  
**Matrix: Water**  
**Analysis Batch: 170880**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 170410**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.00500	0.00572	R6 V1	mg/L		114	85 - 115	27	20

**Lab Sample ID: 550-118120-5 MS**  
**Matrix: Water**  
**Analysis Batch: 170880**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**  
**Prep Batch: 170410**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Hg	ND	V1 R6	0.00500	0.00553	V1	mg/L		111	70 - 130

**Lab Sample ID: 550-118120-5 MSD**  
**Matrix: Water**  
**Analysis Batch: 170880**

**Client Sample ID: CH-CCR-M66A-21419**  
**Prep Type: Total/NA**  
**Prep Batch: 170410**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND	V1 R6	0.00500	0.00576	V1	mg/L		115	70 - 130	4	20

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## HPLC/IC

### Analysis Batch: 171003

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	300.0	
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	300.0	
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	300.0	
MB 550-171003/2	Method Blank	Total/NA	Water	300.0	
LCS 550-171003/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-171003/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-118702-J-8 MS	Matrix Spike	Total/NA	Water	300.0	
550-118702-J-8 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-118702-J-8 DU	Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 171004

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	300.0	
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	300.0	
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	300.0	
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	300.0	
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	300.0	
MB 550-171004/1037	Method Blank	Total/NA	Water	300.0	
LCS 550-171004/59	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-171004/60	Lab Control Sample Dup	Total/NA	Water	300.0	
550-118120-5 MS	CH-CCR-M66A-21419	Total/NA	Water	300.0	
550-118120-5 MSD	CH-CCR-M66A-21419	Total/NA	Water	300.0	

## Metals

### Prep Batch: 169827

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	200.8	
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	200.8	
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	200.8	
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	200.8	
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	200.8	
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	200.8	
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	200.8	
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	200.8	
MB 550-169827/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-169827/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-169827/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-118120-5 MS	CH-CCR-M66A-21419	Total/NA	Water	200.8	
550-118120-5 MSD	CH-CCR-M66A-21419	Total/NA	Water	200.8	
550-118121-B-4-B MS	Matrix Spike	Total/NA	Water	200.8	
550-118121-B-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Prep Batch: 169946

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	200.7	
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	200.7	
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	200.7	
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	200.7	
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	200.7	

TestAmerica Phoenix



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Metals (Continued)

### Prep Batch: 169946 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	200.7	
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	200.7	
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	200.7	
MB 550-169946/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-169946/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-169946/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-118120-1 MS	CH-CCR-M50A-21319	Total/NA	Water	200.7	
550-118120-1 MSD	CH-CCR-M50A-21319	Total/NA	Water	200.7	

### Analysis Batch: 170031

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	200.8 LL	169827
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	200.8 LL	169827
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	200.8 LL	169827
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	200.8 LL	169827
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	200.8 LL	169827
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	200.8 LL	169827
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	200.8 LL	169827
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	200.8 LL	169827
LCS 550-169827/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169827
LCSD 550-169827/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169827
550-118120-5 MS	CH-CCR-M66A-21419	Total/NA	Water	200.8 LL	169827
550-118120-5 MSD	CH-CCR-M66A-21419	Total/NA	Water	200.8 LL	169827

### Analysis Batch: 170187

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	200.7 Rev 4.4	169946
MB 550-169946/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	169946
LCS 550-169946/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	169946
LCSD 550-169946/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-1 MS	CH-CCR-M50A-21319	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-1 MSD	CH-CCR-M50A-21319	Total/NA	Water	200.7 Rev 4.4	169946

### Prep Batch: 170410

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	245.1	
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	245.1	
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	245.1	
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	245.1	
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	245.1	
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	245.1	
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	245.1	
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	245.1	
MB 550-170410/1-A	Method Blank	Total/NA	Water	245.1	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Metals (Continued)

### Prep Batch: 170410 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 550-170410/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-170410/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-118120-5 MS	CH-CCR-M66A-21419	Total/NA	Water	245.1	
550-118120-5 MSD	CH-CCR-M66A-21419	Total/NA	Water	245.1	

### Analysis Batch: 170835

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	200.8 LL	169827
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	200.8 LL	169827
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	200.8 LL	169827
MB 550-169827/1-A	Method Blank	Total/NA	Water	200.8 LL	169827
LCS 550-169827/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169827
LCSD 550-169827/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169827
550-118120-5 MS	CH-CCR-M66A-21419	Total/NA	Water	200.8 LL	169827
550-118120-5 MSD	CH-CCR-M66A-21419	Total/NA	Water	200.8 LL	169827
550-118121-B-4-B MS	Matrix Spike	Total/NA	Water	200.8 LL	169827
550-118121-B-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	169827

### Analysis Batch: 170880

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-1	CH-CCR-M50A-21319	Total/NA	Water	245.1	170410
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	245.1	170410
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	245.1	170410
550-118120-4	CH-CCR-M65A-21419	Total/NA	Water	245.1	170410
550-118120-5	CH-CCR-M66A-21419	Total/NA	Water	245.1	170410
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	245.1	170410
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	245.1	170410
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	245.1	170410
MB 550-170410/1-A	Method Blank	Total/NA	Water	245.1	170410
LCS 550-170410/2-A	Lab Control Sample	Total/NA	Water	245.1	170410
LCSD 550-170410/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	170410
550-118120-5 MS	CH-CCR-M66A-21419	Total/NA	Water	245.1	170410
550-118120-5 MSD	CH-CCR-M66A-21419	Total/NA	Water	245.1	170410

### Analysis Batch: 171060

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118120-2	CH-CCR-M51A-21319	Total/NA	Water	200.8 LL	169827
550-118120-3	CH-CCR-M64A-21319	Total/NA	Water	200.8 LL	169827
550-118120-6	CH-CCR-M67A-21419	Total/NA	Water	200.8 LL	169827
550-118120-7	CH-CCR-W123-21319	Total/NA	Water	200.8 LL	169827
550-118120-8	CH-CCR-FD01-21319	Total/NA	Water	200.8 LL	169827

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Client Sample ID: CH-CCR-M50A-21319**

**Lab Sample ID: 550-118120-1**

**Date Collected: 02/13/19 17:09**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171003	03/02/19 01:03	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:15	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 02:57	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170835	02/28/19 02:22	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 19:54	TRB	TAL PHX

**Client Sample ID: CH-CCR-M51A-21319**

**Lab Sample ID: 550-118120-2**

**Date Collected: 02/13/19 16:20**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171003	03/02/19 01:22	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:21	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 02:59	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	171060	03/05/19 02:32	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 19:56	TRB	TAL PHX

**Client Sample ID: CH-CCR-M64A-21319**

**Lab Sample ID: 550-118120-3**

**Date Collected: 02/13/19 14:47**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171003	03/02/19 01:58	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:27	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:01	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 01:44	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 19:57	TRB	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Client Sample ID: CH-CCR-M65A-21419**

**Lab Sample ID: 550-118120-4**

**Date Collected: 02/14/19 12:12**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 02:54	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:33	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:03	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170835	02/28/19 02:28	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 19:59	TRB	TAL PHX

**Client Sample ID: CH-CCR-M66A-21419**

**Lab Sample ID: 550-118120-5**

**Date Collected: 02/14/19 13:33**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 03:12	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:39	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 02:45	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170835	02/28/19 02:10	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 19:53	TRB	TAL PHX

**Client Sample ID: CH-CCR-M67A-21419**

**Lab Sample ID: 550-118120-6**

**Date Collected: 02/14/19 11:18**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 04:26	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:45	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:06	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 01:48	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 20:04	TRB	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

**Client Sample ID: CH-CCR-W123-21319**

**Lab Sample ID: 550-118120-7**

**Date Collected: 02/13/19 17:44**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 05:02	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:51	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:08	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 01:50	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 20:05	TRB	TAL PHX

**Client Sample ID: CH-CCR-FD01-21319**

**Lab Sample ID: 550-118120-8**

**Date Collected: 02/13/19 14:47**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 05:21	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 02:57	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:14	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 01:57	ARE	TAL PHX
Total/NA	Prep	245.1			170410	02/25/19 17:58	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170880	02/28/19 20:07	TRB	TAL PHX

**Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

- 1
- 2
- 3
- 4
- 5
- 6
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- 14



# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118120-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
245.1	Mercury (CVAA)	EPA	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX
245.1	Preparation, Mercury	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

Chain of Custody Record



THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Phoenix

4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

118120

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

TestAmerica Labo

Client Contact

APS Cholla  
4801 Cholla Lake Rd  
Joseph City, AZ 86032  
(928) 587-0319 Phone  
(xxx) xxx-xxxx FAX  
Project Name:  
Site:  
P O #

Doug Lavraway

Doug Lavraway

Date:

COC No:

Analysis Turnaround Time

928-587-0319  
 CALENDAR DAYS  WORKING DAYS  
TAT if different from Below  
 2 weeks  
 1 week  
 2 days  
 1 day

Lab Contact:

Carrier:

Sampler:

For Lab Use Only:  
Walk-in Client:  
Lab Sampling:  
Job / SDG No.:

Sample Identification

Sample ID	Sample Date	Sample Time	Sample Type (G-Comp, G-Grab)	Matrix	# of Cont.
CH-CCR-M50A-21319	2/13/2019	1709	G	W	2
CH-CCR-M51A-21319	2/13/19	1620	G	W	2
CH-CCR-M64A-21319	2/13/19	1447	G	W	2
CH-CCR-M65A-21419	2/14/019	1212	G	W	2
CH-CCR-M66A-21419	2/14/19	1333	G	W	2
CH-CCR-M67A-21419	2/14/19	1118	G	W	2
CH-CCR-W123-21319	2/13/19	1744	G	W	2
CH-CCR-FD01-21319	2/13/19	1447	G	W	2

Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )
EPA 200.7 (Be, Li)	
200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Ti)	
EPA 245.1 (Hg)	
EPA 300.0 (F)	



550-118120 Chain of Custody

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other  
Possible Hazard Identification:  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  
 Return to Client  
 Disposal by Lab  
 Archive for \_\_\_\_\_ Months

Special Instructions/QC Requirements & Comments:

Method 200.8 with collision cell  
Avoid dilution of samples as much as possible

Custody Seals Intact:  Yes  No

Custody Seal No.:

Cooler Temp. (°C): Obs'd: \_\_\_\_\_

Therm ID No.:

Relinquished by:

Company:

Date/Time:

Received by:

Company:

Date/Time:

Relinquished by:

Company:

Date/Time:

Received by:

Company:

Date/Time:

Relinquished by:

Company:

Date/Time:

Received in Laboratory by:

Company:

Date/Time:

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-118120-1

**Login Number: 118120**

**List Source: TestAmerica Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-118121-1

Client Project/Site: APS - Cholla CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

3/14/2019 9:41:03 AM

Mary Charlson, Project Manager I

(602)437-3340

[mary.charlson@testamericainc.com](mailto:mary.charlson@testamericainc.com)

Designee for

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

### LINKS

Review your project  
results through

TotalAccess

Have a Question?



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[www.testamericainc.com](http://www.testamericainc.com)



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.
M2	Matrix spike recovery was low, the associated blank spike recovery was acceptable.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)



# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Job ID: 550-118121-1**

**Laboratory: TestAmerica Phoenix**

## Narrative

### Job Narrative 550-118121-1

#### Comments

Sample CH-CCR-W301-21519 (550-118121-4) was requested to be used as the matrix spike/matrix spike duplicate (MS/MSD) on the Chain of Custody (COC); however, sample CH-CCR-FD01-21519 (550-118121-13) was analyzed as the MS/MSD for Beryllium and Lithium by method 200.7, and sample CH-CCR-W304-21519 (550-118121-6) was analyzed as the MS/MSD for Mercury by method 245.1.

#### Receipt

The samples were received on 2/18/2019 8:38 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.8° C and 2.0° C.

#### HPLC/IC

Method(s) 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the abundance of Chloride and Sulfate analytes: CH-CCR-M55A-21519 (550-118121-3), CH-CCR-W304-21519 (550-118121-6), CH-CCR-W307-21519 (550-118121-9), CH-CCR-W308-21519 (550-118121-10) and CH-CCR-FD01-21519 (550-118121-13). Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method(s) 200.8 LL: The continuing calibration verification (CCV) associated with batch 550-170032 recovered above the upper control limit for Selenium. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-118121-1	CH-CCR-M52A-21519	Water	02/15/19 17:37	02/18/19 08:38
550-118121-2	CH-CCR-M53A-21519	Water	02/15/19 18:12	02/18/19 08:38
550-118121-3	CH-CCR-M55A-21519	Water	02/15/19 11:49	02/18/19 08:38
550-118121-4	CH-CCR-W301-21519	Water	02/15/19 16:28	02/18/19 08:38
550-118121-5	CH-CCR-W302-21519	Water	02/15/19 15:16	02/18/19 08:38
550-118121-6	CH-CCR-W304-21519	Water	02/15/19 15:52	02/18/19 08:38
550-118121-7	CH-CCR-W305-21519	Water	02/15/19 18:42	02/18/19 08:38
550-118121-8	CH-CCR-W306-21519	Water	02/15/19 19:21	02/18/19 08:38
550-118121-9	CH-CCR-W307-21519	Water	02/15/19 14:21	02/18/19 08:38
550-118121-10	CH-CCR-W308-21519	Water	02/15/19 13:47	02/18/19 08:38
550-118121-11	CH-CCR-W309-21519	Water	02/15/19 12:52	02/18/19 08:38
550-118121-12	CH-CCR-W314-21519	Water	02/15/19 17:01	02/18/19 08:38
550-118121-13	CH-CCR-FD01-21519	Water	02/15/19 18:42	02/18/19 08:38

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Client Sample ID: CH-CCR-M52A-21519

## Lab Sample ID: 550-118121-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.93	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.32		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00077		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.015		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00027		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.037		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.029		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.020		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0015		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M53A-21519

## Lab Sample ID: 550-118121-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.2	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.21		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00064		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.013		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.0011		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0025		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0067		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00078		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M55A-21519

## Lab Sample ID: 550-118121-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.43		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0033		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.014		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.14		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00095		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.019		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.13		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W301-21519

## Lab Sample ID: 550-118121-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.59		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0017		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0080		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00018		0.00010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.018		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0046		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0084		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W302-21519

## Lab Sample ID: 550-118121-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.88	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.37		0.20	mg/L	1		200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Client Sample ID: CH-CCR-W302-21519 (Continued)

## Lab Sample ID: 550-118121-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0043		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.36		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00089		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.020		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.022		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.028		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0039		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0035		0.00050	mg/L	1		200.8 LL	Total/NA
Thallium	0.00016		0.00010	mg/L	1		200.8 LL	Total/NA
Hg	0.00022		0.00020	mg/L	1		245.1	Total/NA

## Client Sample ID: CH-CCR-W304-21519

## Lab Sample ID: 550-118121-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.48		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0020		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0029		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0017		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00059		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W305-21519

## Lab Sample ID: 550-118121-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.22		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00087		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0017		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.018		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.020		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W306-21519

## Lab Sample ID: 550-118121-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.2	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.80		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0053		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00097		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.031		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0021		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W307-21519

## Lab Sample ID: 550-118121-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.26		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00088		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00028		0.00010	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Client Sample ID: CH-CCR-W307-21519 (Continued)

## Lab Sample ID: 550-118121-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Cobalt	0.073		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.00085		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0045		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00063		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W308-21519

## Lab Sample ID: 550-118121-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.39		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0019		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0066		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00079		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0020		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.074		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W309-21519

## Lab Sample ID: 550-118121-11

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.1	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.35		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0047		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0083		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.028		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.19		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W314-21519

## Lab Sample ID: 550-118121-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.82	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.34		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0011		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00017		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.046		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.016		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.012		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-FD01-21519

## Lab Sample ID: 550-118121-13

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.22		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.016		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00012		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0015		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.022		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.0024		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.026		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00070		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-M52A-21519**

**Lab Sample ID: 550-118121-1**

Date Collected: 02/15/19 17:37

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.93	D1	0.80	mg/L			03/02/19 05:39	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:03	1
Lithium	0.32		0.20	mg/L		02/20/19 06:57	02/22/19 03:03	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:16	1
Arsenic	0.00077		0.00050	mg/L		02/19/19 08:51	02/20/19 03:16	1
Barium	0.015		0.00050	mg/L		02/19/19 08:51	02/20/19 03:16	1
Cadmium	0.00027		0.00010	mg/L		02/19/19 08:51	02/20/19 03:16	1
Chromium	0.037		0.0010	mg/L		02/19/19 08:51	02/20/19 03:16	1
Cobalt	0.029		0.00050	mg/L		02/19/19 08:51	02/20/19 03:16	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:16	1
Molybdenum	0.020		0.00050	mg/L		02/19/19 08:51	02/20/19 03:16	1
Selenium	0.0015		0.00050	mg/L		02/19/19 08:51	03/05/19 01:59	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:16	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		02/28/19 13:50	03/01/19 17:27	1

**Client Sample ID: CH-CCR-M53A-21519**

**Lab Sample ID: 550-118121-2**

Date Collected: 02/15/19 18:12

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.2	D1	0.80	mg/L			03/02/19 06:34	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:09	1
Lithium	0.21		0.20	mg/L		02/20/19 06:57	02/22/19 03:09	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:18	1
Arsenic	0.00064		0.00050	mg/L		02/19/19 08:51	02/20/19 03:18	1
Barium	0.013		0.00050	mg/L		02/19/19 08:51	02/20/19 03:18	1
Cadmium	0.0011		0.00010	mg/L		02/19/19 08:51	02/20/19 03:18	1
Chromium	0.0025		0.0010	mg/L		02/19/19 08:51	02/20/19 03:18	1
Cobalt	0.011		0.00050	mg/L		02/19/19 08:51	02/20/19 03:18	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:18	1
Molybdenum	0.0067		0.00050	mg/L		02/19/19 08:51	02/20/19 03:18	1
Selenium	0.00078		0.00050	mg/L		02/19/19 08:51	03/05/19 02:01	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:18	1

TestAmerica Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-M53A-21519**

**Lab Sample ID: 550-118121-2**

Date Collected: 02/15/19 18:12

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		02/28/19 13:50	03/01/19 17:28	1

**Client Sample ID: CH-CCR-M55A-21519**

**Lab Sample ID: 550-118121-3**

Date Collected: 02/15/19 11:49

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 06:53	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:24	1
Lithium	0.43		0.20	mg/L		02/20/19 06:57	02/22/19 03:24	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:20	1
Arsenic	0.0033		0.00050	mg/L		02/19/19 08:51	02/20/19 03:20	1
Barium	0.014		0.00050	mg/L		02/19/19 08:51	02/20/19 03:20	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:20	1
Chromium	0.14		0.0010	mg/L		02/19/19 08:51	02/20/19 03:20	1
Cobalt	0.00095		0.00050	mg/L		02/19/19 08:51	02/20/19 03:20	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:20	1
Molybdenum	0.019		0.00050	mg/L		02/19/19 08:51	02/20/19 03:20	1
Selenium	0.13		0.00050	mg/L		02/19/19 08:51	03/05/19 02:03	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:20	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		02/28/19 13:50	03/01/19 17:30	1

**Client Sample ID: CH-CCR-W301-21519**

**Lab Sample ID: 550-118121-4**

Date Collected: 02/15/19 16:28

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	M2	0.40	mg/L			03/02/19 07:11	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:30	1
Lithium	0.59		0.20	mg/L		02/20/19 06:57	02/22/19 03:30	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:51	1
Arsenic	0.0017		0.00050	mg/L		02/19/19 08:51	02/20/19 02:51	1
Barium	0.0080		0.00050	mg/L		02/19/19 08:51	02/20/19 02:51	1
Cadmium	0.00018		0.00010	mg/L		02/19/19 08:51	02/20/19 02:51	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W301-21519**

**Lab Sample ID: 550-118121-4**

Date Collected: 02/15/19 16:28

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:51	1
<b>Cobalt</b>	<b>0.018</b>		0.00050	mg/L		02/19/19 08:51	02/20/19 02:51	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:51	1
<b>Molybdenum</b>	<b>0.0046</b>		0.00050	mg/L		02/19/19 08:51	02/20/19 02:51	1
<b>Selenium</b>	<b>0.0084</b>		0.00050	mg/L		02/19/19 08:51	02/28/19 02:16	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 02:51	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		02/28/19 13:50	03/01/19 17:32	1

**Client Sample ID: CH-CCR-W302-21519**

**Lab Sample ID: 550-118121-5**

Date Collected: 02/15/19 15:16

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Fluoride</b>	<b>0.88</b>	<b>D1</b>	0.80	mg/L			03/02/19 08:25	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:36	1
<b>Lithium</b>	<b>0.37</b>		0.20	mg/L		02/20/19 06:57	02/22/19 03:36	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Arsenic</b>	<b>0.0043</b>		0.00050	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Barium</b>	<b>0.36</b>		0.00050	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Cadmium</b>	<b>0.00089</b>		0.00010	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Chromium</b>	<b>0.020</b>		0.0010	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Cobalt</b>	<b>0.022</b>		0.00050	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Lead</b>	<b>0.028</b>		0.00050	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Molybdenum</b>	<b>0.0039</b>		0.00050	mg/L		02/19/19 08:51	02/20/19 03:22	1
<b>Selenium</b>	<b>0.0035</b>		0.00050	mg/L		02/19/19 08:51	03/05/19 02:05	1
<b>Thallium</b>	<b>0.00016</b>		0.00010	mg/L		02/19/19 08:51	02/20/19 03:22	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	<b>0.00022</b>		0.00020	mg/L		03/07/19 12:08	03/07/19 15:16	1

**Client Sample ID: CH-CCR-W304-21519**

**Lab Sample ID: 550-118121-6**

Date Collected: 02/15/19 15:52

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 08:43	2

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W304-21519**

**Lab Sample ID: 550-118121-6**

Date Collected: 02/15/19 15:52

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:42	1
Lithium	0.48		0.20	mg/L		02/20/19 06:57	02/22/19 03:42	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:24	1
Arsenic	0.0020		0.00050	mg/L		02/19/19 08:51	02/20/19 03:24	1
Barium	0.011		0.00050	mg/L		02/19/19 08:51	02/20/19 03:24	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:24	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:24	1
Cobalt	0.0029		0.00050	mg/L		02/19/19 08:51	02/20/19 03:24	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:24	1
Molybdenum	0.0017		0.00050	mg/L		02/19/19 08:51	02/20/19 03:24	1
Selenium	0.00059		0.00050	mg/L		02/19/19 08:51	03/05/19 02:07	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:24	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:13	1

**Client Sample ID: CH-CCR-W305-21519**

**Lab Sample ID: 550-118121-7**

Date Collected: 02/15/19 18:42

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			03/02/19 09:02	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:48	1
Lithium	0.22		0.20	mg/L		02/20/19 06:57	02/22/19 03:48	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:26	1
Arsenic	0.00087		0.00050	mg/L		02/19/19 08:51	02/20/19 03:26	1
Barium	0.011		0.00050	mg/L		02/19/19 08:51	02/20/19 03:26	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:26	1
Chromium	0.0017		0.0010	mg/L		02/19/19 08:51	02/20/19 03:26	1
Cobalt	0.018		0.00050	mg/L		02/19/19 08:51	02/20/19 03:26	1
Lead	0.0018		0.00050	mg/L		02/19/19 08:51	02/20/19 03:26	1
Molybdenum	0.020		0.00050	mg/L		02/19/19 08:51	02/20/19 03:26	1
Selenium	ND		0.00050	mg/L		02/19/19 08:51	03/05/19 02:09	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:26	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:17	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W306-21519**

**Lab Sample ID: 550-118121-8**

Date Collected: 02/15/19 19:21

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.2	D1	0.80	mg/L			03/02/19 09:20	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 03:54	1
Lithium	0.80		0.20	mg/L		02/20/19 06:57	02/22/19 03:54	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:28	1
Arsenic	0.0053		0.00050	mg/L		02/19/19 08:51	02/20/19 03:28	1
Barium	0.011		0.00050	mg/L		02/19/19 08:51	02/20/19 03:28	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:28	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:28	1
Cobalt	0.00097		0.00050	mg/L		02/19/19 08:51	02/20/19 03:28	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:28	1
Molybdenum	0.031		0.00050	mg/L		02/19/19 08:51	02/20/19 03:28	1
Selenium	0.0021		0.00050	mg/L		02/19/19 08:51	03/05/19 02:11	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:28	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:19	1

**Client Sample ID: CH-CCR-W307-21519**

**Lab Sample ID: 550-118121-9**

Date Collected: 02/15/19 14:21

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 10:52	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 04:00	1
Lithium	0.26		0.20	mg/L		02/20/19 06:57	02/22/19 04:00	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:31	1
Arsenic	0.00088		0.00050	mg/L		02/19/19 08:51	02/20/19 03:31	1
Barium	0.012		0.00050	mg/L		02/19/19 08:51	02/20/19 03:31	1
Cadmium	0.00028		0.00010	mg/L		02/19/19 08:51	02/20/19 03:31	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:31	1
Cobalt	0.073		0.00050	mg/L		02/19/19 08:51	02/20/19 03:31	1
Lead	0.00085		0.00050	mg/L		02/19/19 08:51	02/20/19 03:31	1
Molybdenum	0.0045		0.00050	mg/L		02/19/19 08:51	02/20/19 03:31	1
Selenium	0.00063		0.00050	mg/L		02/19/19 08:51	03/05/19 02:13	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:31	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W307-21519**

**Lab Sample ID: 550-118121-9**

Date Collected: 02/15/19 14:21

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:21	1

**Client Sample ID: CH-CCR-W308-21519**

**Lab Sample ID: 550-118121-10**

Date Collected: 02/15/19 13:47

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 11:11	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 04:06	1
Lithium	0.39		0.20	mg/L		02/20/19 06:57	02/22/19 04:06	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:33	1
Arsenic	0.0019		0.00050	mg/L		02/19/19 08:51	02/20/19 03:33	1
Barium	0.0066		0.00050	mg/L		02/19/19 08:51	02/20/19 03:33	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:33	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 03:33	1
Cobalt	0.00079		0.00050	mg/L		02/19/19 08:51	02/20/19 03:33	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 03:33	1
Molybdenum	0.0020		0.00050	mg/L		02/19/19 08:51	02/20/19 03:33	1
Selenium	0.074		0.00050	mg/L		02/19/19 08:51	03/05/19 02:15	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 03:33	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:22	1

**Client Sample ID: CH-CCR-W309-21519**

**Lab Sample ID: 550-118121-11**

Date Collected: 02/15/19 12:52

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.1	D1	0.80	mg/L			03/02/19 11:29	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 04:12	1
Lithium	0.35		0.20	mg/L		02/20/19 06:57	02/22/19 04:12	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 04:00	1
Arsenic	0.0047		0.00050	mg/L		02/19/19 09:03	02/20/19 04:00	1
Barium	0.0083		0.00050	mg/L		02/19/19 09:03	02/20/19 04:00	1
Cadmium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 04:00	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W309-21519**

**Lab Sample ID: 550-118121-11**

Date Collected: 02/15/19 12:52

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 04:00	1
Cobalt	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 04:00	1
Lead	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 04:00	1
<b>Molybdenum</b>	<b>0.028</b>		0.00050	mg/L		02/19/19 09:03	02/20/19 04:00	1
<b>Selenium</b>	<b>0.19</b>		0.00050	mg/L		02/19/19 09:03	02/26/19 01:44	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 04:00	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:24	1

**Client Sample ID: CH-CCR-W314-21519**

**Lab Sample ID: 550-118121-12**

Date Collected: 02/15/19 17:01

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Fluoride</b>	<b>0.82</b>	<b>D1</b>	0.80	mg/L			03/02/19 12:06	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 04:17	1
<b>Lithium</b>	<b>0.34</b>		0.20	mg/L		02/20/19 06:57	02/22/19 04:17	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 04:02	1
<b>Arsenic</b>	<b>0.0011</b>		0.00050	mg/L		02/19/19 09:03	02/20/19 04:02	1
<b>Barium</b>	<b>0.011</b>		0.00050	mg/L		02/19/19 09:03	02/20/19 04:02	1
<b>Cadmium</b>	<b>0.00017</b>		0.00010	mg/L		02/19/19 09:03	02/20/19 04:02	1
<b>Chromium</b>	<b>0.046</b>		0.0010	mg/L		02/19/19 09:03	02/20/19 04:02	1
<b>Cobalt</b>	<b>0.016</b>		0.00050	mg/L		02/19/19 09:03	02/20/19 04:02	1
Lead	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 04:02	1
<b>Molybdenum</b>	<b>0.012</b>		0.00050	mg/L		02/19/19 09:03	02/20/19 04:02	1
Selenium	ND		0.00050	mg/L		02/19/19 09:03	02/26/19 01:46	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 04:02	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:25	1

**Client Sample ID: CH-CCR-FD01-21519**

**Lab Sample ID: 550-118121-13**

Date Collected: 02/15/19 18:42

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			03/02/19 12:24	2



# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-FD01-21519**

**Lab Sample ID: 550-118121-13**

Date Collected: 02/15/19 18:42

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 07:19	02/22/19 04:52	1
Lithium	0.22		0.20	mg/L		02/20/19 07:19	02/22/19 04:52	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 04:04	1
Arsenic	0.0018		0.00050	mg/L		02/19/19 09:03	02/20/19 04:04	1
Barium	0.016		0.00050	mg/L		02/19/19 09:03	02/20/19 04:04	1
Cadmium	0.00012		0.00010	mg/L		02/19/19 09:03	02/20/19 04:04	1
Chromium	0.0015		0.0010	mg/L		02/19/19 09:03	02/20/19 04:04	1
Cobalt	0.022		0.00050	mg/L		02/19/19 09:03	02/20/19 04:04	1
Lead	0.0024		0.00050	mg/L		02/19/19 09:03	02/20/19 04:04	1
Molybdenum	0.026		0.00050	mg/L		02/19/19 09:03	02/20/19 04:04	1
Selenium	0.00070		0.00050	mg/L		02/19/19 09:03	02/26/19 01:48	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 04:04	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		02/27/19 10:30	02/27/19 15:07	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-171004/1037**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			03/02/19 02:35	1

**Lab Sample ID: LCS 550-171004/59**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	4.17		mg/L		104	90 - 110

**Lab Sample ID: LCSD 550-171004/60**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	4.17		mg/L		104	90 - 110	0	20

**Lab Sample ID: 550-118121-4 MS**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: CH-CCR-W301-21519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND	M2	4.00	3.05	M2	mg/L		76	80 - 120

**Lab Sample ID: 550-118121-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 171004**

**Client Sample ID: CH-CCR-W301-21519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND	M2	4.00	3.06	M2	mg/L		77	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-169946/1-A**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 06:57	02/22/19 01:55	1
Lithium	ND		0.20	mg/L		02/20/19 06:57	02/22/19 01:55	1

**Lab Sample ID: LCS 550-169946/2-A**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	1.00	1.04		mg/L		104	85 - 115
Lithium	1.00	1.05		mg/L		105	85 - 115

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCSD 550-169946/3-A**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	1.00	1.05		mg/L		105	85 - 115	1	20
Lithium	1.00	1.05		mg/L		105	85 - 115	0	20

**Lab Sample ID: 550-118120-B-1-B MS**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		1.00	1.01		mg/L		101	70 - 130
Lithium	0.46		1.00	1.56		mg/L		109	70 - 130

**Lab Sample ID: 550-118120-B-1-C MSD**  
**Matrix: Water**  
**Analysis Batch: 170187**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 169946**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		1.00	1.03		mg/L		103	70 - 130	1	20
Lithium	0.46		1.00	1.58		mg/L		111	70 - 130	2	20

**Lab Sample ID: MB 550-169948/1-A**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		02/20/19 07:19	02/22/19 04:32	1
Lithium	ND		0.20	mg/L		02/20/19 07:19	02/22/19 04:32	1

**Lab Sample ID: LCS 550-169948/2-A**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	1.00	1.06		mg/L		106	85 - 115
Lithium	1.00	1.04		mg/L		104	85 - 115

**Lab Sample ID: LCSD 550-169948/3-A**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	1.00	1.06		mg/L		106	85 - 115	1	20
Lithium	1.00	1.05		mg/L		105	85 - 115	1	20

**Lab Sample ID: 550-118121-13 MS**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: CH-CCR-FD01-21519**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		1.00	1.03		mg/L		103	70 - 130

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-118121-13 MS**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: CH-CCR-FD01-21519**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.22		1.00	1.28		mg/L		106	70 - 130

**Lab Sample ID: 550-118121-13 MSD**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: CH-CCR-FD01-21519**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Beryllium	ND		1.00	1.02		mg/L		102	70 - 130	1	20
Lithium	0.22		1.00	1.27		mg/L		105	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-169827/1-A**  
**Matrix: Water**  
**Analysis Batch: 170031**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:38	1
Arsenic	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:38	1
Barium	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:38	1
Cadmium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 02:38	1
Chromium	ND		0.0010	mg/L		02/19/19 08:51	02/20/19 02:38	1
Cobalt	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:38	1
Lead	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:38	1
Molybdenum	ND		0.00050	mg/L		02/19/19 08:51	02/20/19 02:38	1
Thallium	ND		0.00010	mg/L		02/19/19 08:51	02/20/19 02:38	1

**Lab Sample ID: MB 550-169827/1-A**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.00050	mg/L		02/19/19 08:51	02/28/19 02:04	1

**Lab Sample ID: LCS 550-169827/2-A**  
**Matrix: Water**  
**Analysis Batch: 170031**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.100	0.0998		mg/L		100	85 - 115
Arsenic	0.100	0.0982		mg/L		98	85 - 115
Barium	0.100	0.105		mg/L		105	85 - 115
Cadmium	0.100	0.0980		mg/L		98	85 - 115
Chromium	0.100	0.0974		mg/L		97	85 - 115
Cobalt	0.100	0.0968		mg/L		97	85 - 115
Lead	0.100	0.0939		mg/L		94	85 - 115
Molybdenum	0.100	0.0969		mg/L		97	85 - 115
Thallium	0.100	0.0970		mg/L		97	85 - 115

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-169827/2-A**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Selenium	0.100	0.0995		mg/L		100	85 - 115

**Lab Sample ID: LCS 550-169827/2-A**  
**Matrix: Water**  
**Analysis Batch: 171060**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Chromium	0.100	0.107		mg/L		107	85 - 115

**Lab Sample ID: LCSD 550-169827/3-A**  
**Matrix: Water**  
**Analysis Batch: 170031**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.0999		mg/L		100	85 - 115	0	20
Arsenic	0.100	0.0988		mg/L		99	85 - 115	1	20
Barium	0.100	0.102		mg/L		102	85 - 115	2	20
Cadmium	0.100	0.0975		mg/L		98	85 - 115	0	20
Chromium	0.100	0.0985		mg/L		98	85 - 115	1	20
Cobalt	0.100	0.0990		mg/L		99	85 - 115	2	20
Lead	0.100	0.0942		mg/L		94	85 - 115	0	20
Molybdenum	0.100	0.0962		mg/L		96	85 - 115	1	20
Thallium	0.100	0.0990		mg/L		99	85 - 115	2	20

**Lab Sample ID: LCSD 550-169827/3-A**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.100	0.0981		mg/L		98	85 - 115	1	20

**Lab Sample ID: LCSD 550-169827/3-A**  
**Matrix: Water**  
**Analysis Batch: 171060**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chromium	0.100	0.107		mg/L		107	85 - 115	0	20

**Lab Sample ID: 550-118120-B-5-B MS**  
**Matrix: Water**  
**Analysis Batch: 170835**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 169827**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Selenium	0.027		0.100	0.139		mg/L		113	70 - 130

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-118120-B-5-C MSD**

**Matrix: Water**

**Analysis Batch: 170835**

**Client Sample ID: Matrix Spike Duplicate**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.027		0.100	0.144		mg/L		117	70 - 130	3	20

**Lab Sample ID: 550-118121-4 MS**

**Matrix: Water**

**Analysis Batch: 170031**

**Client Sample ID: CH-CCR-W301-21519**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Antimony	ND		0.100	0.0968		mg/L		97	70 - 130
Arsenic	0.0017		0.100	0.107		mg/L		105	70 - 130
Barium	0.0080		0.100	0.118		mg/L		110	70 - 130
Cadmium	0.00018		0.100	0.0815		mg/L		81	70 - 130
Chromium	ND		0.100	0.101		mg/L		101	70 - 130
Cobalt	0.018		0.100	0.107		mg/L		89	70 - 130
Lead	ND		0.100	0.0763		mg/L		76	70 - 130
Molybdenum	0.0046		0.100	0.102		mg/L		98	70 - 130
Thallium	ND		0.100	0.0801		mg/L		80	70 - 130

**Lab Sample ID: 550-118121-4 MS**

**Matrix: Water**

**Analysis Batch: 170835**

**Client Sample ID: CH-CCR-W301-21519**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Selenium	0.0084		0.100	0.122		mg/L		113	70 - 130

**Lab Sample ID: 550-118121-4 MSD**

**Matrix: Water**

**Analysis Batch: 170031**

**Client Sample ID: CH-CCR-W301-21519**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	ND		0.100	0.0964		mg/L		96	70 - 130	0	20
Arsenic	0.0017		0.100	0.108		mg/L		107	70 - 130	2	20
Barium	0.0080		0.100	0.120		mg/L		112	70 - 130	2	20
Cadmium	0.00018		0.100	0.0822		mg/L		82	70 - 130	1	20
Chromium	ND		0.100	0.103		mg/L		103	70 - 130	1	20
Cobalt	0.018		0.100	0.109		mg/L		91	70 - 130	2	20
Lead	ND		0.100	0.0766		mg/L		77	70 - 130	0	20
Molybdenum	0.0046		0.100	0.102		mg/L		97	70 - 130	1	20
Thallium	ND		0.100	0.0797		mg/L		80	70 - 130	0	20

**Lab Sample ID: 550-118121-4 MSD**

**Matrix: Water**

**Analysis Batch: 170835**

**Client Sample ID: CH-CCR-W301-21519**

**Prep Type: Total/NA**

**Prep Batch: 169827**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.0084		0.100	0.129		mg/L		121	70 - 130	6	20

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: MB 550-169830/1-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 03:39	1
Arsenic	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Barium	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Cadmium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:39	1
Chromium	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 03:39	1
Cobalt	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Lead	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Molybdenum	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:39	1

**Lab Sample ID: MB 550-169830/1-A**  
**Matrix: Water**  
**Analysis Batch: 170429**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.00050	mg/L		02/19/19 09:03	02/26/19 01:31	1

**Lab Sample ID: LCS 550-169830/2-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.0984		mg/L		98	85 - 115
Arsenic	0.100	0.0986		mg/L		99	85 - 115
Barium	0.100	0.112		mg/L		112	85 - 115
Cadmium	0.100	0.0939		mg/L		94	85 - 115
Chromium	0.100	0.0975		mg/L		97	85 - 115
Cobalt	0.100	0.0945		mg/L		95	85 - 115
Lead	0.100	0.0894		mg/L		89	85 - 115
Molybdenum	0.100	0.0931		mg/L		93	85 - 115
Thallium	0.100	0.0914		mg/L		91	85 - 115

**Lab Sample ID: LCS 550-169830/2-A**  
**Matrix: Water**  
**Analysis Batch: 170429**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Selenium	0.100	0.0951		mg/L		95	85 - 115

**Lab Sample ID: LCSD 550-169830/3-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.0989		mg/L		99	85 - 115	1	20
Arsenic	0.100	0.0989		mg/L		99	85 - 115	0	20
Barium	0.100	0.114		mg/L		114	85 - 115	2	20
Cadmium	0.100	0.0941		mg/L		94	85 - 115	0	20
Chromium	0.100	0.0992		mg/L		99	85 - 115	2	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCSD 550-169830/3-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cobalt	0.100	0.0958		mg/L		96	85 - 115	1	20
Lead	0.100	0.0906		mg/L		91	85 - 115	1	20
Molybdenum	0.100	0.0929		mg/L		93	85 - 115	0	20
Thallium	0.100	0.0916		mg/L		92	85 - 115	0	20

**Lab Sample ID: LCSD 550-169830/3-A**  
**Matrix: Water**  
**Analysis Batch: 170429**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.100	0.0898		mg/L		90	85 - 115	6	20

**Lab Sample ID: 550-118122-B-4-B MS**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Antimony	ND		0.100	0.0977		mg/L		98	70 - 130
Arsenic	0.0030		0.100	0.104		mg/L		101	70 - 130
Barium	0.068		0.100	0.171		mg/L		103	70 - 130
Cadmium	ND		0.100	0.0852		mg/L		85	70 - 130
Chromium	ND		0.100	0.0960		mg/L		96	70 - 130
Cobalt	ND		0.100	0.0889		mg/L		89	70 - 130
Lead	ND		0.100	0.0785		mg/L		78	70 - 130
Molybdenum	0.0024		0.100	0.0982		mg/L		96	70 - 130
Thallium	ND		0.100	0.0829		mg/L		83	70 - 130

**Lab Sample ID: 550-118122-B-4-B MS**  
**Matrix: Water**  
**Analysis Batch: 170429**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Selenium	ND		0.100	0.102		mg/L		102	70 - 130

**Lab Sample ID: 550-118122-B-4-C MSD**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	ND		0.100	0.0992		mg/L		99	70 - 130	2	20
Arsenic	0.0030		0.100	0.105		mg/L		102	70 - 130	1	20
Barium	0.068		0.100	0.175		mg/L		107	70 - 130	2	20
Cadmium	ND		0.100	0.0847		mg/L		85	70 - 130	1	20
Chromium	ND		0.100	0.0978		mg/L		98	70 - 130	2	20
Cobalt	ND		0.100	0.0902		mg/L		90	70 - 130	1	20
Lead	ND		0.100	0.0805		mg/L		81	70 - 130	3	20
Molybdenum	0.0024		0.100	0.0991		mg/L		97	70 - 130	1	20
Thallium	ND		0.100	0.0840		mg/L		84	70 - 130	1	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-118122-B-4-C MSD**  
**Matrix: Water**  
**Analysis Batch: 170429**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	ND		0.100	0.100		mg/L		100	70 - 130	2	20

## Method: 245.1 - Mercury (CVAA)

**Lab Sample ID: MB 550-170388/1-A**  
**Matrix: Water**  
**Analysis Batch: 170664**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 170388**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		02/27/19 10:30	02/27/19 14:29	1

**Lab Sample ID: LCS 550-170388/2-A**  
**Matrix: Water**  
**Analysis Batch: 170664**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 170388**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Hg	0.00500	0.00466		mg/L		93	85 - 115

**Lab Sample ID: LCSD 550-170388/3-A**  
**Matrix: Water**  
**Analysis Batch: 170664**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 170388**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.00500	0.00451		mg/L		90	85 - 115	3	20

**Lab Sample ID: 550-117968-A-2-C MS**  
**Matrix: Water**  
**Analysis Batch: 170664**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 170388**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Hg	ND		0.00500	0.00513		mg/L		103	70 - 130

**Lab Sample ID: 550-117968-A-2-D MSD**  
**Matrix: Water**  
**Analysis Batch: 170664**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 170388**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.00500	0.00524		mg/L		105	70 - 130	2	20

**Lab Sample ID: MB 550-170791/1-A**  
**Matrix: Water**  
**Analysis Batch: 171008**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 170791**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		02/28/19 13:50	03/01/19 16:48	1

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Method: 245.1 - Mercury (CVAA) (Continued)

<b>Lab Sample ID: LCS 550-170791/2-A</b>				<b>Client Sample ID: Lab Control Sample</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171008</b>				<b>Prep Batch: 170791</b>							
Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits				
Hg	0.00500	0.00521		mg/L		104	85 - 115				
<b>Lab Sample ID: LCSD 550-170791/3-A</b>				<b>Client Sample ID: Lab Control Sample Dup</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171008</b>				<b>Prep Batch: 170791</b>							
Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit		
Hg	0.00500	0.00521		mg/L		104	85 - 115	0	20		
<b>Lab Sample ID: 550-117929-B-2-B MS</b>				<b>Client Sample ID: Matrix Spike</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171008</b>				<b>Prep Batch: 170791</b>							
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits		
Hg	ND		0.00500	0.00516		mg/L		103	70 - 130		
<b>Lab Sample ID: 550-117929-B-2-C MSD</b>				<b>Client Sample ID: Matrix Spike Duplicate</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171008</b>				<b>Prep Batch: 170791</b>							
Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.00500	0.00501		mg/L		100	70 - 130	3	20
<b>Lab Sample ID: MB 550-171390/12-A</b>				<b>Client Sample ID: Method Blank</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171418</b>				<b>Prep Batch: 171390</b>							
Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac			
Hg	ND		0.00020	mg/L		03/07/19 12:08	03/07/19 15:05	1			
<b>Lab Sample ID: LCS 550-171390/13-A</b>				<b>Client Sample ID: Lab Control Sample</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171418</b>				<b>Prep Batch: 171390</b>							
Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits				
Hg	0.00500	0.00484		mg/L		97	85 - 115				
<b>Lab Sample ID: LCSD 550-171390/14-A</b>				<b>Client Sample ID: Lab Control Sample Dup</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171418</b>				<b>Prep Batch: 171390</b>							
Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit		
Hg	0.00500	0.00471		mg/L		94	85 - 115	3	20		
<b>Lab Sample ID: 550-118121-6 MS</b>				<b>Client Sample ID: CH-CCR-W304-21519</b>							
<b>Matrix: Water</b>				<b>Prep Type: Total/NA</b>							
<b>Analysis Batch: 171418</b>				<b>Prep Batch: 171390</b>							
Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits		
Hg	ND		0.00500	0.00472		mg/L		94	70 - 130		

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Lab Sample ID: 550-118121-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 171418**

**Client Sample ID: CH-CCR-W304-21519**  
**Prep Type: Total/NA**  
**Prep Batch: 171390**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.00500	0.00463		mg/L		93	70 - 130	2	20

**Lab Sample ID: MB 550-171694/1-A**  
**Matrix: Water**  
**Analysis Batch: 171717**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 171694**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/11/19 15:07	03/11/19 19:57	1

**Lab Sample ID: LCS 550-171694/2-A**  
**Matrix: Water**  
**Analysis Batch: 171717**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 171694**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Hg	0.00500	0.00461		mg/L		92	85 - 115

**Lab Sample ID: LCSD 550-171694/3-A**  
**Matrix: Water**  
**Analysis Batch: 171717**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 171694**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.00500	0.00462		mg/L		92	85 - 115	0	20

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## HPLC/IC

### Analysis Batch: 171004

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	300.0	
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	300.0	
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	300.0	
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	300.0	
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	300.0	
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	300.0	
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	300.0	
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	300.0	
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	300.0	
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	300.0	
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	300.0	
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	300.0	
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	300.0	
MB 550-171004/1037	Method Blank	Total/NA	Water	300.0	
LCS 550-171004/59	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-171004/60	Lab Control Sample Dup	Total/NA	Water	300.0	
550-118121-4 MS	CH-CCR-W301-21519	Total/NA	Water	300.0	
550-118121-4 MSD	CH-CCR-W301-21519	Total/NA	Water	300.0	

## Metals

### Prep Batch: 169827

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	200.8	
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	200.8	
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	200.8	
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	200.8	
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	200.8	
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	200.8	
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	200.8	
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	200.8	
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	200.8	
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	200.8	
MB 550-169827/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-169827/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-169827/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-118120-B-5-B MS	Matrix Spike	Total/NA	Water	200.8	
550-118120-B-5-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	
550-118121-4 MS	CH-CCR-W301-21519	Total/NA	Water	200.8	
550-118121-4 MSD	CH-CCR-W301-21519	Total/NA	Water	200.8	

### Prep Batch: 169830

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	200.8	
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	200.8	
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	200.8	
MB 550-169830/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-169830/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-169830/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-118122-B-4-B MS	Matrix Spike	Total/NA	Water	200.8	

TestAmerica Phoenix



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Metals (Continued)

### Prep Batch: 169830 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-B-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Prep Batch: 169946

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	200.7	
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	200.7	
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	200.7	
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	200.7	
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	200.7	
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	200.7	
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	200.7	
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	200.7	
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	200.7	
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	200.7	
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	200.7	
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	200.7	
MB 550-169946/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-169946/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-169946/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-118120-B-1-B MS	Matrix Spike	Total/NA	Water	200.7	
550-118120-B-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Prep Batch: 169948

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	200.7	
MB 550-169948/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-169948/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-169948/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-118121-13 MS	CH-CCR-FD01-21519	Total/NA	Water	200.7	
550-118121-13 MSD	CH-CCR-FD01-21519	Total/NA	Water	200.7	

### Analysis Batch: 170031

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	200.8 LL	169827
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	200.8 LL	169827
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	200.8 LL	169827
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	200.8 LL	169827
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	200.8 LL	169827
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	200.8 LL	169827
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	200.8 LL	169827
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	200.8 LL	169827
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	200.8 LL	169827
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	200.8 LL	169827
MB 550-169827/1-A	Method Blank	Total/NA	Water	200.8 LL	169827
LCS 550-169827/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169827
LCSD 550-169827/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169827
550-118121-4 MS	CH-CCR-W301-21519	Total/NA	Water	200.8 LL	169827
550-118121-4 MSD	CH-CCR-W301-21519	Total/NA	Water	200.8 LL	169827

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Metals (Continued)

### Analysis Batch: 170032

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	200.8 LL	169830
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	200.8 LL	169830
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	200.8 LL	169830
MB 550-169830/1-A	Method Blank	Total/NA	Water	200.8 LL	169830
LCS 550-169830/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169830
LCSD 550-169830/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169830
550-118122-B-4-B MS	Matrix Spike	Total/NA	Water	200.8 LL	169830
550-118122-B-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	169830

### Analysis Batch: 170187

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	200.7 Rev 4.4	169946
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	200.7 Rev 4.4	169946
MB 550-169946/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	169946
LCS 550-169946/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	169946
LCSD 550-169946/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-B-1-B MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	169946
550-118120-B-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	169946

### Analysis Batch: 170188

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	200.7 Rev 4.4	169948
MB 550-169948/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	169948
LCS 550-169948/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	169948
LCSD 550-169948/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	169948
550-118121-13 MS	CH-CCR-FD01-21519	Total/NA	Water	200.7 Rev 4.4	169948
550-118121-13 MSD	CH-CCR-FD01-21519	Total/NA	Water	200.7 Rev 4.4	169948

### Prep Batch: 170388

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	245.1	
MB 550-170388/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-170388/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-170388/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-117968-A-2-C MS	Matrix Spike	Total/NA	Water	245.1	
550-117968-A-2-D MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	

### Analysis Batch: 170429

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	200.8 LL	169830
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	200.8 LL	169830

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Metals (Continued)

### Analysis Batch: 170429 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	200.8 LL	169830
MB 550-169830/1-A	Method Blank	Total/NA	Water	200.8 LL	169830
LCS 550-169830/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169830
LCSD 550-169830/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169830
550-118122-B-4-B MS	Matrix Spike	Total/NA	Water	200.8 LL	169830
550-118122-B-4-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	169830

### Analysis Batch: 170664

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-13	CH-CCR-FD01-21519	Total/NA	Water	245.1	170388
MB 550-170388/1-A	Method Blank	Total/NA	Water	245.1	170388
LCS 550-170388/2-A	Lab Control Sample	Total/NA	Water	245.1	170388
LCSD 550-170388/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	170388
550-117968-A-2-C MS	Matrix Spike	Total/NA	Water	245.1	170388
550-117968-A-2-D MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	170388

### Prep Batch: 170791

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	245.1	
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	245.1	
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	245.1	
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	245.1	
MB 550-170791/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-170791/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-170791/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-117929-B-2-B MS	Matrix Spike	Total/NA	Water	245.1	
550-117929-B-2-C MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	

### Analysis Batch: 170835

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	200.8 LL	169827
MB 550-169827/1-A	Method Blank	Total/NA	Water	200.8 LL	169827
LCS 550-169827/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169827
LCSD 550-169827/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169827
550-118120-B-5-B MS	Matrix Spike	Total/NA	Water	200.8 LL	169827
550-118120-B-5-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	169827
550-118121-4 MS	CH-CCR-W301-21519	Total/NA	Water	200.8 LL	169827
550-118121-4 MSD	CH-CCR-W301-21519	Total/NA	Water	200.8 LL	169827

### Analysis Batch: 171008

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	245.1	170791
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	245.1	170791
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	245.1	170791
550-118121-4	CH-CCR-W301-21519	Total/NA	Water	245.1	170791
MB 550-170791/1-A	Method Blank	Total/NA	Water	245.1	170791
LCS 550-170791/2-A	Lab Control Sample	Total/NA	Water	245.1	170791
LCSD 550-170791/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	170791
550-117929-B-2-B MS	Matrix Spike	Total/NA	Water	245.1	170791
550-117929-B-2-C MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	170791

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Metals (Continued)

### Analysis Batch: 171060

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-1	CH-CCR-M52A-21519	Total/NA	Water	200.8 LL	169827
550-118121-2	CH-CCR-M53A-21519	Total/NA	Water	200.8 LL	169827
550-118121-3	CH-CCR-M55A-21519	Total/NA	Water	200.8 LL	169827
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	200.8 LL	169827
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	200.8 LL	169827
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	200.8 LL	169827
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	200.8 LL	169827
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	200.8 LL	169827
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	200.8 LL	169827
LCS 550-169827/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169827
LCSD 550-169827/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169827

### Prep Batch: 171390

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	245.1	
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	245.1	
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	245.1	
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	245.1	
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	245.1	
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	245.1	
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	245.1	
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	245.1	
MB 550-171390/12-A	Method Blank	Total/NA	Water	245.1	
LCS 550-171390/13-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-171390/14-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-118121-6 MS	CH-CCR-W304-21519	Total/NA	Water	245.1	
550-118121-6 MSD	CH-CCR-W304-21519	Total/NA	Water	245.1	

### Analysis Batch: 171418

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118121-5	CH-CCR-W302-21519	Total/NA	Water	245.1	171390
550-118121-6	CH-CCR-W304-21519	Total/NA	Water	245.1	171390
550-118121-7	CH-CCR-W305-21519	Total/NA	Water	245.1	171390
550-118121-8	CH-CCR-W306-21519	Total/NA	Water	245.1	171390
550-118121-9	CH-CCR-W307-21519	Total/NA	Water	245.1	171390
550-118121-10	CH-CCR-W308-21519	Total/NA	Water	245.1	171390
550-118121-11	CH-CCR-W309-21519	Total/NA	Water	245.1	171390
550-118121-12	CH-CCR-W314-21519	Total/NA	Water	245.1	171390
MB 550-171390/12-A	Method Blank	Total/NA	Water	245.1	171390
LCS 550-171390/13-A	Lab Control Sample	Total/NA	Water	245.1	171390
LCSD 550-171390/14-A	Lab Control Sample Dup	Total/NA	Water	245.1	171390
550-118121-6 MS	CH-CCR-W304-21519	Total/NA	Water	245.1	171390
550-118121-6 MSD	CH-CCR-W304-21519	Total/NA	Water	245.1	171390

### Prep Batch: 171694

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-171694/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-171694/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-171694/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Metals (Continued)

### Analysis Batch: 171717

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-171694/1-A	Method Blank	Total/NA	Water	245.1	171694
LCS 550-171694/2-A	Lab Control Sample	Total/NA	Water	245.1	171694
LCSD 550-171694/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	171694

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# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-M52A-21519**

**Lab Sample ID: 550-118121-1**

**Date Collected: 02/15/19 17:37**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 05:39	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:03	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:16	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 01:59	ARE	TAL PHX
Total/NA	Prep	245.1			170791	02/28/19 13:50	TRB	TAL PHX
Total/NA	Analysis	245.1		1	171008	03/01/19 17:27	JTG	TAL PHX

**Client Sample ID: CH-CCR-M53A-21519**

**Lab Sample ID: 550-118121-2**

**Date Collected: 02/15/19 18:12**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 06:34	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:09	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:18	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:01	ARE	TAL PHX
Total/NA	Prep	245.1			170791	02/28/19 13:50	TRB	TAL PHX
Total/NA	Analysis	245.1		1	171008	03/01/19 17:28	JTG	TAL PHX

**Client Sample ID: CH-CCR-M55A-21519**

**Lab Sample ID: 550-118121-3**

**Date Collected: 02/15/19 11:49**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 06:53	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:24	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:20	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:03	ARE	TAL PHX
Total/NA	Prep	245.1			170791	02/28/19 13:50	TRB	TAL PHX
Total/NA	Analysis	245.1		1	171008	03/01/19 17:30	JTG	TAL PHX



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W301-21519**

**Lab Sample ID: 550-118121-4**

**Date Collected: 02/15/19 16:28**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	171004	03/02/19 07:11	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:30	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 02:51	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170835	02/28/19 02:16	ARE	TAL PHX
Total/NA	Prep	245.1			170791	02/28/19 13:50	TRB	TAL PHX
Total/NA	Analysis	245.1		1	171008	03/01/19 17:32	JTG	TAL PHX

**Client Sample ID: CH-CCR-W302-21519**

**Lab Sample ID: 550-118121-5**

**Date Collected: 02/15/19 15:16**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 08:25	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:36	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:22	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:05	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:16	JTG	TAL PHX

**Client Sample ID: CH-CCR-W304-21519**

**Lab Sample ID: 550-118121-6**

**Date Collected: 02/15/19 15:52**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 08:43	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:42	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:24	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:07	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:13	JTG	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W305-21519**

**Lab Sample ID: 550-118121-7**

**Date Collected: 02/15/19 18:42**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	171004	03/02/19 09:02	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:48	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:26	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:09	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:17	JTG	TAL PHX

**Client Sample ID: CH-CCR-W306-21519**

**Lab Sample ID: 550-118121-8**

**Date Collected: 02/15/19 19:21**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 09:20	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 03:54	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:28	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:11	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:19	JTG	TAL PHX

**Client Sample ID: CH-CCR-W307-21519**

**Lab Sample ID: 550-118121-9**

**Date Collected: 02/15/19 14:21**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 10:52	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 04:00	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:31	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:13	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:21	JTG	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-W308-21519**

**Lab Sample ID: 550-118121-10**

**Date Collected: 02/15/19 13:47**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 11:11	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 04:06	SRA	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170031	02/20/19 03:33	ARE	TAL PHX
Total/NA	Prep	200.8			169827	02/19/19 08:51	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	171060	03/05/19 02:15	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:22	JTG	TAL PHX

**Client Sample ID: CH-CCR-W309-21519**

**Lab Sample ID: 550-118121-11**

**Date Collected: 02/15/19 12:52**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 11:29	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 04:12	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 04:00	ARE	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170429	02/26/19 01:44	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:24	JTG	TAL PHX

**Client Sample ID: CH-CCR-W314-21519**

**Lab Sample ID: 550-118121-12**

**Date Collected: 02/15/19 17:01**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 12:06	NEL	TAL PHX
Total/NA	Prep	200.7			169946	02/20/19 06:57	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170187	02/22/19 04:17	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 04:02	ARE	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170429	02/26/19 01:46	ARE	TAL PHX
Total/NA	Prep	245.1			171390	03/07/19 12:08	JTG	TAL PHX
Total/NA	Analysis	245.1		1	171418	03/07/19 15:25	JTG	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

**Client Sample ID: CH-CCR-FD01-21519**

**Lab Sample ID: 550-118121-13**

**Date Collected: 02/15/19 18:42**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	171004	03/02/19 12:24	NEL	TAL PHX
Total/NA	Prep	200.7			169948	02/20/19 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170188	02/22/19 04:52	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 04:04	ARE	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170429	02/26/19 01:48	ARE	TAL PHX
Total/NA	Prep	245.1			170388	02/27/19 10:30	TRB	TAL PHX
Total/NA	Analysis	245.1		1	170664	02/27/19 15:07	TRB	TAL PHX

### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

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# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118121-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
245.1	Mercury (CVAA)	EPA	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX
245.1	Preparation, Mercury	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Chain of Custody Record

118121

**TestAmerica Phoenix**  
 4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

**TestAmerica**  
 THE LEADER IN ENVIRONMENTAL TESTING  
 TestAmerica Laboratories, Inc.

APS Cholla 4801 Cholla Lake Rd Joseph City, AZ 86032 (928) 587-0319 Phone (xxx) xxx-xxxx FAX Project Name: Site: PO #	Client Contact	Doug Lavarnway 928-587-0319	Doug Lavarnway	Date:	Carrier:	COC No. of COCs
Analysis Turnaround Time		<input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS	Lab Contact:	Sampler: For Lab Use Only: Walk-In Client: Lab Sampling: Job / SDG No.:		
TAT if different from Below		2 weeks 1 week 2 days 1 day	Sample Specific Notes:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 (Be, Li)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 245.1 (Hg)	EPA 300.0 (F)
CH-CCR-M52A-21519	2/15/2019	1737	G	W	2	N	X	X	X	X	X
CH-CCR-M53A-21519	2/15/19	1812	G	W	2	N	X	X	X	X	X
CH-CCR-M55A-21519	2/15/19	1149	G	W	2	N	X	X	X	X	X
CH-CCR-W301-21519	2/15/19	1628	G	W	2	N	X	X	X	X	X
CH-CCR-W302-21519	2/15/19	1516	G	W	2	N	X	X	X	X	X
CH-CCR-W304-21519	2/15/19	1562	G	W	2	N	X	X	X	X	X
CH-CCR-W305-21519	2/15/19	1842	G	W	2	N	X	X	X	X	X
CH-CCR-W306-21519	2/15/19	1921	G	W	2	N	X	X	X	X	X
CH-CCR-W307-21519	2/15/19	1421	G	W	2	N	X	X	X	X	X
CH-CCR-W308-21519	2/15/19	1347	G	W	2	N	X	X	X	X	X
CH-CCR-W309-21519	2/15/19	1252	G	W	2	N	X	X	X	X	X
CH-CCR-W314-21519	2/15/19	1701	G	W	2	N	X	X	X	X	X
CH-CCR-FD01-21519	2/15/19	1842	G	W	2	N	X	X	X	X	X



Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Method 200.8 with collision cell  
 Avoid dilution of samples as much as possible

Custody Seals Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Custody Seal No.:	Cooler Temp. (°C):	Obs'd:	Cor'd:	Therm ID No.:
Relinquished by: Doug Lavarnway	Company: APS	Date/Time: 2/18/19	Received by:	Company: APS	Date/Time: 02-18-19
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: TA-PHX	Company: TA-PHX	Date/Time: 02-18-19

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-118121-1

**Login Number: 118121**

**List Source: TestAmerica Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-118122-1

Client Project/Site: APS - Cholla CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

2/28/2019 3:21:40 PM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

**TotalAccess**

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
D1	Sample required dilution due to matrix.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

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**Job ID: 550-118122-1**

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**Laboratory: TestAmerica Phoenix**

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**Narrative**

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**Job Narrative**  
**550-118122-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 2/18/2019 8:38 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.8° C and 2.0° C.

**HPLC/IC**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**Metals**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**General Chemistry**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

- 1
- 2
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- 13
- 14



# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-118122-1	CH-CCR-M56A-21519	Water	02/15/19 22:14	02/18/19 08:38
550-118122-2	CH-CCR-M57A-21519	Water	02/15/19 21:41	02/18/19 08:38
550-118122-3	CH-CCR-M58A-21519	Water	02/15/19 21:04	02/18/19 08:38
550-118122-4	CH-CCR-M62A-21519	Water	02/15/19 20:13	02/18/19 08:38
550-118122-5	CH-CCR-FD02-21519	Water	02/15/19 20:13	02/18/19 08:38

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- 10
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- 13
- 14

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Client Sample ID: CH-CCR-M56A-21519

## Lab Sample ID: 550-118122-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2000	D2	100	mg/L	50		300.0	Total/NA
Sulfate	850	D2	100	mg/L	50		300.0	Total/NA
Boron	0.30		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0082		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.067		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0052		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00073		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0074		0.00050	mg/L	1		200.8 LL	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M57A-21519

## Lab Sample ID: 550-118122-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2100	D2	100	mg/L	50		300.0	Total/NA
Sulfate	1300	D2	100	mg/L	50		300.0	Total/NA
Boron	0.63		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	490		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0017		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.041		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0074		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0049		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0029		0.00050	mg/L	1		200.8 LL	Total/NA
pH	7.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M58A-21519

## Lab Sample ID: 550-118122-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2100	D2	100	mg/L	50		300.0	Total/NA
Sulfate	540	D2	100	mg/L	50		300.0	Total/NA
Boron	0.23		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	310		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0043		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.063		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M62A-21519

## Lab Sample ID: 550-118122-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2900	D2	400	mg/L	200		300.0	Total/NA
Sulfate	560	D2	400	mg/L	200		300.0	Total/NA
Boron	0.23		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	490		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0030		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.068		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0024		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Client Sample ID: CH-CCR-M62A-21519 (Continued)

## Lab Sample ID: 550-118122-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	14.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD02-21519

## Lab Sample ID: 550-118122-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3000	D2	100	mg/L	50		300.0	Total/NA
Sulfate	590	D2	100	mg/L	50		300.0	Total/NA
Boron	0.23		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	490		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0032		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.071		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0025		0.00050	mg/L	1		200.8 LL	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	11.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

**Client Sample ID: CH-CCR-M56A-21519**

**Lab Sample ID: 550-118122-1**

Date Collected: 02/15/19 22:14

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2000	D2	100	mg/L			02/26/19 01:01	50
Fluoride	ND		0.40	mg/L			02/26/19 00:43	1
Sulfate	850	D2	100	mg/L			02/26/19 01:01	50

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.30		0.050	mg/L		02/20/19 07:19	02/22/19 04:58	1
Calcium	300		2.0	mg/L		02/20/19 07:19	02/22/19 04:58	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0082		0.00050	mg/L		02/19/19 09:03	02/20/19 03:51	1
Barium	0.067		0.00050	mg/L		02/19/19 09:03	02/20/19 03:51	1
Chromium	0.0052		0.0010	mg/L		02/19/19 09:03	02/20/19 03:51	1
Cobalt	0.00073		0.00050	mg/L		02/19/19 09:03	02/20/19 03:51	1
Molybdenum	0.0074		0.00050	mg/L		02/19/19 09:03	02/20/19 03:51	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:51	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	H5	1.7	SU			02/18/19 17:00	1
Temperature	13.7	H5	0.1	Degrees C			02/18/19 17:00	1

**Client Sample ID: CH-CCR-M57A-21519**

**Lab Sample ID: 550-118122-2**

Date Collected: 02/15/19 21:41

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2100	D2	100	mg/L			02/26/19 01:38	50
Fluoride	ND		0.40	mg/L			02/26/19 01:19	1
Sulfate	1300	D2	100	mg/L			02/26/19 01:38	50

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.63		0.050	mg/L		02/20/19 07:19	02/22/19 05:04	1
Calcium	490		2.0	mg/L		02/20/19 07:19	02/22/19 05:04	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0017		0.00050	mg/L		02/19/19 09:03	02/20/19 03:53	1
Barium	0.041		0.00050	mg/L		02/19/19 09:03	02/20/19 03:53	1
Chromium	0.0074		0.0010	mg/L		02/19/19 09:03	02/20/19 03:53	1
Cobalt	0.0049		0.00050	mg/L		02/19/19 09:03	02/20/19 03:53	1
Molybdenum	0.0029		0.00050	mg/L		02/19/19 09:03	02/20/19 03:53	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:53	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.1	H5	1.7	SU			02/18/19 17:00	1
Temperature	10.2	H5	0.1	Degrees C			02/18/19 17:00	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

**Client Sample ID: CH-CCR-M58A-21519**

**Lab Sample ID: 550-118122-3**

Date Collected: 02/15/19 21:04

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2100	D2	100	mg/L			02/26/19 02:15	50
Fluoride	ND		0.40	mg/L			02/26/19 01:56	1
Sulfate	540	D2	100	mg/L			02/26/19 02:15	50

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.23		0.050	mg/L		02/20/19 07:19	02/22/19 05:10	1
Calcium	310		2.0	mg/L		02/20/19 07:19	02/22/19 05:10	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0043		0.00050	mg/L		02/19/19 09:03	02/20/19 03:56	1
Barium	0.063		0.00050	mg/L		02/19/19 09:03	02/20/19 03:56	1
Chromium	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 03:56	1
Cobalt	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:56	1
Molybdenum	0.0018		0.00050	mg/L		02/19/19 09:03	02/20/19 03:56	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:56	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.5	H5	1.7	SU			02/18/19 17:00	1
Temperature	10.5	H5	0.1	Degrees C			02/18/19 17:00	1

**Client Sample ID: CH-CCR-M62A-21519**

**Lab Sample ID: 550-118122-4**

Date Collected: 02/15/19 20:13

Matrix: Water

Date Received: 02/18/19 08:38

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2900	D2	400	mg/L			02/26/19 07:09	200
Fluoride	ND		0.40	mg/L			02/26/19 06:51	1
Sulfate	560	D2	400	mg/L			02/26/19 07:09	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.23		0.050	mg/L		02/20/19 07:19	02/22/19 05:16	1
Calcium	490		2.0	mg/L		02/20/19 07:19	02/22/19 05:16	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0030		0.00050	mg/L		02/19/19 09:03	02/20/19 03:45	1
Barium	0.068		0.00050	mg/L		02/19/19 09:03	02/20/19 03:45	1
Chromium	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 03:45	1
Cobalt	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:45	1
Molybdenum	0.0024		0.00050	mg/L		02/19/19 09:03	02/20/19 03:45	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:45	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	H5	1.7	SU			02/18/19 17:00	1
Temperature	14.2	H5	0.1	Degrees C			02/18/19 17:00	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

**Client Sample ID: CH-CCR-FD02-21519**

**Lab Sample ID: 550-118122-5**

**Date Collected: 02/15/19 20:13**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3000	D2	100	mg/L			02/28/19 00:54	50
Fluoride	ND		0.40	mg/L			02/28/19 00:36	1
Sulfate	590	D2	100	mg/L			02/28/19 00:54	50

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.23		0.050	mg/L		02/20/19 07:19	02/22/19 05:22	1
Calcium	490		2.0	mg/L		02/20/19 07:19	02/22/19 05:22	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0032		0.00050	mg/L		02/19/19 09:03	02/20/19 03:58	1
Barium	0.071		0.00050	mg/L		02/19/19 09:03	02/20/19 03:58	1
Chromium	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 03:58	1
Cobalt	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:58	1
Molybdenum	0.0025		0.00050	mg/L		02/19/19 09:03	02/20/19 03:58	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:58	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	H5	1.7	SU			02/18/19 17:00	1
Temperature	11.0	H5	0.1	Degrees C			02/18/19 17:00	1



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-170479/2**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			02/25/19 18:35	1
Fluoride	ND		0.40	mg/L			02/25/19 18:35	1
Sulfate	ND		2.0	mg/L			02/25/19 18:35	1

**Lab Sample ID: LCS 550-170479/5**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.3		mg/L		106	90 - 110
Fluoride	4.00	4.10		mg/L		102	90 - 110
Sulfate	20.0	20.4		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-170479/6**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.2		mg/L		106	90 - 110	0	20
Fluoride	4.00	4.11		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-117875-Q-3 MS ^50**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Matrix Spike**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	160	D2	1000	1280	D2	mg/L		112	80 - 120
Fluoride	ND	D1 D5	200	211	D1	mg/L		104	80 - 120
Sulfate	480	D2	1000	1550	D2	mg/L		107	80 - 120

**Lab Sample ID: 550-117875-Q-3 MSD ^50**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Matrix Spike Duplicate**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	160	D2	1000	1270	D2	mg/L		111	80 - 120	0	20
Fluoride	ND	D1 D5	200	211	D1	mg/L		104	80 - 120	0	20
Sulfate	480	D2	1000	1540	D2	mg/L		106	80 - 120	1	20

**Lab Sample ID: 550-118123-A-1 MS**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Matrix Spike**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	2.1		4.00	5.88		mg/L		95	80 - 120

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-118123-A-1 MS ^200**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Matrix Spike**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7300	D2	4000	11400	D2	mg/L		102	80 - 120
Sulfate	4100	D2	4000	8380	D2	mg/L		107	80 - 120

**Lab Sample ID: 550-118123-A-1 MSD**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Matrix Spike Duplicate**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	2.1		4.00	5.93		mg/L		97	80 - 120	1	20

**Lab Sample ID: 550-118123-A-1 MSD ^200**

**Matrix: Water**

**Analysis Batch: 170479**

**Client Sample ID: Matrix Spike Duplicate**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	7300	D2	4000	11400	D2	mg/L		102	80 - 120	0	20
Sulfate	4100	D2	4000	8330	D2	mg/L		106	80 - 120	1	20

**Lab Sample ID: MB 550-170483/1040**

**Matrix: Water**

**Analysis Batch: 170483**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			02/26/19 06:32	1
Fluoride	ND		0.40	mg/L			02/26/19 06:32	1
Sulfate	ND		2.0	mg/L			02/26/19 06:32	1

**Lab Sample ID: LCS 550-170483/65**

**Matrix: Water**

**Analysis Batch: 170483**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.3		mg/L		106	90 - 110
Fluoride	4.00	4.14		mg/L		104	90 - 110
Sulfate	20.0	20.7		mg/L		104	90 - 110

**Lab Sample ID: LCSD 550-170483/66**

**Matrix: Water**

**Analysis Batch: 170483**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.2		mg/L		106	90 - 110	0	20
Fluoride	4.00	4.12		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	1	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-118122-4 MS**

**Matrix: Water**

**Analysis Batch: 170483**

**Client Sample ID: CH-CCR-M62A-21519**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND		4.00	4.05		mg/L		95	80 - 120

**Lab Sample ID: 550-118122-4 MS**

**Matrix: Water**

**Analysis Batch: 170483**

**Client Sample ID: CH-CCR-M62A-21519**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	2900	D2	4000	7400	D2	mg/L		114	80 - 120
Sulfate	560	D2	4000	4810	D2	mg/L		106	80 - 120

**Lab Sample ID: 550-118122-4 MSD**

**Matrix: Water**

**Analysis Batch: 170483**

**Client Sample ID: CH-CCR-M62A-21519**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND		4.00	4.19		mg/L		98	80 - 120	3	20

**Lab Sample ID: 550-118122-4 MSD**

**Matrix: Water**

**Analysis Batch: 170483**

**Client Sample ID: CH-CCR-M62A-21519**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2900	D2	4000	7360	D2	mg/L		113	80 - 120	1	20
Sulfate	560	D2	4000	4800	D2	mg/L		106	80 - 120	0	20

**Lab Sample ID: MB 550-170752/2**

**Matrix: Water**

**Analysis Batch: 170752**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			02/27/19 19:23	1
Fluoride	ND		0.40	mg/L			02/27/19 19:23	1
Sulfate	ND		2.0	mg/L			02/27/19 19:23	1

**Lab Sample ID: LCS 550-170752/5**

**Matrix: Water**

**Analysis Batch: 170752**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.2		mg/L		106	90 - 110
Fluoride	4.00	4.10		mg/L		103	90 - 110
Sulfate	20.0	20.3		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-170752/6**

**Matrix: Water**

**Analysis Batch: 170752**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.2		mg/L		106	90 - 110	0	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: LCSD 550-170752/6**  
**Matrix: Water**  
**Analysis Batch: 170752**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	4.12		mg/L		103	90 - 110	1	20
Sulfate	20.0	20.3		mg/L		101	90 - 110	0	20

**Lab Sample ID: 550-118043-A-10 MS**  
**Matrix: Water**  
**Analysis Batch: 170752**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	7.5		4.00	11.3		mg/L		95	80 - 120

**Lab Sample ID: 550-118043-A-10 MS ^10**  
**Matrix: Water**  
**Analysis Batch: 170752**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	400	D2	200	609	D2	mg/L		103	80 - 120
Sulfate	180	D2	200	397	D2	mg/L		107	80 - 120

**Lab Sample ID: 550-118043-A-10 MSD**  
**Matrix: Water**  
**Analysis Batch: 170752**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	7.5		4.00	11.4		mg/L		96	80 - 120	1	20

**Lab Sample ID: 550-118043-A-10 MSD ^10**  
**Matrix: Water**  
**Analysis Batch: 170752**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	400	D2	200	601	D2	mg/L		99	80 - 120	1	20
Sulfate	180	D2	200	393	D2	mg/L		105	80 - 120	1	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-169948/1-A**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		02/20/19 07:19	02/22/19 04:32	1
Calcium	ND		2.0	mg/L		02/20/19 07:19	02/22/19 04:32	1

**Lab Sample ID: LCS 550-169948/2-A**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	1.03		mg/L		103	85 - 115

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCS 550-169948/2-A**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	21.0	22.9		mg/L		109	85 - 115

**Lab Sample ID: LCSD 550-169948/3-A**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Boron	1.00	1.04		mg/L		104	85 - 115	2	20
Calcium	21.0	23.0		mg/L		110	85 - 115	1	20

**Lab Sample ID: 550-118121-B-13-B MS**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.36		1.00	1.44		mg/L		109	70 - 130
Calcium	740	M3	21.0	748	M3	mg/L		45	70 - 130

**Lab Sample ID: 550-118121-B-13-C MSD**  
**Matrix: Water**  
**Analysis Batch: 170188**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 169948**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Boron	0.36		1.00	1.43		mg/L		107	70 - 130	1	20
Calcium	740	M3	21.0	747	M3	mg/L		39	70 - 130	0	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-169830/1-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Barium	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Chromium	ND		0.0010	mg/L		02/19/19 09:03	02/20/19 03:39	1
Cobalt	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Molybdenum	ND		0.00050	mg/L		02/19/19 09:03	02/20/19 03:39	1
Thallium	ND		0.00010	mg/L		02/19/19 09:03	02/20/19 03:39	1

**Lab Sample ID: LCS 550-169830/2-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.0986		mg/L		99	85 - 115
Barium	0.100	0.112		mg/L		112	85 - 115
Chromium	0.100	0.0975		mg/L		97	85 - 115
Cobalt	0.100	0.0945		mg/L		95	85 - 115

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-169830/2-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Molybdenum	0.100	0.0931		mg/L		93	85 - 115
Thallium	0.100	0.0914		mg/L		91	85 - 115

**Lab Sample ID: LCSD 550-169830/3-A**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Arsenic	0.100	0.0989		mg/L		99	85 - 115	0	20
Barium	0.100	0.114		mg/L		114	85 - 115	2	20
Chromium	0.100	0.0992		mg/L		99	85 - 115	2	20
Cobalt	0.100	0.0958		mg/L		96	85 - 115	1	20
Molybdenum	0.100	0.0929		mg/L		93	85 - 115	0	20
Thallium	0.100	0.0916		mg/L		92	85 - 115	0	20

**Lab Sample ID: 550-118122-4 MS**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: CH-CCR-M62A-21519**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.0030		0.100	0.104		mg/L		101	70 - 130
Barium	0.068		0.100	0.171		mg/L		103	70 - 130
Chromium	ND		0.100	0.0960		mg/L		96	70 - 130
Cobalt	ND		0.100	0.0889		mg/L		89	70 - 130
Molybdenum	0.0024		0.100	0.0982		mg/L		96	70 - 130
Thallium	ND		0.100	0.0829		mg/L		83	70 - 130

**Lab Sample ID: 550-118122-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 170032**

**Client Sample ID: CH-CCR-M62A-21519**  
**Prep Type: Total/NA**  
**Prep Batch: 169830**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Arsenic	0.0030		0.100	0.105		mg/L		102	70 - 130	1	20
Barium	0.068		0.100	0.175		mg/L		107	70 - 130	2	20
Chromium	ND		0.100	0.0978		mg/L		98	70 - 130	2	20
Cobalt	ND		0.100	0.0902		mg/L		90	70 - 130	1	20
Molybdenum	0.0024		0.100	0.0991		mg/L		97	70 - 130	1	20
Thallium	ND		0.100	0.0840		mg/L		84	70 - 130	1	20

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-169802/1**  
**Matrix: Water**  
**Analysis Batch: 169802**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		99.6	98.5 - 101.5

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: LCSSRM 550-169802/13**  
**Matrix: Water**  
**Analysis Batch: 169802**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.6	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-169802/22**  
**Matrix: Water**  
**Analysis Batch: 169802**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.6	98.5 - 101.5

**Lab Sample ID: 550-117936-A-7 DU**  
**Matrix: Water**  
**Analysis Batch: 169802**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	8.0	H5	8.0	H5	SU		0.1	5
Temperature	9.1	H5	9.4	H5	Degrees C		3	

**Lab Sample ID: 550-118122-4 DU**  
**Matrix: Water**  
**Analysis Batch: 169802**

**Client Sample ID: CH-CCR-M62A-21519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.3	H5	7.3	H5	SU		0.3	5
Temperature	14.2	H5	13.7	H5	Degrees C		4	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## HPLC/IC

### Analysis Batch: 170479

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-1	CH-CCR-M56A-21519	Total/NA	Water	300.0	
550-118122-1	CH-CCR-M56A-21519	Total/NA	Water	300.0	
550-118122-2	CH-CCR-M57A-21519	Total/NA	Water	300.0	
550-118122-2	CH-CCR-M57A-21519	Total/NA	Water	300.0	
550-118122-3	CH-CCR-M58A-21519	Total/NA	Water	300.0	
550-118122-3	CH-CCR-M58A-21519	Total/NA	Water	300.0	
MB 550-170479/2	Method Blank	Total/NA	Water	300.0	
LCS 550-170479/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-170479/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-117875-Q-3 MS ^50	Matrix Spike	Total/NA	Water	300.0	
550-117875-Q-3 MSD ^50	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-118123-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-118123-A-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-118123-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-118123-A-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 170483

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-4	CH-CCR-M62A-21519	Total/NA	Water	300.0	
550-118122-4	CH-CCR-M62A-21519	Total/NA	Water	300.0	
MB 550-170483/1040	Method Blank	Total/NA	Water	300.0	
LCS 550-170483/65	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-170483/66	Lab Control Sample Dup	Total/NA	Water	300.0	
550-118122-4 MS	CH-CCR-M62A-21519	Total/NA	Water	300.0	
550-118122-4 MS	CH-CCR-M62A-21519	Total/NA	Water	300.0	
550-118122-4 MSD	CH-CCR-M62A-21519	Total/NA	Water	300.0	
550-118122-4 MSD	CH-CCR-M62A-21519	Total/NA	Water	300.0	

### Analysis Batch: 170752

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-5	CH-CCR-FD02-21519	Total/NA	Water	300.0	
550-118122-5	CH-CCR-FD02-21519	Total/NA	Water	300.0	
MB 550-170752/2	Method Blank	Total/NA	Water	300.0	
LCS 550-170752/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-170752/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-118043-A-10 MS	Matrix Spike	Total/NA	Water	300.0	
550-118043-A-10 MS ^10	Matrix Spike	Total/NA	Water	300.0	
550-118043-A-10 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-118043-A-10 MSD ^10	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 169830

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-1	CH-CCR-M56A-21519	Total/NA	Water	200.8	
550-118122-2	CH-CCR-M57A-21519	Total/NA	Water	200.8	
550-118122-3	CH-CCR-M58A-21519	Total/NA	Water	200.8	
550-118122-4	CH-CCR-M62A-21519	Total/NA	Water	200.8	
550-118122-5	CH-CCR-FD02-21519	Total/NA	Water	200.8	
MB 550-169830/1-A	Method Blank	Total/NA	Water	200.8	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Metals (Continued)

### Prep Batch: 169830 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 550-169830/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-169830/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-118122-4 MS	CH-CCR-M62A-21519	Total/NA	Water	200.8	
550-118122-4 MSD	CH-CCR-M62A-21519	Total/NA	Water	200.8	

### Prep Batch: 169948

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-1	CH-CCR-M56A-21519	Total/NA	Water	200.7	
550-118122-2	CH-CCR-M57A-21519	Total/NA	Water	200.7	
550-118122-3	CH-CCR-M58A-21519	Total/NA	Water	200.7	
550-118122-4	CH-CCR-M62A-21519	Total/NA	Water	200.7	
550-118122-5	CH-CCR-FD02-21519	Total/NA	Water	200.7	
MB 550-169948/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-169948/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-169948/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-118121-B-13-B MS	Matrix Spike	Total/NA	Water	200.7	
550-118121-B-13-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 170032

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-1	CH-CCR-M56A-21519	Total/NA	Water	200.8 LL	169830
550-118122-2	CH-CCR-M57A-21519	Total/NA	Water	200.8 LL	169830
550-118122-3	CH-CCR-M58A-21519	Total/NA	Water	200.8 LL	169830
550-118122-4	CH-CCR-M62A-21519	Total/NA	Water	200.8 LL	169830
550-118122-5	CH-CCR-FD02-21519	Total/NA	Water	200.8 LL	169830
MB 550-169830/1-A	Method Blank	Total/NA	Water	200.8 LL	169830
LCS 550-169830/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	169830
LCSD 550-169830/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	169830
550-118122-4 MS	CH-CCR-M62A-21519	Total/NA	Water	200.8 LL	169830
550-118122-4 MSD	CH-CCR-M62A-21519	Total/NA	Water	200.8 LL	169830

### Analysis Batch: 170188

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-1	CH-CCR-M56A-21519	Total/NA	Water	200.7 Rev 4.4	169948
550-118122-2	CH-CCR-M57A-21519	Total/NA	Water	200.7 Rev 4.4	169948
550-118122-3	CH-CCR-M58A-21519	Total/NA	Water	200.7 Rev 4.4	169948
550-118122-4	CH-CCR-M62A-21519	Total/NA	Water	200.7 Rev 4.4	169948
550-118122-5	CH-CCR-FD02-21519	Total/NA	Water	200.7 Rev 4.4	169948
MB 550-169948/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	169948
LCS 550-169948/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	169948
LCSD 550-169948/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	169948
550-118121-B-13-B MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	169948
550-118121-B-13-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	169948

## General Chemistry

### Analysis Batch: 169802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-1	CH-CCR-M56A-21519	Total/NA	Water	SM 4500 H+ B	
550-118122-2	CH-CCR-M57A-21519	Total/NA	Water	SM 4500 H+ B	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## General Chemistry (Continued)

### Analysis Batch: 169802 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-118122-3	CH-CCR-M58A-21519	Total/NA	Water	SM 4500 H+ B	
550-118122-4	CH-CCR-M62A-21519	Total/NA	Water	SM 4500 H+ B	
550-118122-5	CH-CCR-FD02-21519	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-169802/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-169802/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-169802/22	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-117936-A-7 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	
550-118122-4 DU	CH-CCR-M62A-21519	Total/NA	Water	SM 4500 H+ B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

**Client Sample ID: CH-CCR-M56A-21519**

**Lab Sample ID: 550-118122-1**

**Date Collected: 02/15/19 22:14**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	170479	02/26/19 00:43	NEL	TAL PHX
Total/NA	Analysis	300.0		50	170479	02/26/19 01:01	NEL	TAL PHX
Total/NA	Prep	200.7			169948	02/20/19 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170188	02/22/19 04:58	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 03:51	ARE	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	169802	02/18/19 17:00	MRR	TAL PHX

**Client Sample ID: CH-CCR-M57A-21519**

**Lab Sample ID: 550-118122-2**

**Date Collected: 02/15/19 21:41**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	170479	02/26/19 01:19	NEL	TAL PHX
Total/NA	Analysis	300.0		50	170479	02/26/19 01:38	NEL	TAL PHX
Total/NA	Prep	200.7			169948	02/20/19 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170188	02/22/19 05:04	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 03:53	ARE	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	169802	02/18/19 17:00	MRR	TAL PHX

**Client Sample ID: CH-CCR-M58A-21519**

**Lab Sample ID: 550-118122-3**

**Date Collected: 02/15/19 21:04**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	170479	02/26/19 01:56	NEL	TAL PHX
Total/NA	Analysis	300.0		50	170479	02/26/19 02:15	NEL	TAL PHX
Total/NA	Prep	200.7			169948	02/20/19 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170188	02/22/19 05:10	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 03:56	ARE	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	169802	02/18/19 17:00	MRR	TAL PHX

**Client Sample ID: CH-CCR-M62A-21519**

**Lab Sample ID: 550-118122-4**

**Date Collected: 02/15/19 20:13**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	170483	02/26/19 06:51	NEL	TAL PHX
Total/NA	Analysis	300.0		200	170483	02/26/19 07:09	NEL	TAL PHX
Total/NA	Prep	200.7			169948	02/20/19 07:19	SGO	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

**Client Sample ID: CH-CCR-M62A-21519**

**Lab Sample ID: 550-118122-4**

**Date Collected: 02/15/19 20:13**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	200.7 Rev 4.4		1	170188	02/22/19 05:16	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 03:45	ARE	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	169802	02/18/19 17:00	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD02-21519**

**Lab Sample ID: 550-118122-5**

**Date Collected: 02/15/19 20:13**

**Matrix: Water**

**Date Received: 02/18/19 08:38**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	170752	02/28/19 00:36	NEL	TAL PHX
Total/NA	Analysis	300.0		50	170752	02/28/19 00:54	NEL	TAL PHX
Total/NA	Prep	200.7			169948	02/20/19 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	170188	02/22/19 05:22	SRA	TAL PHX
Total/NA	Prep	200.8			169830	02/19/19 09:03	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	170032	02/20/19 03:58	ARE	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	169802	02/18/19 17:00	MRR	TAL PHX

**Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

TestAmerica Job ID: 550-118122-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**Chain of Custody Record**

**TestAmerica Phoenix**  
4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

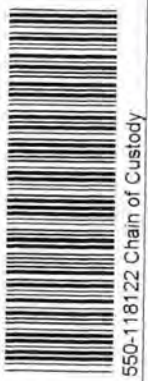
118122

Regulatory Program:  DW  NPDES  RCRA  Other: **CCR**

TestAmerica Laboratories, Inc.

<b>Client Contact</b>	<b>Doug Lavarway</b>	<b>Doug Lavarway</b>	<b>Date:</b>	<b>COC No:</b>
APS Cholla	928-587-0319	Lab Contact:	Carrier:	of COCs
4801 Cholla Lake Rd	Analysis Turnaround Time			
Joseph City, AZ 86032	<input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS			
(928) 587-0319 Phone	TAT, if different from Below			
(xxx) xxx-xxxx FAX	<input type="checkbox"/> 2 weeks			
Project Name:	<input type="checkbox"/> 1 week			
Site:	<input type="checkbox"/> 2 days			
P.O.#	<input type="checkbox"/> 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 (B, Ca)	200.8 (As, Ba, Cr, Co, Mo, Tl)	EPA 300.0 (Cl, F, SO4)	SM 4500-HB (pH)	Sample Specific Notes:
CH-CCR-M56A-21519 -01	2/15/2019	2214	G	W		N		X	X	X	X	
CH-CCR-M57A-21519 -02	2/15/19	2141	G	W		N		X	X	X	X	
CH-CCR-M58A-21519 -03	2/15/19	2104	G	W		N		X	X	X	X	
CH-CCR-M62A-21519 -04	2/15/19	2013	G	W		N		X	X	X	X	
CH-CCR-FD02-21519 -05	2/15/19	2013	G	W		N		X	X	X	X	



**Preservation Used:** 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

**Possible Hazard Identification:** Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

**Special Instructions/QC Requirements & Comments:**  
Method 200.8 with collision cell

Custody Seal No.: \_\_\_\_\_

Relinquished by: *Dave Lavarway* Date/Time: 2/18/19  
 Relinquished by: *CDO* Date/Time: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Received in Laboratory: *TA* Date/Time: 02-19-19

Temp 1-8: 20-c

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-118122-1

**Login Number: 118122**

**List Source: TestAmerica Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-120430-1

**Login Number: 120430**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.

## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-120430-1  
Client Project/Site: APS - Cholla CCR  
Revision: 1

For:  
Arizona Public Service Company  
4801 Cholla Lake Rd  
Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:  
5/8/2019 9:39:27 AM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*





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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
H1	Sample analysis performed past holding time.
H1	Sample analysis performed past holding time.
N1	See case narrative.
N1	See case narrative.

### Metals

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
L3	The associated blank spike recovery was above method acceptance limits.
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

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**Job ID: 550-120430-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

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**Narrative**

**Job Narrative  
550-120430-1**

**Comments**

This revised report contains the Flouride result for sample 550-120430-3 from a reanalysis past hold time. The sample was run in duplicate. Refer to the supporting QC.

**Receipt**

The samples were received on 4/3/2019 3:56 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.9° C.

**HPLC/IC**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**Metals**

Method(s) 200.7 Rev 4.4: The continuing calibration blank (CCB) for analytical batch 550-174948 contained Sodium above the reporting limit (RL). All reported samples associated with this CCB contained this analyte at a concentration greater than 10X the value found in the CCB; therefore, re-analysis of samples was not performed.

Method(s) 200.8 LL: Insufficient sample volume was available to perform a redigestion on the matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 550-174005 and analytical batch 550-175459 for Barium; therefore the results for Barium have been reported and qualified on the MS/MSD.

Method(s) 200.8: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/DUP) associated with preparation batch 550-175634.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**General Chemistry**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-120430-1	CH-CCR-W317-33019	Water	03/30/19 16:01	04/03/19 15:56
550-120430-2	CH-CCR-BAP-33019	Water	03/30/19 14:57	04/03/19 15:56
550-120430-3	CH-CCR-FAP-33019	Water	03/30/19 13:34	04/03/19 15:56

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Client Sample ID: CH-CCR-W317-33019

## Lab Sample ID: 550-120430-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	400	mg/L	200		300.0	Total/NA
Sulfate	670	D2	400	mg/L	200		300.0	Total/NA
Boron	0.20		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	320		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	110		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	7.1		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	650		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0036		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.039		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0035		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00085		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.064		0.00050	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	190		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	190		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	3300	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-BAP-33019

## Lab Sample ID: 550-120430-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2100	D2	400	mg/L	200		300.0	Total/NA
Fluoride	3.7	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3100	D2	400	mg/L	200		300.0	Total/NA
Boron	4.8		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	550		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	28		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1500		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Antimony	0.0027		0.0010	mg/L	1		200.8 LL	Total/NA
Arsenic	0.017		0.0010	mg/L	1		200.8 LL	Total/NA
Barium	0.20		0.0010	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00011		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0035		0.0020	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00099		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.027		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.014		0.00050	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	120		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	120		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	7700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	8.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FAP-33019

## Lab Sample ID: 550-120430-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	24000	D2	1000	mg/L	500		300.0	Total/NA
Fluoride	68	D1 H1 N1	4.0	mg/L	10		300.0	Total/NA
Fluoride	5.1	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	24000	D2	1000	mg/L	500		300.0	Total/NA
Beryllium	0.0057	D1	0.0020	mg/L	2		200.7 Rev 4.4	Total/NA
Boron	350	D2	0.50	mg/L	10		200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

**Client Sample ID: CH-CCR-FAP-33019 (Continued)**

**Lab Sample ID: 550-120430-3**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Calcium	730	D1	4.0	mg/L	2		200.7 Rev 4.4	Total/NA
Lithium	4.1	D1	0.40	mg/L	2		200.7 Rev 4.4	Total/NA
Magnesium	4900	D2	20	mg/L	10		200.7 Rev 4.4	Total/NA
Potassium	340	D1	1.0	mg/L	2		200.7 Rev 4.4	Total/NA
Sodium	17000	D2	5.0	mg/L	10		200.7 Rev 4.4	Total/NA
Antimony	0.036	D1	0.0040	mg/L	4		200.8 LL	Total/NA
Arsenic	0.17		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.092	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Chromium	0.0024		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0053		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.52	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Selenium	0.034		0.00050	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	36		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	36		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	74000	D2	1000	mg/L	1		SM 2540C	Total/NA
pH	6.7	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

**Client Sample ID: CH-CCR-W317-33019**

**Lab Sample ID: 550-120430-1**

Date Collected: 03/30/19 16:01

Matrix: Water

Date Received: 04/03/19 15:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1400	D2	400	mg/L			04/05/19 02:14	200
Fluoride	ND		0.40	mg/L			04/05/19 01:56	1
Sulfate	670	D2	400	mg/L			04/05/19 02:14	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/08/19 09:36	04/12/19 01:33	1
Boron	0.20		0.050	mg/L		04/08/19 09:36	04/12/19 01:33	1
Calcium	320		2.0	mg/L		04/08/19 09:36	04/12/19 01:33	1
Lithium	ND		0.20	mg/L		04/08/19 09:36	04/12/19 01:33	1
Magnesium	110		2.0	mg/L		04/08/19 09:36	04/12/19 01:33	1
Potassium	7.1		0.50	mg/L		04/08/19 09:36	04/12/19 01:33	1
Sodium	650		0.50	mg/L		04/08/19 09:36	04/12/19 01:33	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/04/19 11:48	04/11/19 04:46	1
Arsenic	0.0036		0.00050	mg/L		04/18/19 07:36	04/18/19 21:41	1
Barium	0.039		0.00050	mg/L		04/18/19 07:36	04/18/19 21:41	1
Cadmium	ND		0.00010	mg/L		04/04/19 11:48	04/11/19 04:46	1
Chromium	0.0035		0.0010	mg/L		04/18/19 07:36	04/18/19 21:41	1
Cobalt	0.00085		0.00050	mg/L		04/04/19 11:48	04/11/19 04:46	1
Lead	ND		0.00050	mg/L		04/04/19 11:48	04/11/19 04:46	1
Molybdenum	0.064		0.00050	mg/L		04/04/19 11:48	04/11/19 04:46	1
Selenium	ND		0.00050	mg/L		04/04/19 11:48	04/11/19 04:46	1
Thallium	ND		0.00010	mg/L		04/04/19 11:48	04/11/19 04:46	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/05/19 10:06	04/05/19 18:17	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	190		6.0	mg/L			04/10/19 13:40	1
Bicarbonate Alkalinity as CaCO3	190		6.0	mg/L			04/10/19 13:40	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			04/10/19 13:40	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1
Total Dissolved Solids	3300	D2	100	mg/L			04/04/19 11:55	1
pH	7.5	H5	1.7	SU			04/05/19 11:43	1
Temperature	10.6	H5	0.1	Degrees C			04/05/19 11:43	1

**Client Sample ID: CH-CCR-BAP-33019**

**Lab Sample ID: 550-120430-2**

Date Collected: 03/30/19 14:57

Matrix: Water

Date Received: 04/03/19 15:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2100	D2	400	mg/L			04/05/19 02:51	200
Fluoride	3.7	D1	0.80	mg/L			04/05/19 02:33	2
Sulfate	3100	D2	400	mg/L			04/05/19 02:51	200

Eurolins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

**Client Sample ID: CH-CCR-BAP-33019**

**Lab Sample ID: 550-120430-2**

Date Collected: 03/30/19 14:57

Matrix: Water

Date Received: 04/03/19 15:56

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/08/19 09:36	04/12/19 01:39	1
<b>Boron</b>	<b>4.8</b>		0.050	mg/L		04/08/19 09:36	04/12/19 01:39	1
<b>Calcium</b>	<b>550</b>		2.0	mg/L		04/08/19 09:36	04/12/19 01:39	1
Lithium	ND		0.20	mg/L		04/08/19 09:36	04/12/19 01:39	1
<b>Magnesium</b>	<b>300</b>		2.0	mg/L		04/08/19 09:36	04/12/19 01:39	1
<b>Potassium</b>	<b>28</b>		0.50	mg/L		04/08/19 09:36	04/12/19 01:39	1
<b>Sodium</b>	<b>1500</b>		0.50	mg/L		04/08/19 09:36	04/12/19 01:39	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Antimony</b>	<b>0.0027</b>		0.0010	mg/L		04/04/19 11:48	04/11/19 04:44	1
<b>Arsenic</b>	<b>0.017</b>		0.0010	mg/L		04/18/19 07:36	04/18/19 21:54	1
<b>Barium</b>	<b>0.20</b>		0.0010	mg/L		04/18/19 07:36	04/18/19 21:54	1
<b>Cadmium</b>	<b>0.00011</b>		0.00010	mg/L		04/04/19 11:48	04/11/19 04:44	1
<b>Chromium</b>	<b>0.0035</b>		0.0020	mg/L		04/18/19 07:36	04/18/19 21:54	1
<b>Cobalt</b>	<b>0.00099</b>		0.00050	mg/L		04/04/19 11:48	04/11/19 04:44	1
Lead	ND		0.00050	mg/L		04/04/19 11:48	04/11/19 04:44	1
<b>Molybdenum</b>	<b>0.027</b>		0.00050	mg/L		04/04/19 11:48	04/11/19 04:44	1
<b>Selenium</b>	<b>0.014</b>		0.00050	mg/L		04/04/19 11:48	04/11/19 04:44	1
Thallium	ND		0.00010	mg/L		04/04/19 11:48	04/11/19 04:44	1

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/05/19 10:06	04/05/19 18:19	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Alkalinity as CaCO3</b>	<b>120</b>		6.0	mg/L			04/11/19 14:35	1
<b>Bicarbonate Alkalinity as CaCO3</b>	<b>120</b>		6.0	mg/L			04/11/19 14:35	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			04/11/19 14:35	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			04/11/19 14:35	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			04/11/19 14:35	1
<b>Total Dissolved Solids</b>	<b>7700</b>	<b>D2</b>	100	mg/L			04/04/19 11:55	1
<b>pH</b>	<b>8.3</b>	<b>H5</b>	1.7	SU			04/05/19 11:43	1
<b>Temperature</b>	<b>12.0</b>	<b>H5</b>	0.1	Degrees C			04/05/19 11:43	1

**Client Sample ID: CH-CCR-FAP-33019**

**Lab Sample ID: 550-120430-3**

Date Collected: 03/30/19 13:34

Matrix: Water

Date Received: 04/03/19 15:56

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Chloride</b>	<b>24000</b>	<b>D2</b>	1000	mg/L			04/05/19 11:56	500
<b>Fluoride</b>	<b>68</b>	<b>D1 H1 N1</b>	4.0	mg/L			05/02/19 06:54	10
<b>Fluoride</b>	<b>5.1</b>	<b>D1</b>	0.80	mg/L			04/05/19 03:09	2
<b>Sulfate</b>	<b>24000</b>	<b>D2</b>	1000	mg/L			04/05/19 11:56	500

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.0057</b>	<b>D1</b>	0.0020	mg/L		04/08/19 09:36	04/13/19 03:00	2
<b>Boron</b>	<b>350</b>	<b>D2</b>	0.50	mg/L		04/08/19 09:36	04/13/19 02:54	10

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

**Client Sample ID: CH-CCR-FAP-33019**

**Lab Sample ID: 550-120430-3**

Date Collected: 03/30/19 13:34

Matrix: Water

Date Received: 04/03/19 15:56

### Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	730	D1	4.0	mg/L		04/08/19 09:36	04/13/19 03:00	2
Lithium	4.1	D1	0.40	mg/L		04/08/19 09:36	04/13/19 03:00	2
Magnesium	4900	D2	20	mg/L		04/08/19 09:36	04/13/19 02:54	10
Potassium	340	D1	1.0	mg/L		04/08/19 09:36	04/13/19 03:00	2
Sodium	17000	D2	5.0	mg/L		04/08/19 09:36	04/13/19 02:54	10

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.036	D1	0.0040	mg/L		04/18/19 07:36	04/19/19 03:21	4
Arsenic	0.17		0.00050	mg/L		04/18/19 07:36	04/18/19 21:43	1
Barium	0.092	D1	0.0020	mg/L		04/18/19 07:36	04/19/19 03:21	4
Cadmium	ND	D1	0.00040	mg/L		04/18/19 07:36	04/19/19 03:21	4
Chromium	0.0024		0.0010	mg/L		04/18/19 07:36	04/18/19 21:43	1
Cobalt	0.0053		0.00050	mg/L		04/04/19 11:48	04/11/19 04:48	1
Lead	ND	D1	0.0020	mg/L		04/18/19 07:36	04/19/19 03:21	4
Molybdenum	0.52	D1	0.0020	mg/L		04/18/19 07:36	04/19/19 03:21	4
Selenium	0.034		0.00050	mg/L		04/04/19 11:48	04/11/19 04:48	1
Thallium	ND	D1	0.00040	mg/L		04/18/19 07:36	04/19/19 03:21	4

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/08/19 13:46	04/08/19 17:45	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	36		6.0	mg/L			04/10/19 13:40	1
Bicarbonate Alkalinity as CaCO3	36		6.0	mg/L			04/10/19 13:40	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			04/10/19 13:40	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1
Total Dissolved Solids	74000	D2	1000	mg/L			04/04/19 11:55	1
pH	6.7	H5	1.7	SU			04/05/19 11:43	1
Temperature	16.0	H5	0.1	Degrees C			04/05/19 11:43	1

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-174157/2**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			04/04/19 17:02	1
Fluoride	ND		0.40	mg/L			04/04/19 17:02	1
Sulfate	ND		2.0	mg/L			04/04/19 17:02	1

**Lab Sample ID: LCS 550-174157/5**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.8		mg/L		104	90 - 110
Fluoride	4.00	4.00		mg/L		100	90 - 110
Sulfate	20.0	20.1		mg/L		100	90 - 110

**Lab Sample ID: LCSD 550-174157/6**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.8		mg/L		104	90 - 110	0	20
Fluoride	4.00	4.00		mg/L		100	90 - 110	0	20
Sulfate	20.0	20.1		mg/L		100	90 - 110	0	20

**Lab Sample ID: 550-120430-2 MS**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	3.7	D1	8.00	11.3	D1	mg/L		94	80 - 120

**Lab Sample ID: 550-120430-2 MS**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	2100	D2	4000	6330	D2	mg/L		106	80 - 120
Sulfate	3100	D2	4000	6870	D2	mg/L		96	80 - 120

**Lab Sample ID: 550-120430-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	3.7	D1	8.00	11.3	D1	mg/L		95	80 - 120	0	20

**Lab Sample ID: 550-120430-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2100	D2	4000	6360	D2	mg/L		107	80 - 120	0	20

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# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-120430-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 174157**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	3100	D2	4000	7120	D2	mg/L		102	80 - 120	4	20

**Lab Sample ID: MB 550-176721/2**  
**Matrix: Water**  
**Analysis Batch: 176721**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			05/01/19 16:17	1

**Lab Sample ID: LCS 550-176721/5**  
**Matrix: Water**  
**Analysis Batch: 176721**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	4.01		mg/L		100	90 - 110

**Lab Sample ID: LCSD 550-176721/6**  
**Matrix: Water**  
**Analysis Batch: 176721**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	4.01		mg/L		100	90 - 110	0	20

**Lab Sample ID: 550-122015-B-3 MS**  
**Matrix: Water**  
**Analysis Batch: 176721**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	0.53		4.00	4.60		mg/L		102	80 - 120

**Lab Sample ID: 550-122015-B-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 176721**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	0.53		4.00	4.47		mg/L		99	80 - 120	3	20

**Lab Sample ID: 550-120430-3 DU**  
**Matrix: Water**  
**Analysis Batch: 176721**

**Client Sample ID: CH-CCR-FAP-33019**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Fluoride	68	H1 N1 D1	66.2	D1 H1 N1	mg/L		3	20

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-174227/1-A**  
**Matrix: Water**  
**Analysis Batch: 174823**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174227**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/08/19 09:36	04/12/19 00:57	1
Boron	ND		0.050	mg/L		04/08/19 09:36	04/12/19 00:57	1
Calcium	ND		2.0	mg/L		04/08/19 09:36	04/12/19 00:57	1
Lithium	ND		0.20	mg/L		04/08/19 09:36	04/12/19 00:57	1
Magnesium	ND		2.0	mg/L		04/08/19 09:36	04/12/19 00:57	1
Potassium	ND		0.50	mg/L		04/08/19 09:36	04/12/19 00:57	1
Sodium	ND		0.50	mg/L		04/08/19 09:36	04/12/19 00:57	1

**Lab Sample ID: LCS 550-174227/2-A**  
**Matrix: Water**  
**Analysis Batch: 174823**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174227**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	1.00	0.954		mg/L		95	85 - 115
Boron	1.00	0.920		mg/L		92	85 - 115
Calcium	21.0	20.1		mg/L		96	85 - 115
Lithium	1.00	0.914		mg/L		91	85 - 115
Magnesium	21.0	19.8		mg/L		94	85 - 115
Potassium	20.0	18.3		mg/L		91	85 - 115
Sodium	20.0	18.2		mg/L		91	85 - 115

**Lab Sample ID: LCSD 550-174227/3-A**  
**Matrix: Water**  
**Analysis Batch: 174823**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174227**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Beryllium	1.00	0.961		mg/L		96	85 - 115	1	20
Boron	1.00	0.941		mg/L		94	85 - 115	2	20
Calcium	21.0	20.3		mg/L		97	85 - 115	1	20
Lithium	1.00	0.914		mg/L		91	85 - 115	0	20
Magnesium	21.0	20.0		mg/L		95	85 - 115	1	20
Potassium	20.0	18.4		mg/L		92	85 - 115	1	20
Sodium	20.0	18.3		mg/L		91	85 - 115	0	20

**Lab Sample ID: 550-120373-C-1-B MS**  
**Matrix: Water**  
**Analysis Batch: 174823**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174227**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		1.00	0.980		mg/L		98	70 - 130
Boron	0.13		1.00	1.09		mg/L		96	70 - 130
Calcium	31		21.0	51.9		mg/L		97	70 - 130
Lithium	ND		1.00	0.950		mg/L		95	70 - 130
Magnesium	16		21.0	35.8		mg/L		96	70 - 130
Potassium	11		20.0	29.9		mg/L		96	70 - 130
Sodium	49		20.0	65.7		mg/L		83	70 - 130

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-120373-C-1-C MSD**  
**Matrix: Water**  
**Analysis Batch: 174823**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174227**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		1.00	0.959		mg/L		96	70 - 130	2	20
Boron	0.13		1.00	1.06		mg/L		93	70 - 130	3	20
Calcium	31		21.0	49.8		mg/L		87	70 - 130	4	20
Lithium	ND		1.00	0.915		mg/L		91	70 - 130	4	20
Magnesium	16		21.0	34.4		mg/L		90	70 - 130	4	20
Potassium	11		20.0	28.7		mg/L		90	70 - 130	4	20
Sodium	49		20.0	63.3		mg/L		71	70 - 130	4	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-174005/1-A**  
**Matrix: Water**  
**Analysis Batch: 174664**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/04/19 11:48	04/11/19 04:33	1
Cadmium	ND		0.00010	mg/L		04/04/19 11:48	04/11/19 04:33	1
Cobalt	ND		0.00050	mg/L		04/04/19 11:48	04/11/19 04:33	1
Lead	ND		0.00050	mg/L		04/04/19 11:48	04/11/19 04:33	1
Molybdenum	ND		0.00050	mg/L		04/04/19 11:48	04/11/19 04:33	1
Selenium	ND		0.00050	mg/L		04/04/19 11:48	04/11/19 04:33	1
Thallium	ND		0.00010	mg/L		04/04/19 11:48	04/11/19 04:33	1

**Lab Sample ID: MB 550-174005/1-A**  
**Matrix: Water**  
**Analysis Batch: 175459**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		04/04/19 11:48	04/19/19 03:31	1
Barium	ND		0.00050	mg/L		04/04/19 11:48	04/19/19 03:31	1
Chromium	ND		0.0010	mg/L		04/04/19 11:48	04/19/19 03:31	1

**Lab Sample ID: LCS 550-174005/2-A**  
**Matrix: Water**  
**Analysis Batch: 174664**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.113		mg/L		113	85 - 115
Cadmium	0.100	0.111		mg/L		111	85 - 115
Cobalt	0.100	0.114		mg/L		114	85 - 115
Lead	0.100	0.111		mg/L		111	85 - 115
Molybdenum	0.100	0.112		mg/L		112	85 - 115
Selenium	0.100	0.111		mg/L		111	85 - 115
Thallium	0.100	0.112		mg/L		112	85 - 115



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-174005/2-A**  
**Matrix: Water**  
**Analysis Batch: 175459**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.100	0.105		mg/L		105	85 - 115
Barium	0.100	0.124	L3	mg/L		124	85 - 115
Chromium	0.100	0.104		mg/L		104	85 - 115

**Lab Sample ID: LCSD 550-174005/3-A**  
**Matrix: Water**  
**Analysis Batch: 174664**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.106		mg/L		106	85 - 115	6	20
Cadmium	0.100	0.105		mg/L		105	85 - 115	5	20
Cobalt	0.100	0.108		mg/L		108	85 - 115	5	20
Lead	0.100	0.106		mg/L		106	85 - 115	5	20
Molybdenum	0.100	0.106		mg/L		106	85 - 115	5	20
Selenium	0.100	0.106		mg/L		106	85 - 115	5	20
Thallium	0.100	0.105		mg/L		105	85 - 115	6	20

**Lab Sample ID: LCSD 550-174005/3-A**  
**Matrix: Water**  
**Analysis Batch: 175459**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.100	0.104		mg/L		104	85 - 115	0	20
Barium	0.100	0.124	L3	mg/L		124	85 - 115	0	20
Chromium	0.100	0.102		mg/L		102	85 - 115	2	20

**Lab Sample ID: 550-120430-2 MS**  
**Matrix: Water**  
**Analysis Batch: 174664**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Antimony	0.0027		0.100	0.110		mg/L		107	70 - 130
Cadmium	0.00011		0.100	0.0963		mg/L		96	70 - 130
Cobalt	0.00099		0.100	0.101		mg/L		100	70 - 130
Lead	ND		0.100	0.0962		mg/L		96	70 - 130
Molybdenum	0.027		0.100	0.138		mg/L		112	70 - 130
Selenium	0.014		0.100	0.143		mg/L		128	70 - 130
Thallium	ND		0.100	0.0951		mg/L		95	70 - 130

**Lab Sample ID: 550-120430-2 MS**  
**Matrix: Water**  
**Analysis Batch: 175459**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.018		0.100	0.132		mg/L		113	70 - 130
Barium	0.20	L3 M1	0.100	0.346	M1	mg/L		150	70 - 130
Chromium	0.0024		0.100	0.104		mg/L		102	70 - 130

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-120430-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 174664**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
Antimony	0.0027		0.100	0.112		mg/L		109	70 - 130	2	20
Cadmium	0.00011		0.100	0.0976		mg/L		98	70 - 130	1	20
Cobalt	0.00099		0.100	0.101		mg/L		101	70 - 130	0	20
Lead	ND		0.100	0.0960		mg/L		96	70 - 130	0	20
Molybdenum	0.027		0.100	0.139		mg/L		112	70 - 130	1	20
Selenium	0.014		0.100	0.143		mg/L		128	70 - 130	0	20
Thallium	ND		0.100	0.0953		mg/L		95	70 - 130	0	20

**Lab Sample ID: 550-120430-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 175459**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**  
**Prep Batch: 174005**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
Arsenic	0.018		0.100	0.130		mg/L		112	70 - 130	1	20
Barium	0.20	L3 M1	0.100	0.339	M1	mg/L		142	70 - 130	2	20
Chromium	0.0024		0.100	0.105		mg/L		102	70 - 130	1	20

**Lab Sample ID: MB 550-175310/1-A**  
**Matrix: Water**  
**Analysis Batch: 175447**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 175310**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Arsenic	ND		0.00050	mg/L		04/18/19 07:36	04/18/19 21:10	1
Barium	ND		0.00050	mg/L		04/18/19 07:36	04/18/19 21:10	1
Chromium	ND		0.0010	mg/L		04/18/19 07:36	04/18/19 21:10	1

**Lab Sample ID: LCS 550-175310/4-A**  
**Matrix: Water**  
**Analysis Batch: 175447**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 175310**

Analyte	Spike	LCS	LCS	Unit	D	%Rec	Limits
		Added	Result				
Arsenic	0.100	0.0988		mg/L		99	85 - 115
Barium	0.100	0.105		mg/L		105	85 - 115
Chromium	0.100	0.0940		mg/L		94	85 - 115

**Lab Sample ID: LCSD 550-175310/5-A**  
**Matrix: Water**  
**Analysis Batch: 175447**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 175310**

Analyte	Spike	LCSD	LCSD	Unit	D	%Rec	Limits	RPD	Limit
		Added	Result						
Arsenic	0.100	0.0973		mg/L		97	85 - 115	2	20
Barium	0.100	0.107		mg/L		107	85 - 115	2	20
Chromium	0.100	0.0924		mg/L		92	85 - 115	2	20

**Lab Sample ID: 550-121243-D-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 175447**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 175310**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	Limits
	Result	Qualifier	Added	Result	Qualifier				
Arsenic	0.0065		0.100	0.108		mg/L		101	70 - 130

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-121243-D-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 175447**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 175310**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Barium	0.10		0.100	0.206		mg/L		103	70 - 130
Chromium	ND		0.100	0.0936		mg/L		93	70 - 130

**Lab Sample ID: 550-121243-D-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 175447**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 175310**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.0065		0.100	0.109		mg/L		103	70 - 130	2	20
Barium	0.10		0.100	0.213		mg/L		111	70 - 130	4	20
Chromium	ND		0.100	0.0949		mg/L		94	70 - 130	1	20

## Method: 245.1 - Mercury (CVAA)

**Lab Sample ID: MB 550-174072/1-A**  
**Matrix: Water**  
**Analysis Batch: 174194**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174072**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/05/19 10:06	04/05/19 17:38	1

**Lab Sample ID: LCS 550-174072/2-A**  
**Matrix: Water**  
**Analysis Batch: 174194**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174072**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Hg	0.00500	0.00518		mg/L		104	85 - 115

**Lab Sample ID: LCSD 550-174072/3-A**  
**Matrix: Water**  
**Analysis Batch: 174194**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174072**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.00500	0.00511		mg/L		102	85 - 115	1	20

**Lab Sample ID: 550-120155-C-1-C MS**  
**Matrix: Water**  
**Analysis Batch: 174194**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174072**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Hg	ND		0.00500	0.00519		mg/L		104	70 - 130

**Lab Sample ID: 550-120155-C-1-D MSD**  
**Matrix: Water**  
**Analysis Batch: 174194**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174072**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.00500	0.00509		mg/L		102	70 - 130	2	20

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: 245.1 - Mercury (CVAA) (Continued)

**Lab Sample ID: MB 550-174290/1-A**  
**Matrix: Water**  
**Analysis Batch: 174352**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174290**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/08/19 13:46	04/08/19 17:33	1

**Lab Sample ID: LCS 550-174290/2-A**  
**Matrix: Water**  
**Analysis Batch: 174352**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174290**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hg	0.00500	0.00528		mg/L		106	85 - 115

**Lab Sample ID: LCSD 550-174290/3-A**  
**Matrix: Water**  
**Analysis Batch: 174352**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174290**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hg	0.00500	0.00534		mg/L		107	85 - 115	1	20

**Lab Sample ID: 550-120139-A-2-E MS**  
**Matrix: Water**  
**Analysis Batch: 174352**

**Client Sample ID: Matrix Spike**  
**Prep Type: Dissolved**  
**Prep Batch: 174290**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Hg	ND		0.00500	0.00529		mg/L		106	70 - 130

**Lab Sample ID: 550-120139-A-2-F MSD**  
**Matrix: Water**  
**Analysis Batch: 174352**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Dissolved**  
**Prep Batch: 174290**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hg	ND		0.00500	0.00531		mg/L		106	70 - 130	0	20

## Method: SM 2320B - Alkalinity

**Lab Sample ID: MB 550-174586/1**  
**Matrix: Water**  
**Analysis Batch: 174586**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			04/10/19 13:40	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			04/10/19 13:40	1

**Lab Sample ID: LCS 550-174586/2**  
**Matrix: Water**  
**Analysis Batch: 174586**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity as CaCO3	250	250		mg/L		100	90 - 110

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: SM 2320B - Alkalinity (Continued)

**Lab Sample ID: LCSD 550-174586/14**  
**Matrix: Water**  
**Analysis Batch: 174586**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	254		mg/L		102	90 - 110	2	20

**Lab Sample ID: 550-120435-A-1 DU**  
**Matrix: Water**  
**Analysis Batch: 174586**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity as CaCO3	690		690		mg/L		0.3	20
Bicarbonate Alkalinity as CaCO3	690		690		mg/L		0.3	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

**Lab Sample ID: MB 550-174733/1**  
**Matrix: Water**  
**Analysis Batch: 174733**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			04/11/19 14:35	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			04/11/19 14:35	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			04/11/19 14:35	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			04/11/19 14:35	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			04/11/19 14:35	1

**Lab Sample ID: LCS 550-174733/2**  
**Matrix: Water**  
**Analysis Batch: 174733**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity as CaCO3	250	254		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-174733/10**  
**Matrix: Water**  
**Analysis Batch: 174733**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	254		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-120430-2 DU**  
**Matrix: Water**  
**Analysis Batch: 174733**

**Client Sample ID: CH-CCR-BAP-33019**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity as CaCO3	120		122		mg/L		2	20
Bicarbonate Alkalinity as CaCO3	120		122		mg/L		2	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-174008/1  
Matrix: Water  
Analysis Batch: 174008

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			04/04/19 11:55	1

Lab Sample ID: LCS 550-174008/2  
Matrix: Water  
Analysis Batch: 174008

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	978		mg/L		98	90 - 110

Lab Sample ID: LCSD 550-174008/3  
Matrix: Water  
Analysis Batch: 174008

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	996		mg/L		100	90 - 110	2	10

Lab Sample ID: 550-120430-2 DU  
Matrix: Water  
Analysis Batch: 174008

Client Sample ID: CH-CCR-BAP-33019  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	7700	D2	7440	D2	mg/L		4	10

## Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-174155/1  
Matrix: Water  
Analysis Batch: 174155

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.0	98.5 - 101.5

Lab Sample ID: LCSSRM 550-174155/12  
Matrix: Water  
Analysis Batch: 174155

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		101.0	98.5 - 101.5

Lab Sample ID: 550-120430-2 DU  
Matrix: Water  
Analysis Batch: 174155

Client Sample ID: CH-CCR-BAP-33019  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	8.3	H5	8.3	H5	SU		0.1	5
Temperature	12.0	H5	11.7	H5	Degrees C		3	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## HPLC/IC

### Analysis Batch: 174157

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	300.0	
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	300.0	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	300.0	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	300.0	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	300.0	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	300.0	
MB 550-174157/2	Method Blank	Total/NA	Water	300.0	
LCS 550-174157/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-174157/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-120430-2 MS	CH-CCR-BAP-33019	Total/NA	Water	300.0	
550-120430-2 MS	CH-CCR-BAP-33019	Total/NA	Water	300.0	
550-120430-2 MSD	CH-CCR-BAP-33019	Total/NA	Water	300.0	
550-120430-2 MSD	CH-CCR-BAP-33019	Total/NA	Water	300.0	

### Analysis Batch: 176721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	300.0	
MB 550-176721/2	Method Blank	Total/NA	Water	300.0	
LCS 550-176721/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-176721/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-122015-B-3 MS	Matrix Spike	Total/NA	Water	300.0	
550-122015-B-3 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-120430-3 DU	CH-CCR-FAP-33019	Total/NA	Water	300.0	

## Metals

### Prep Batch: 174005

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	200.8	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	200.8	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.8	
MB 550-174005/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-174005/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-174005/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-120430-2 MS	CH-CCR-BAP-33019	Total/NA	Water	200.8	
550-120430-2 MSD	CH-CCR-BAP-33019	Total/NA	Water	200.8	

### Prep Batch: 174072

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	245.1	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	245.1	
MB 550-174072/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-174072/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-174072/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-120155-C-1-C MS	Matrix Spike	Total/NA	Water	245.1	
550-120155-C-1-D MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	

### Analysis Batch: 174194

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	245.1	174072
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	245.1	174072

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# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Metals (Continued)

### Analysis Batch: 174194 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-174072/1-A	Method Blank	Total/NA	Water	245.1	174072
LCS 550-174072/2-A	Lab Control Sample	Total/NA	Water	245.1	174072
LCSD 550-174072/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	174072
550-120155-C-1-C MS	Matrix Spike	Total/NA	Water	245.1	174072
550-120155-C-1-D MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	174072

### Prep Batch: 174227

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	200.7	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	200.7	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.7	
MB 550-174227/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-174227/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-174227/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-120373-C-1-B MS	Matrix Spike	Total/NA	Water	200.7	
550-120373-C-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Prep Batch: 174290

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	245.1	
MB 550-174290/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-174290/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-174290/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-120139-A-2-E MS	Matrix Spike	Dissolved	Water	245.1	
550-120139-A-2-F MSD	Matrix Spike Duplicate	Dissolved	Water	245.1	

### Analysis Batch: 174352

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	245.1	174290
MB 550-174290/1-A	Method Blank	Total/NA	Water	245.1	174290
LCS 550-174290/2-A	Lab Control Sample	Total/NA	Water	245.1	174290
LCSD 550-174290/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	174290
550-120139-A-2-E MS	Matrix Spike	Dissolved	Water	245.1	174290
550-120139-A-2-F MSD	Matrix Spike Duplicate	Dissolved	Water	245.1	174290

### Analysis Batch: 174664

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	200.8 LL	174005
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	200.8 LL	174005
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.8 LL	174005
MB 550-174005/1-A	Method Blank	Total/NA	Water	200.8 LL	174005
LCS 550-174005/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	174005
LCSD 550-174005/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	174005
550-120430-2 MS	CH-CCR-BAP-33019	Total/NA	Water	200.8 LL	174005
550-120430-2 MSD	CH-CCR-BAP-33019	Total/NA	Water	200.8 LL	174005

### Analysis Batch: 174823

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	200.7 Rev 4.4	174227
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	200.7 Rev 4.4	174227
MB 550-174227/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	174227

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# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Metals (Continued)

### Analysis Batch: 174823 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 550-174227/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	174227
LCSD 550-174227/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	174227
550-120373-C-1-B MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	174227
550-120373-C-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	174227

### Analysis Batch: 174948

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.7 Rev 4.4	174227
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.7 Rev 4.4	174227

### Prep Batch: 175310

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	200.8	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	200.8	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.8	
MB 550-175310/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-175310/4-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-175310/5-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-121243-D-1-A MS	Matrix Spike	Total/NA	Water	200.8	
550-121243-D-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Analysis Batch: 175447

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	200.8 LL	175310
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	200.8 LL	175310
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.8 LL	175310
MB 550-175310/1-A	Method Blank	Total/NA	Water	200.8 LL	175310
LCS 550-175310/4-A	Lab Control Sample	Total/NA	Water	200.8 LL	175310
LCSD 550-175310/5-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	175310
550-121243-D-1-A MS	Matrix Spike	Total/NA	Water	200.8 LL	175310
550-121243-D-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	175310

### Analysis Batch: 175457

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	200.8 LL	175310

### Analysis Batch: 175459

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-174005/1-A	Method Blank	Total/NA	Water	200.8 LL	174005
LCS 550-174005/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	174005
LCSD 550-174005/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	174005
550-120430-2 MS	CH-CCR-BAP-33019	Total/NA	Water	200.8 LL	174005
550-120430-2 MSD	CH-CCR-BAP-33019	Total/NA	Water	200.8 LL	174005

## General Chemistry

### Analysis Batch: 174008

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	SM 2540C	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	SM 2540C	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	SM 2540C	

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# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## General Chemistry (Continued)

### Analysis Batch: 174008 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-174008/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-174008/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-174008/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-120430-2 DU	CH-CCR-BAP-33019	Total/NA	Water	SM 2540C	

### Analysis Batch: 174155

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	SM 4500 H+ B	
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	SM 4500 H+ B	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	SM 4500 H+ B	
LCS SRM 550-174155/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCS SRM 550-174155/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-120430-2 DU	CH-CCR-BAP-33019	Total/NA	Water	SM 4500 H+ B	

### Analysis Batch: 174586

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-1	CH-CCR-W317-33019	Total/NA	Water	SM 2320B	
550-120430-3	CH-CCR-FAP-33019	Total/NA	Water	SM 2320B	
MB 550-174586/1	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-174586/2	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-174586/14	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-120435-A-1 DU	Duplicate	Total/NA	Water	SM 2320B	

### Analysis Batch: 174733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-120430-2	CH-CCR-BAP-33019	Total/NA	Water	SM 2320B	
MB 550-174733/1	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-174733/2	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-174733/10	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-120430-2 DU	CH-CCR-BAP-33019	Total/NA	Water	SM 2320B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

**Client Sample ID: CH-CCR-W317-33019**

**Lab Sample ID: 550-120430-1**

**Date Collected: 03/30/19 16:01**

**Matrix: Water**

**Date Received: 04/03/19 15:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	174157	04/05/19 01:56	NEL	TAL PHX
Total/NA	Analysis	300.0		200	174157	04/05/19 02:14	NEL	TAL PHX
Total/NA	Prep	200.7			174227	04/08/19 09:36	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	174823	04/12/19 01:33	SRA	TAL PHX
Total/NA	Prep	200.8			174005	04/04/19 11:48	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	174664	04/11/19 04:46	ARE	TAL PHX
Total/NA	Prep	200.8			175310	04/18/19 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	175447	04/18/19 21:41	ARE	TAL PHX
Total/NA	Prep	245.1			174072	04/05/19 10:06	JTG	TAL PHX
Total/NA	Analysis	245.1		1	174194	04/05/19 18:17	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	174586	04/10/19 13:40	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	174008	(Start) 04/04/19 11:55 (End) 04/05/19 09:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	174155	04/05/19 11:43	MRR	TAL PHX

**Client Sample ID: CH-CCR-BAP-33019**

**Lab Sample ID: 550-120430-2**

**Date Collected: 03/30/19 14:57**

**Matrix: Water**

**Date Received: 04/03/19 15:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	174157	04/05/19 02:33	NEL	TAL PHX
Total/NA	Analysis	300.0		200	174157	04/05/19 02:51	NEL	TAL PHX
Total/NA	Prep	200.7			174227	04/08/19 09:36	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	174823	04/12/19 01:39	SRA	TAL PHX
Total/NA	Prep	200.8			174005	04/04/19 11:48	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	174664	04/11/19 04:44	ARE	TAL PHX
Total/NA	Prep	200.8			175310	04/18/19 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	175447	04/18/19 21:54	ARE	TAL PHX
Total/NA	Prep	245.1			174072	04/05/19 10:06	JTG	TAL PHX
Total/NA	Analysis	245.1		1	174194	04/05/19 18:19	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	174733	04/11/19 14:35	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	174008	(Start) 04/04/19 11:55 (End) 04/05/19 09:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	174155	04/05/19 11:43	MRR	TAL PHX

**Client Sample ID: CH-CCR-FAP-33019**

**Lab Sample ID: 550-120430-3**

**Date Collected: 03/30/19 13:34**

**Matrix: Water**

**Date Received: 04/03/19 15:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	174157	04/05/19 03:09	NEL	TAL PHX
Total/NA	Analysis	300.0		500	174157	04/05/19 11:56	NEL	TAL PHX

Eurofins TestAmerica, Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

**Client Sample ID: CH-CCR-FAP-33019**

**Lab Sample ID: 550-120430-3**

**Date Collected: 03/30/19 13:34**

**Matrix: Water**

**Date Received: 04/03/19 15:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	176721	05/02/19 06:54	NEL	TAL PHX
Total/NA	Prep	200.7			174227	04/08/19 09:36	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		10	174948	04/13/19 02:54	SRA	TAL PHX
Total/NA	Prep	200.7			174227	04/08/19 09:36	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	174948	04/13/19 03:00	SRA	TAL PHX
Total/NA	Prep	200.8			174005	04/04/19 11:48	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	174664	04/11/19 04:48	ARE	TAL PHX
Total/NA	Prep	200.8			175310	04/18/19 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	175447	04/18/19 21:43	ARE	TAL PHX
Total/NA	Prep	200.8			175310	04/18/19 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	175457	04/19/19 03:21	ARE	TAL PHX
Total/NA	Prep	245.1			174290	04/08/19 13:46	TRB	TAL PHX
Total/NA	Analysis	245.1		1	174352	04/08/19 17:45	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	174586	04/10/19 13:40	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	174008		YET	TAL PHX
					(Start)	04/04/19 11:55		
					(End)	04/05/19 09:55		
Total/NA	Analysis	SM 4500 H+ B		1	174155	04/05/19 11:43	MRR	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19 *

1

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\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-120430-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
245.1	Mercury (CVAA)	EPA	TAL PHX
SM 2320B	Alkalinity	SM	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX
245.1	Preparation, Mercury	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



**TestAmerica Phoenix**  
4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

120430

Regulatory Program:  DW  NPDES  RCRA  Other: **CCR**

TestAmerica Laboratories, Inc.

Client Contact		Doug Lavarrway 928-587-0319		Lab Contact:		Doug Lavarrway		Date: 03/30/2019		Carrier:		COC No. _____ of _____ COCs	
Analysis Turnaround Time		<input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below _____ <input type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Filtered Sample ( Y / N ) Perform MS / MSD ( Y / N ) EPA 200.7 (Be, Li) 200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl) EPA 245.1 (Hg) EPA 300.0 (F) EPA 200.7 Rev 4.4 (B, Ca, Na, K, M) EPA 300.0 (Cl, F, SO4) SM 2540C (TDS) SM 4500-HB (pH) SM 2320B (HCO3)		Date/Time: _____ Received by: _____ Company: _____		Date/Time: _____ Received in Laboratory by: _____ Company: _____		Date/Time: _____ Received by: _____ Company: _____		Date/Time: _____ Received in Laboratory by: _____ Company: _____	
Sample Identification		Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sample Specific Notes: 550-120430 Chain of Custody						
CH-CCR-W317-33019		3/30/2019	1601	G	W	2							
CH-CCR-BAP-33019		3/30/2019	1457	G	W	2							
CH-CCR-FAP-33019		3/30/2019	1334	G	W	2							
Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other _____													
Possible Hazard Identification:		Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)											
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.													
<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown		<input type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months											
Special Instructions/QC Requirements & Comments:		Method 200.8 with collision cell											
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C):		Obs'd:		Corrd:		Therm ID#:		(59°C) R	
Relinquished by: Doug Lavarrway		Company: AOS		Date/Time: 3/31/2019		Received by: _____		Company: _____		Date/Time: _____		Received in Laboratory by: _____	
Relinquished by: _____		Company: _____		Date/Time: _____		Received by: _____		Company: _____		Date/Time: _____		Received in Laboratory by: _____	
Relinquished by: _____		Company: _____		Date/Time: _____		Received by: _____		Company: _____		Date/Time: _____		Received in Laboratory by: _____	

## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-121047-1  
Client Project/Site: APP Work - Cholla

For:  
Arizona Public Service Company  
PO BOX 188, Ste. 4458  
Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:  
4/26/2019 1:05:17 PM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
B1	Target analyte detected in method blank at or above the method reporting limit.
B7	Target analyte detected in method blank at or above method reporting limit. Concentration found in the sample was 10 times above the concentration found in the blank.
D1	Sample required dilution due to matrix.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)



# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

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## Job ID: 550-121047-1

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Laboratory: Eurofins TestAmerica, Phoenix

### Narrative

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#### Job Narrative 550-121047-1

### Comments

No additional comments.

### Receipt

The samples were received on 4/12/2019 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.2° C.

### HPLC/IC

Method(s) 300.0: The following samples were diluted Fluoride by method EPA 300.0 due to the nature of the samples matrix: CH-CCR-M67A-41119 (550-121047-6) and CH-CCR-M64A-41119 (550-121047-8). This analyte was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-121047-1	CH-CCR-M50A-41119	Water	04/11/19 11:14	04/12/19 09:30
550-121047-2	CH-CCR-M51A-41119	Water	04/10/19 08:48	04/12/19 09:30
550-121047-3	CH-CCR-w123-41119	Water	04/11/19 11:42	04/12/19 09:30
550-121047-4	CH-CCR-M65A-41119	Water	04/11/19 14:02	04/12/19 09:30
550-121047-5	CH-CCR-M66A-41119	Water	04/11/19 14:26	04/12/19 09:30
550-121047-6	CH-CCR-M67A-41119	Water	04/11/19 13:36	04/12/19 09:30
550-121047-7	CH-CCR-W126-41119	Water	04/11/19 12:20	04/12/19 09:30
550-121047-8	CH-CCR-M64A-41119	Water	04/11/19 15:26	04/12/19 09:30
550-121047-9	CH-CCR-FD01-41119	Water	04/11/19 12:20	04/12/19 09:30

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Client Sample ID: CH-CCR-M50A-41119

## Lab Sample ID: 550-121047-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2200	D2	200	mg/L	100		300.0	Total/NA
Fluoride	2.0	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3000	D2	200	mg/L	100		300.0	Total/NA
Boron	3.1		0.050	mg/L	1		200.7	Total/NA
Calcium	610		2.0	mg/L	1		200.7	Total/NA
Lithium	0.44		0.20	mg/L	1		200.7	Total/NA
Arsenic	3.0		0.50	ug/L	1		200.8 LL	Total/NA
Barium	8.8	B7	0.50	ug/L	1		200.8 LL	Total/NA
Chromium	1.1		1.0	ug/L	1		200.8 LL	Total/NA
Cobalt	0.62		0.50	ug/L	1		200.8 LL	Total/NA
Molybdenum	7.1		0.50	ug/L	1		200.8 LL	Total/NA
Selenium	2.5		0.50	ug/L	1		200.8 LL	Total/NA
Total Dissolved Solids	7700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M51A-41119

## Lab Sample ID: 550-121047-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5000	D2	200	mg/L	100		300.0	Total/NA
Fluoride	5.4	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2800	D2	200	mg/L	100		300.0	Total/NA
Boron	31		0.050	mg/L	1		200.7	Total/NA
Calcium	790		2.0	mg/L	1		200.7	Total/NA
Lithium	0.45		0.20	mg/L	1		200.7	Total/NA
Arsenic	32	D1	5.0	ug/L	10		200.8 LL	Total/NA
Barium	9.1	B7 D1	1.0	ug/L	2		200.8 LL	Total/NA
Chromium	16	D1	10	ug/L	10		200.8 LL	Total/NA
Molybdenum	90	D1	1.0	ug/L	2		200.8 LL	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	11.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-w123-41119

## Lab Sample ID: 550-121047-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6200	D2	200	mg/L	100		300.0	Total/NA
Fluoride	3.9	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3400	D2	200	mg/L	100		300.0	Total/NA
Boron	37		0.050	mg/L	1		200.7	Total/NA
Calcium	790		2.0	mg/L	1		200.7	Total/NA
Lithium	0.67		0.20	mg/L	1		200.7	Total/NA
Arsenic	1.9		0.50	ug/L	1		200.8 LL	Total/NA
Barium	11	B7	0.50	ug/L	1		200.8 LL	Total/NA
Chromium	97		1.0	ug/L	1		200.8 LL	Total/NA
Cobalt	1.9		0.50	ug/L	1		200.8 LL	Total/NA
Molybdenum	410		0.50	ug/L	1		200.8 LL	Total/NA
Selenium	5.3		0.50	ug/L	1		200.8 LL	Total/NA
Total Dissolved Solids	14000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.6	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-M65A-41119**

**Lab Sample ID: 550-121047-4**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3600	D2	200	mg/L	100		300.0	Total/NA
Fluoride	1.9	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2700	D2	200	mg/L	100		300.0	Total/NA
Boron	11		0.050	mg/L	1		200.7	Total/NA
Calcium	730		2.0	mg/L	1		200.7	Total/NA
Lithium	0.52		0.20	mg/L	1		200.7	Total/NA
Arsenic	1.8		0.50	ug/L	1		200.8 LL	Total/NA
Barium	16	B7	0.50	ug/L	1		200.8 LL	Total/NA
Cadmium	0.11		0.10	ug/L	1		200.8 LL	Total/NA
Chromium	10		1.0	ug/L	1		200.8 LL	Total/NA
Cobalt	3.6		0.50	ug/L	1		200.8 LL	Total/NA
Molybdenum	67		0.50	ug/L	1		200.8 LL	Total/NA
Selenium	2.4		0.50	ug/L	1		200.8 LL	Total/NA
Total Dissolved Solids	9400	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

**Client Sample ID: CH-CCR-M66A-41119**

**Lab Sample ID: 550-121047-5**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4300	D2	200	mg/L	100		300.0	Total/NA
Fluoride	1.4	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2800	D2	200	mg/L	100		300.0	Total/NA
Boron	1.5		0.050	mg/L	1		200.7	Total/NA
Calcium	790		2.0	mg/L	1		200.7	Total/NA
Lithium	0.50		0.20	mg/L	1		200.7	Total/NA
Arsenic	2.5		0.50	ug/L	1		200.8 LL	Total/NA
Barium	16	B7	0.50	ug/L	1		200.8 LL	Total/NA
Cadmium	0.28		0.10	ug/L	1		200.8 LL	Total/NA
Chromium	210		1.0	ug/L	1		200.8 LL	Total/NA
Cobalt	1.7		0.50	ug/L	1		200.8 LL	Total/NA
Molybdenum	39		0.50	ug/L	1		200.8 LL	Total/NA
Selenium	27		0.50	ug/L	1		200.8 LL	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	11.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

**Client Sample ID: CH-CCR-M67A-41119**

**Lab Sample ID: 550-121047-6**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4900	D2	200	mg/L	100		300.0	Total/NA
Sulfate	1500	D2	200	mg/L	100		300.0	Total/NA
Boron	0.37		0.050	mg/L	1		200.7	Total/NA
Calcium	1500		2.0	mg/L	1		200.7	Total/NA
Arsenic	16		0.50	ug/L	1		200.8 LL	Total/NA
Barium	23	B7	0.50	ug/L	1		200.8 LL	Total/NA
Cobalt	4.1		0.50	ug/L	1		200.8 LL	Total/NA
Molybdenum	5.2		0.50	ug/L	1		200.8 LL	Total/NA
Selenium	0.75		0.50	ug/L	1		200.8 LL	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	6.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Client Sample ID: CH-CCR-W126-41119

## Lab Sample ID: 550-121047-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6700	D2	200	mg/L	100		300.0	Total/NA
Fluoride	3.7	D1	0.80	mg/L		2	300.0	Total/NA
Sulfate	3900	D2	200	mg/L	100		300.0	Total/NA
Boron	46		0.050	mg/L		1	200.7	Total/NA
Calcium	740		2.0	mg/L		1	200.7	Total/NA
Lithium	0.73		0.20	mg/L		1	200.7	Total/NA
Arsenic	1.7		0.50	ug/L		1	200.8 LL	Total/NA
Barium	11	B7	0.50	ug/L		1	200.8 LL	Total/NA
Chromium	8.5		1.0	ug/L		1	200.8 LL	Total/NA
Cobalt	4.2		0.50	ug/L		1	200.8 LL	Total/NA
Molybdenum	220		0.50	ug/L		1	200.8 LL	Total/NA
Selenium	2.0		0.50	ug/L		1	200.8 LL	Total/NA
Total Dissolved Solids	16000	D2	200	mg/L		1	SM 2540C	Total/NA
pH	7.4	H5	1.7	SU		1	SM 4500 H+ B	Total/NA
Temperature	10.9	H5	0.1	Degrees C		1	SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M64A-41119

## Lab Sample ID: 550-121047-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4400	D2	200	mg/L	100		300.0	Total/NA
Sulfate	4300	D2	200	mg/L	100		300.0	Total/NA
Boron	1.3		0.050	mg/L		1	200.7	Total/NA
Calcium	500		2.0	mg/L		1	200.7	Total/NA
Lithium	0.27		0.20	mg/L		1	200.7	Total/NA
Arsenic	0.58		0.50	ug/L		1	200.8 LL	Total/NA
Barium	11	B7	0.50	ug/L		1	200.8 LL	Total/NA
Molybdenum	5.0		0.50	ug/L		1	200.8 LL	Total/NA
Selenium	0.53		0.50	ug/L		1	200.8 LL	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L		1	SM 2540C	Total/NA
pH	7.3	H5	1.7	SU		1	SM 4500 H+ B	Total/NA
Temperature	11.1	H5	0.1	Degrees C		1	SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD01-41119

## Lab Sample ID: 550-121047-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6700	D2	200	mg/L	100		300.0	Total/NA
Fluoride	3.7	D1	0.80	mg/L		2	300.0	Total/NA
Sulfate	3900	D2	200	mg/L	100		300.0	Total/NA
Boron	47		0.050	mg/L		1	200.7	Total/NA
Calcium	750		2.0	mg/L		1	200.7	Total/NA
Lithium	0.73		0.20	mg/L		1	200.7	Total/NA
Arsenic	1.6		0.50	ug/L		1	200.8 LL	Total/NA
Barium	9.4	B7	0.50	ug/L		1	200.8 LL	Total/NA
Chromium	6.9		1.0	ug/L		1	200.8 LL	Total/NA
Cobalt	4.1		0.50	ug/L		1	200.8 LL	Total/NA
Molybdenum	220		0.50	ug/L		1	200.8 LL	Total/NA
Selenium	1.9		0.50	ug/L		1	200.8 LL	Total/NA
Total Dissolved Solids	16000	D2	200	mg/L		1	SM 2540C	Total/NA
pH	7.4	H5	1.7	SU		1	SM 4500 H+ B	Total/NA
Temperature	12.2	H5	0.1	Degrees C		1	SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-M50A-41119**

**Lab Sample ID: 550-121047-1**

Date Collected: 04/11/19 11:14

Matrix: Water

Date Received: 04/12/19 09:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2200	D2	200	mg/L			04/22/19 21:45	100
Fluoride	2.0	D1	0.80	mg/L			04/19/19 19:57	2
Sulfate	3000	D2	200	mg/L			04/22/19 21:45	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.1		0.050	mg/L		04/13/19 09:55	04/24/19 14:01	1
Calcium	610		2.0	mg/L		04/13/19 09:55	04/24/19 14:01	1
Lithium	0.44		0.20	mg/L		04/13/19 09:55	04/24/19 14:01	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3.0		0.50	ug/L		04/12/19 22:18	04/22/19 22:16	1
Barium	8.8	B7	0.50	ug/L		04/12/19 22:18	04/19/19 20:46	1
Cadmium	ND		0.10	ug/L		04/12/19 22:18	04/19/19 20:46	1
Chromium	1.1		1.0	ug/L		04/12/19 22:18	04/22/19 22:16	1
Cobalt	0.62		0.50	ug/L		04/12/19 22:18	04/22/19 22:16	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 01:54	1
Molybdenum	7.1		0.50	ug/L		04/12/19 22:18	04/19/19 20:46	1
Selenium	2.5		0.50	ug/L		04/12/19 22:18	04/22/19 22:16	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7700	D2	100	mg/L			04/15/19 07:59	1
pH	7.4	H5	1.7	SU			04/22/19 12:27	1
Temperature	10.8	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M51A-41119**

**Lab Sample ID: 550-121047-2**

Date Collected: 04/10/19 08:48

Matrix: Water

Date Received: 04/12/19 09:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5000	D2	200	mg/L			04/22/19 22:04	100
Fluoride	5.4	D1	0.80	mg/L			04/19/19 20:15	2
Sulfate	2800	D2	200	mg/L			04/22/19 22:04	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	31		0.050	mg/L		04/13/19 09:55	04/24/19 14:07	1
Calcium	790		2.0	mg/L		04/13/19 09:55	04/24/19 14:07	1
Lithium	0.45		0.20	mg/L		04/13/19 09:55	04/24/19 14:07	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	32	D1	5.0	ug/L		04/12/19 22:18	04/19/19 21:46	10
Barium	9.1	B7 D1	1.0	ug/L		04/12/19 22:18	04/19/19 20:50	2
Cadmium	ND	D1	0.20	ug/L		04/12/19 22:18	04/19/19 20:50	2
Chromium	16	D1	10	ug/L		04/12/19 22:18	04/19/19 21:46	10
Cobalt	ND	D1	5.0	ug/L		04/12/19 22:18	04/19/19 21:46	10
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 01:56	1

Eurolins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-M51A-41119**

**Lab Sample ID: 550-121047-2**

Date Collected: 04/10/19 08:48

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	90	D1	1.0	ug/L		04/12/19 22:18	04/19/19 20:50	2
Selenium	ND	D1	5.0	ug/L		04/12/19 22:18	04/23/19 01:25	10

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	200	mg/L			04/15/19 07:57	1
pH	7.2	H5	1.7	SU			04/22/19 12:27	1
Temperature	11.0	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-w123-41119**

**Lab Sample ID: 550-121047-3**

Date Collected: 04/11/19 11:42

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6200	D2	200	mg/L			04/22/19 22:22	100
Fluoride	3.9	D1	0.80	mg/L			04/19/19 20:34	2
Sulfate	3400	D2	200	mg/L			04/22/19 22:22	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	37		0.050	mg/L		04/13/19 09:55	04/24/19 14:13	1
Calcium	790		2.0	mg/L		04/13/19 09:55	04/24/19 14:13	1
Lithium	0.67		0.20	mg/L		04/13/19 09:55	04/24/19 14:13	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.9		0.50	ug/L		04/12/19 22:18	04/22/19 22:22	1
Barium	11	B7	0.50	ug/L		04/12/19 22:18	04/19/19 20:52	1
Cadmium	ND		0.10	ug/L		04/12/19 22:18	04/19/19 20:52	1
Chromium	97		1.0	ug/L		04/12/19 22:18	04/22/19 22:22	1
Cobalt	1.9		0.50	ug/L		04/12/19 22:18	04/22/19 22:22	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 01:59	1
Molybdenum	410		0.50	ug/L		04/12/19 22:18	04/19/19 20:52	1
Selenium	5.3		0.50	ug/L		04/12/19 22:18	04/22/19 22:22	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	14000	D2	200	mg/L			04/15/19 07:59	1
pH	7.6	H5	1.7	SU			04/22/19 12:27	1
Temperature	10.8	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M65A-41119**

**Lab Sample ID: 550-121047-4**

Date Collected: 04/11/19 14:02

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3600	D2	200	mg/L			04/22/19 22:41	100
Fluoride	1.9	D1	0.80	mg/L			04/19/19 20:52	2
Sulfate	2700	D2	200	mg/L			04/22/19 22:41	100

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-M65A-41119**

**Lab Sample ID: 550-121047-4**

Date Collected: 04/11/19 14:02

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	11		0.050	mg/L		04/13/19 09:55	04/24/19 14:18	1
Calcium	730		2.0	mg/L		04/13/19 09:55	04/24/19 14:18	1
Lithium	0.52		0.20	mg/L		04/13/19 09:55	04/24/19 14:18	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.8		0.50	ug/L		04/12/19 22:18	04/22/19 22:24	1
Barium	16	B7	0.50	ug/L		04/12/19 22:18	04/19/19 20:55	1
Cadmium	0.11		0.10	ug/L		04/12/19 22:18	04/19/19 20:55	1
Chromium	10		1.0	ug/L		04/12/19 22:18	04/22/19 22:24	1
Cobalt	3.6		0.50	ug/L		04/12/19 22:18	04/22/19 22:24	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 02:01	1
Molybdenum	67		0.50	ug/L		04/12/19 22:18	04/19/19 20:55	1
Selenium	2.4		0.50	ug/L		04/12/19 22:18	04/22/19 22:24	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	9400	D2	100	mg/L			04/15/19 07:59	1
pH	7.2	H5	1.7	SU			04/22/19 12:27	1
Temperature	10.6	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M66A-41119**

**Lab Sample ID: 550-121047-5**

Date Collected: 04/11/19 14:26

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4300	D2	200	mg/L			04/22/19 22:59	100
Fluoride	1.4	D1	0.80	mg/L			04/19/19 21:10	2
Sulfate	2800	D2	200	mg/L			04/22/19 22:59	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.5		0.050	mg/L		04/13/19 09:55	04/24/19 14:24	1
Calcium	790		2.0	mg/L		04/13/19 09:55	04/24/19 14:24	1
Lithium	0.50		0.20	mg/L		04/13/19 09:55	04/24/19 14:24	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	2.5		0.50	ug/L		04/12/19 22:18	04/22/19 22:26	1
Barium	16	B7	0.50	ug/L		04/12/19 22:18	04/19/19 20:57	1
Cadmium	0.28		0.10	ug/L		04/12/19 22:18	04/19/19 20:57	1
Chromium	210		1.0	ug/L		04/12/19 22:18	04/22/19 22:26	1
Cobalt	1.7		0.50	ug/L		04/12/19 22:18	04/22/19 22:26	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 02:03	1
Molybdenum	39		0.50	ug/L		04/12/19 22:18	04/19/19 20:57	1
Selenium	27		0.50	ug/L		04/12/19 22:18	04/22/19 22:26	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	100	mg/L			04/15/19 07:59	1

Eurolins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-M66A-41119**

**Lab Sample ID: 550-121047-5**

Date Collected: 04/11/19 14:26

Matrix: Water

Date Received: 04/12/19 09:30

## General Chemistry (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.2	H5	1.7	SU			04/22/19 12:27	1
Temperature	11.5	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M67A-41119**

**Lab Sample ID: 550-121047-6**

Date Collected: 04/11/19 13:36

Matrix: Water

Date Received: 04/12/19 09:30

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4900	D2	200	mg/L			04/22/19 23:17	100
Fluoride	ND	D1 D5	0.80	mg/L			04/19/19 21:29	2
Sulfate	1500	D2	200	mg/L			04/22/19 23:17	100

## Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.37		0.050	mg/L		04/13/19 09:55	04/24/19 14:30	1
Calcium	1500		2.0	mg/L		04/13/19 09:55	04/24/19 14:30	1
Lithium	ND		0.20	mg/L		04/13/19 09:55	04/24/19 14:30	1

## Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	16		0.50	ug/L		04/12/19 22:18	04/22/19 22:28	1
Barium	23	B7	0.50	ug/L		04/12/19 22:18	04/19/19 20:59	1
Cadmium	ND		0.10	ug/L		04/12/19 22:18	04/19/19 20:59	1
Chromium	ND		1.0	ug/L		04/12/19 22:18	04/22/19 22:28	1
Cobalt	4.1		0.50	ug/L		04/12/19 22:18	04/22/19 22:28	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 02:05	1
Molybdenum	5.2		0.50	ug/L		04/12/19 22:18	04/19/19 20:59	1
Selenium	0.75		0.50	ug/L		04/12/19 22:18	04/22/19 22:28	1

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	100	mg/L			04/15/19 07:59	1
pH	6.9	H5	1.7	SU			04/22/19 12:27	1
Temperature	12.1	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-W126-41119**

**Lab Sample ID: 550-121047-7**

Date Collected: 04/11/19 12:20

Matrix: Water

Date Received: 04/12/19 09:30

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6700	D2	200	mg/L			04/22/19 23:36	100
Fluoride	3.7	D1	0.80	mg/L			04/19/19 21:47	2
Sulfate	3900	D2	200	mg/L			04/22/19 23:36	100

## Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	46		0.050	mg/L		04/13/19 09:55	04/24/19 14:36	1
Calcium	740		2.0	mg/L		04/13/19 09:55	04/24/19 14:36	1
Lithium	0.73		0.20	mg/L		04/13/19 09:55	04/24/19 14:36	1

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-W126-41119**

**Lab Sample ID: 550-121047-7**

Date Collected: 04/11/19 12:20

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.7		0.50	ug/L		04/12/19 22:18	04/22/19 22:30	1
Barium	11	B7	0.50	ug/L		04/12/19 22:18	04/19/19 21:01	1
Cadmium	ND		0.10	ug/L		04/12/19 22:18	04/19/19 21:01	1
Chromium	8.5		1.0	ug/L		04/12/19 22:18	04/22/19 22:30	1
Cobalt	4.2		0.50	ug/L		04/12/19 22:18	04/22/19 22:30	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 02:07	1
Molybdenum	220		0.50	ug/L		04/12/19 22:18	04/19/19 21:01	1
Selenium	2.0		0.50	ug/L		04/12/19 22:18	04/22/19 22:30	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	200	mg/L			04/15/19 07:59	1
pH	7.4	H5	1.7	SU			04/22/19 12:27	1
Temperature	10.9	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M64A-41119**

**Lab Sample ID: 550-121047-8**

Date Collected: 04/11/19 15:26

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4400	D2	200	mg/L			04/23/19 00:31	100
Fluoride	ND	D1 D5	0.80	mg/L			04/19/19 22:06	2
Sulfate	4300	D2	200	mg/L			04/23/19 00:31	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.3		0.050	mg/L		04/13/19 09:55	04/24/19 14:42	1
Calcium	500		2.0	mg/L		04/13/19 09:55	04/24/19 14:42	1
Lithium	0.27		0.20	mg/L		04/13/19 09:55	04/24/19 14:42	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.58		0.50	ug/L		04/12/19 22:18	04/22/19 22:33	1
Barium	11	B7	0.50	ug/L		04/12/19 22:18	04/19/19 21:03	1
Cadmium	ND		0.10	ug/L		04/12/19 22:18	04/19/19 21:03	1
Chromium	ND		1.0	ug/L		04/12/19 22:18	04/22/19 22:33	1
Cobalt	ND		0.50	ug/L		04/12/19 22:18	04/22/19 22:33	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 02:09	1
Molybdenum	5.0		0.50	ug/L		04/12/19 22:18	04/19/19 21:03	1
Selenium	0.53		0.50	ug/L		04/12/19 22:18	04/22/19 22:33	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	200	mg/L			04/15/19 07:59	1
pH	7.3	H5	1.7	SU			04/22/19 12:27	1
Temperature	11.1	H5	0.1	Degrees C			04/22/19 12:27	1



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-FD01-41119**

**Lab Sample ID: 550-121047-9**

Date Collected: 04/11/19 12:20

Matrix: Water

Date Received: 04/12/19 09:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6700	D2	200	mg/L			04/23/19 00:49	100
Fluoride	3.7	D1	0.80	mg/L			04/19/19 22:24	2
Sulfate	3900	D2	200	mg/L			04/23/19 00:49	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	47		0.050	mg/L		04/13/19 09:55	04/24/19 14:53	1
Calcium	750		2.0	mg/L		04/13/19 09:55	04/24/19 14:53	1
Lithium	0.73		0.20	mg/L		04/13/19 09:55	04/24/19 14:53	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.6		0.50	ug/L		04/12/19 22:18	04/22/19 22:35	1
Barium	9.4	B7	0.50	ug/L		04/12/19 22:18	04/19/19 21:05	1
Cadmium	ND		0.10	ug/L		04/12/19 22:18	04/19/19 21:05	1
Chromium	6.9		1.0	ug/L		04/12/19 22:18	04/22/19 22:35	1
Cobalt	4.1		0.50	ug/L		04/12/19 22:18	04/22/19 22:35	1
Lead	ND		0.50	ug/L		04/12/19 22:18	04/19/19 02:11	1
Molybdenum	220		0.50	ug/L		04/12/19 22:18	04/19/19 21:05	1
Selenium	1.9		0.50	ug/L		04/12/19 22:18	04/22/19 22:35	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	200	mg/L			04/16/19 11:29	1
pH	7.4	H5	1.7	SU			04/22/19 12:27	1
Temperature	12.2	H5	0.1	Degrees C			04/22/19 12:27	1

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-175692/2**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			04/19/19 18:06	1
Fluoride	ND		0.40	mg/L			04/19/19 18:06	1
Sulfate	ND		2.0	mg/L			04/19/19 18:06	1

**Lab Sample ID: LCS 550-175692/5**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.4		mg/L		102	90 - 110
Fluoride	4.00	3.96		mg/L		99	90 - 110
Sulfate	20.0	19.8		mg/L		99	90 - 110

**Lab Sample ID: LCSD 550-175692/6**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.3		mg/L		102	90 - 110	0	20
Fluoride	4.00	3.94		mg/L		99	90 - 110	0	20
Sulfate	20.0	19.7		mg/L		99	90 - 110	0	20

**Lab Sample ID: 550-121053-B-4 MS**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.4		4.00	5.41		mg/L		99	80 - 120

**Lab Sample ID: 550-121053-B-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.4		4.00	5.51		mg/L		102	80 - 120	2	20

**Lab Sample ID: MB 550-175831/2**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			04/22/19 19:18	1
Sulfate	ND		2.0	mg/L			04/22/19 19:18	1

**Lab Sample ID: LCS 550-175831/5**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.0		mg/L		105	90 - 110

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: LCS 550-175831/5**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	20.0	20.4		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-175831/6**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.0		mg/L		105	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-121032-A-1 MS ^100**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	6900	D2	2000	8540	D2	mg/L		82	80 - 120
Sulfate	4000	D2	2000	5890	D2	mg/L		94	80 - 120

**Lab Sample ID: 550-121032-A-1 MSD ^100**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	6900	D2	2000	8530	D2	mg/L		82	80 - 120	0	20
Sulfate	4000	D2	2000	5890	D2	mg/L		94	80 - 120	0	20

## Method: 200.7 - Total Recoverable Metals by ICP

**Lab Sample ID: MB 550-174907/1-A**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		04/13/19 09:55	04/24/19 13:38	1
Calcium	ND		2.0	mg/L		04/13/19 09:55	04/24/19 13:38	1
Lithium	ND		0.20	mg/L		04/13/19 09:55	04/24/19 13:38	1

**Lab Sample ID: LCS 550-174907/2-A**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.954		mg/L		95	85 - 115
Calcium	21.0	20.5		mg/L		98	85 - 115
Lithium	1.00	0.977		mg/L		98	85 - 115

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: 200.7 - Total Recoverable Metals by ICP (Continued)

**Lab Sample ID: LCSD 550-174907/3-A**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD	
									%Rec.	Limit
Boron	1.00	0.952		mg/L		95	85 - 115	0		20
Calcium	21.0	20.4		mg/L		97	85 - 115	1		20
Lithium	1.00	0.963		mg/L		96	85 - 115	1		20

**Lab Sample ID: 550-121070-D-1-B MS**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits	RPD	
										%Rec.	Limit
Boron	0.32		1.00	1.27		mg/L		95	70 - 130		
Calcium	150	M3	21.0	154	M3	mg/L		33	70 - 130		
Lithium	ND		1.00	1.03		mg/L		96	70 - 130		

**Lab Sample ID: 550-121070-D-1-C MSD**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	
										%Rec.	Limit
Boron	0.32		1.00	1.28		mg/L		96	70 - 130	0	20
Calcium	150	M3	21.0	156	M3	mg/L		46	70 - 130	2	20
Lithium	ND		1.00	1.04		mg/L		97	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-174905/1-A**  
**Matrix: Water**  
**Analysis Batch: 175451**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

**Lab Sample ID: MB 550-174905/1-A**  
**Matrix: Water**  
**Analysis Batch: 175605**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.657	B1	0.50	ug/L		04/12/19 22:18	04/19/19 20:30	1
Cadmium	ND		0.10	ug/L		04/12/19 22:18	04/19/19 20:30	1
Chromium	ND		1.0	ug/L		04/12/19 22:18	04/19/19 20:30	1
Cobalt	ND		0.50	ug/L		04/12/19 22:18	04/19/19 20:30	1
Molybdenum	ND		0.50	ug/L		04/12/19 22:18	04/19/19 20:30	1

**Lab Sample ID: MB 550-174905/1-A**  
**Matrix: Water**  
**Analysis Batch: 175765**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		1.0	ug/L		04/12/19 22:18	04/22/19 22:03	1

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: MB 550-174905/1-A**  
**Matrix: Water**  
**Analysis Batch: 175765**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	ND		0.50	ug/L		04/12/19 22:18	04/22/19 22:03	1
Selenium	ND		0.50	ug/L		04/12/19 22:18	04/22/19 22:03	1

**Lab Sample ID: MB 550-174905/1-A**  
**Matrix: Water**  
**Analysis Batch: 175770**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.50	ug/L		04/12/19 22:18	04/23/19 01:12	1

**Lab Sample ID: LCS 550-174905/2-A**  
**Matrix: Water**  
**Analysis Batch: 175451**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	100	95.3		ug/L		95	85 - 115

**Lab Sample ID: LCS 550-174905/2-A**  
**Matrix: Water**  
**Analysis Batch: 175605**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	100	101		ug/L		101	85 - 115
Barium	100	108		ug/L		108	85 - 115
Cadmium	100	96.9		ug/L		97	85 - 115
Chromium	100	100		ug/L		100	85 - 115
Cobalt	100	99.9		ug/L		100	85 - 115
Molybdenum	100	95.7		ug/L		96	85 - 115

**Lab Sample ID: LCS 550-174905/2-A**  
**Matrix: Water**  
**Analysis Batch: 175765**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	100	101		ug/L		101	85 - 115
Chromium	100	103		ug/L		103	85 - 115
Cobalt	100	102		ug/L		102	85 - 115
Selenium	100	99.6		ug/L		100	85 - 115

**Lab Sample ID: LCS 550-174905/2-A**  
**Matrix: Water**  
**Analysis Batch: 175770**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Selenium	100	101		ug/L		101	85 - 115

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCSD 550-174905/3-A**  
**Matrix: Water**  
**Analysis Batch: 175451**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lead	100	99.0		ug/L		99	85 - 115	4	20

**Lab Sample ID: LCSD 550-174905/3-A**  
**Matrix: Water**  
**Analysis Batch: 175605**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	100	107		ug/L		107	85 - 115	6	20
Barium	100	115		ug/L		115	85 - 115	6	20
Cadmium	100	102		ug/L		102	85 - 115	5	20
Chromium	100	106		ug/L		106	85 - 115	5	20
Cobalt	100	106		ug/L		106	85 - 115	6	20
Molybdenum	100	102		ug/L		102	85 - 115	6	20

**Lab Sample ID: LCSD 550-174905/3-A**  
**Matrix: Water**  
**Analysis Batch: 175765**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	100	105		ug/L		105	85 - 115	4	20
Chromium	100	105		ug/L		105	85 - 115	2	20
Cobalt	100	105		ug/L		105	85 - 115	3	20
Selenium	100	101		ug/L		101	85 - 115	1	20

**Lab Sample ID: LCSD 550-174905/3-A**  
**Matrix: Water**  
**Analysis Batch: 175770**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	100	99.2		ug/L		99	85 - 115	1	20

**Lab Sample ID: 550-121087-H-7-A MS**  
**Matrix: Water**  
**Analysis Batch: 175451**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Lead	ND		100	94.5		ug/L		95	70 - 130

**Lab Sample ID: 550-121087-H-7-A MS**  
**Matrix: Water**  
**Analysis Batch: 175605**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Arsenic	2.3		100	113		ug/L		111	70 - 130
Barium	180	B7	100	309		ug/L		125	70 - 130
Cadmium	ND		100	103		ug/L		103	70 - 130
Chromium	ND		100	109		ug/L		109	70 - 130
Cobalt	ND		100	105		ug/L		105	70 - 130
Molybdenum	ND		100	107		ug/L		107	70 - 130

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-121087-H-7-A MS**  
**Matrix: Water**  
**Analysis Batch: 175765**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Arsenic	2.5		100	108		ug/L		106	70 - 130
Chromium	ND		100	106		ug/L		106	70 - 130
Cobalt	ND		100	102		ug/L		102	70 - 130
Selenium	ND		100	106		ug/L		106	70 - 130

**Lab Sample ID: 550-121087-H-7-A MS**  
**Matrix: Water**  
**Analysis Batch: 175770**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Selenium	ND		100	104		ug/L		103	70 - 130

**Lab Sample ID: 550-121087-H-7-B MSD**  
**Matrix: Water**  
**Analysis Batch: 175451**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lead	ND		100	94.9		ug/L		95	70 - 130	0	20

**Lab Sample ID: 550-121087-H-7-B MSD**  
**Matrix: Water**  
**Analysis Batch: 175605**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	2.3		100	110		ug/L		108	70 - 130	3	20
Barium	180	B7	100	296		ug/L		112	70 - 130	4	20
Cadmium	ND		100	101		ug/L		101	70 - 130	1	20
Chromium	ND		100	106		ug/L		106	70 - 130	3	20
Cobalt	ND		100	102		ug/L		102	70 - 130	2	20
Molybdenum	ND		100	109		ug/L		109	70 - 130	1	20

**Lab Sample ID: 550-121087-H-7-B MSD**  
**Matrix: Water**  
**Analysis Batch: 175765**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	2.5		100	108		ug/L		105	70 - 130	0	20
Chromium	ND		100	106		ug/L		106	70 - 130	1	20
Cobalt	ND		100	102		ug/L		102	70 - 130	0	20
Selenium	ND		100	104		ug/L		104	70 - 130	2	20

**Lab Sample ID: 550-121087-H-7-B MSD**  
**Matrix: Water**  
**Analysis Batch: 175770**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174905**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	ND		100	106		ug/L		106	70 - 130	2	20



# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-174932/1**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			04/15/19 07:57	1

**Lab Sample ID: LCS 550-174932/2**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	994		mg/L		99	90 - 110

**Lab Sample ID: LCSD 550-174932/3**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	980		mg/L		98	90 - 110	1	10

**Lab Sample ID: 550-121053-B-1 DU**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	3100	D2	2990	D2	mg/L		3	10

**Lab Sample ID: MB 550-174933/1**  
**Matrix: Water**  
**Analysis Batch: 174933**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			04/15/19 07:59	1

**Lab Sample ID: LCS 550-174933/2**  
**Matrix: Water**  
**Analysis Batch: 174933**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	1010		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-174933/3**  
**Matrix: Water**  
**Analysis Batch: 174933**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	994		mg/L		99	90 - 110	2	10

**Lab Sample ID: 550-121002-F-1 DU**  
**Matrix: Water**  
**Analysis Batch: 174933**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	870		890		mg/L		2	10

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-175061/1**  
**Matrix: Water**  
**Analysis Batch: 175061**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			04/16/19 11:29	1

**Lab Sample ID: LCS 550-175061/2**  
**Matrix: Water**  
**Analysis Batch: 175061**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	998		mg/L		100	90 - 110

**Lab Sample ID: LCSD 550-175061/3**  
**Matrix: Water**  
**Analysis Batch: 175061**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	994		mg/L		99	90 - 110	0	10

**Lab Sample ID: 160-33687-J-12 DU**  
**Matrix: Water**  
**Analysis Batch: 175061**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	4000	D2	4020	D2	mg/L		0.8	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-175710/1**  
**Matrix: Water**  
**Analysis Batch: 175710**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.4	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-175710/13**  
**Matrix: Water**  
**Analysis Batch: 175710**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.9	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-175710/25**  
**Matrix: Water**  
**Analysis Batch: 175710**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		101.0	98.5 - 101.5

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: 550-120963-D-3 DU**  
**Matrix: Water**  
**Analysis Batch: 175710**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
pH	7.3	H5	7.3	H5	SU		0.4		5
Temperature	9.4	H5	9.1	H5	Degrees C		3		

**Lab Sample ID: 550-121053-B-1 DU**  
**Matrix: Water**  
**Analysis Batch: 175710**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
pH	7.7	H5	7.7	H5	SU		0		5
Temperature	12.0	H5	11.9	H5	Degrees C		0.8		

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## HPLC/IC

### Analysis Batch: 175692

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	300.0	
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	300.0	
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	300.0	
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	300.0	
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	300.0	
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	300.0	
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	300.0	
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	300.0	
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	300.0	
MB 550-175692/2	Method Blank	Total/NA	Water	300.0	
LCS 550-175692/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-175692/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121053-B-4 MS	Matrix Spike	Total/NA	Water	300.0	
550-121053-B-4 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 175831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	300.0	
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	300.0	
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	300.0	
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	300.0	
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	300.0	
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	300.0	
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	300.0	
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	300.0	
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	300.0	
MB 550-175831/2	Method Blank	Total/NA	Water	300.0	
LCS 550-175831/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-175831/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121032-A-1 MS ^100	Matrix Spike	Total/NA	Water	300.0	
550-121032-A-1 MSD ^100	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 174905

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	200.8	
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	200.8	
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	200.8	
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	200.8	
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	200.8	
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	200.8	
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	200.8	
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	200.8	
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	200.8	
MB 550-174905/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-174905/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-174905/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-121087-H-7-A MS	Matrix Spike	Total/NA	Water	200.8	
550-121087-H-7-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Metals

### Prep Batch: 174907

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	200.7	
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	200.7	
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	200.7	
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	200.7	
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	200.7	
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	200.7	
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	200.7	
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	200.7	
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	200.7	
MB 550-174907/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-174907/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-174907/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-121070-D-1-B MS	Matrix Spike	Total/NA	Water	200.7	
550-121070-D-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 175451

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	200.8 LL	174905
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	200.8 LL	174905
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	200.8 LL	174905
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	200.8 LL	174905
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	200.8 LL	174905
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	200.8 LL	174905
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	200.8 LL	174905
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	200.8 LL	174905
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	200.8 LL	174905
MB 550-174905/1-A	Method Blank	Total/NA	Water	200.8 LL	174905
LCS 550-174905/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	174905
LCSD 550-174905/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	174905
550-121087-H-7-A MS	Matrix Spike	Total/NA	Water	200.8 LL	174905
550-121087-H-7-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	174905

### Analysis Batch: 175605

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	200.8 LL	174905
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	200.8 LL	174905
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	200.8 LL	174905
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	200.8 LL	174905
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	200.8 LL	174905
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	200.8 LL	174905
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	200.8 LL	174905
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	200.8 LL	174905
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	200.8 LL	174905
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	200.8 LL	174905
MB 550-174905/1-A	Method Blank	Total/NA	Water	200.8 LL	174905
LCS 550-174905/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	174905
LCSD 550-174905/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	174905
550-121087-H-7-A MS	Matrix Spike	Total/NA	Water	200.8 LL	174905
550-121087-H-7-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	174905

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Metals

### Analysis Batch: 175765

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	200.8 LL	174905
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	200.8 LL	174905
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	200.8 LL	174905
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	200.8 LL	174905
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	200.8 LL	174905
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	200.8 LL	174905
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	200.8 LL	174905
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	200.8 LL	174905
MB 550-174905/1-A	Method Blank	Total/NA	Water	200.8 LL	174905
LCS 550-174905/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	174905
LCSD 550-174905/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	174905
550-121087-H-7-A MS	Matrix Spike	Total/NA	Water	200.8 LL	174905
550-121087-H-7-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	174905

### Analysis Batch: 175770

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	200.8 LL	174905
MB 550-174905/1-A	Method Blank	Total/NA	Water	200.8 LL	174905
LCS 550-174905/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	174905
LCSD 550-174905/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	174905
550-121087-H-7-A MS	Matrix Spike	Total/NA	Water	200.8 LL	174905
550-121087-H-7-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	174905

### Analysis Batch: 176071

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	200.7	174907
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	200.7	174907
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	200.7	174907
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	200.7	174907
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	200.7	174907
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	200.7	174907
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	200.7	174907
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	200.7	174907
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	200.7	174907
MB 550-174907/1-A	Method Blank	Total/NA	Water	200.7	174907
LCS 550-174907/2-A	Lab Control Sample	Total/NA	Water	200.7	174907
LCSD 550-174907/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	174907
550-121070-D-1-B MS	Matrix Spike	Total/NA	Water	200.7	174907
550-121070-D-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	174907

## General Chemistry

### Analysis Batch: 174932

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	SM 2540C	
MB 550-174932/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-174932/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-174932/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-121053-B-1 DU	Duplicate	Total/NA	Water	SM 2540C	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## General Chemistry

### Analysis Batch: 174933

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	SM 2540C	
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	SM 2540C	
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	SM 2540C	
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	SM 2540C	
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	SM 2540C	
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	SM 2540C	
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	SM 2540C	
MB 550-174933/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-174933/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-174933/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-121002-F-1 DU	Duplicate	Total/NA	Water	SM 2540C	

### Analysis Batch: 175061

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	SM 2540C	
MB 550-175061/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-175061/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-175061/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
160-33687-J-12 DU	Duplicate	Total/NA	Water	SM 2540C	

### Analysis Batch: 175710

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121047-1	CH-CCR-M50A-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-2	CH-CCR-M51A-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-3	CH-CCR-w123-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-4	CH-CCR-M65A-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-5	CH-CCR-M66A-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-6	CH-CCR-M67A-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-7	CH-CCR-W126-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-8	CH-CCR-M64A-41119	Total/NA	Water	SM 4500 H+ B	
550-121047-9	CH-CCR-FD01-41119	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-175710/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-175710/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-175710/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-120963-D-3 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	
550-121053-B-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-M50A-41119**

**Lab Sample ID: 550-121047-1**

**Date Collected: 04/11/19 11:14**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 19:57	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/22/19 21:45	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:01	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 01:54	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 20:46	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:16	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	174933		YET	TAL PHX
					(Start)	04/15/19 07:59		
					(End)	04/16/19 11:50		
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M51A-41119**

**Lab Sample ID: 550-121047-2**

**Date Collected: 04/10/19 08:48**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 20:15	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/22/19 22:04	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:07	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 01:56	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		2	175605	04/19/19 20:50	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		10	175605	04/19/19 21:46	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		10	175770	04/23/19 01:25	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	174932		YET	TAL PHX
					(Start)	04/15/19 07:57		
					(End)	04/16/19 11:50		
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-w123-41119**

**Lab Sample ID: 550-121047-3**

**Date Collected: 04/11/19 11:42**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 20:34	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/22/19 22:22	NEL	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-w123-41119**

**Lab Sample ID: 550-121047-3**

**Date Collected: 04/11/19 11:42**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:13	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 01:59	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 20:52	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:22	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	174933		YET	TAL PHX
					(Start)	04/15/19 07:59		
					(End)	04/16/19 11:50		
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M65A-41119**

**Lab Sample ID: 550-121047-4**

**Date Collected: 04/11/19 14:02**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 20:52	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/22/19 22:41	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:18	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 02:01	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 20:55	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:24	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	174933		YET	TAL PHX
					(Start)	04/15/19 07:59		
					(End)	04/16/19 11:50		
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M66A-41119**

**Lab Sample ID: 550-121047-5**

**Date Collected: 04/11/19 14:26**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 21:10	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/22/19 22:59	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:24	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 02:03	ARE	TAL PHX

Eurofins TestAmerica, Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-M66A-41119**

**Lab Sample ID: 550-121047-5**

**Date Collected: 04/11/19 14:26**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 20:57	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:26	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	174933	(Start) 04/15/19 07:59 (End) 04/16/19 11:50	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M67A-41119**

**Lab Sample ID: 550-121047-6**

**Date Collected: 04/11/19 13:36**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 21:29	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/22/19 23:17	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:30	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 02:05	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 20:59	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:28	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	174933	(Start) 04/15/19 07:59 (End) 04/16/19 11:50	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-W126-41119**

**Lab Sample ID: 550-121047-7**

**Date Collected: 04/11/19 12:20**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 21:47	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/22/19 23:36	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:36	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 02:07	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 21:01	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:30	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

**Client Sample ID: CH-CCR-W126-41119**

**Lab Sample ID: 550-121047-7**

**Date Collected: 04/11/19 12:20**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	174933		YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M64A-41119**

**Lab Sample ID: 550-121047-8**

**Date Collected: 04/11/19 15:26**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 22:06	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/23/19 00:31	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:42	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 02:09	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 21:03	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:33	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	174933		YET	TAL PHX
					(Start)	04/15/19 07:59		
					(End)	04/16/19 11:50		
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD01-41119**

**Lab Sample ID: 550-121047-9**

**Date Collected: 04/11/19 12:20**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	175692	04/19/19 22:24	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/23/19 00:49	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:53	SRA	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175451	04/19/19 02:11	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175605	04/19/19 21:05	ARE	TAL PHX
Total/NA	Prep	200.8			174905	04/12/19 22:18	BCV	TAL PHX
Total/NA	Analysis	200.8 LL		1	175765	04/22/19 22:35	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	175061		YET	TAL PHX
					(Start)	04/16/19 11:29		
					(End)	04/17/19 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

Eurofins TestAmerica, Phoenix

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19 *

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121047-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7	Total Recoverable Metals by ICP	EPA	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



TestAmerica Phoenix  
4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

121647

TestAmerica  
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarnway 928-587-0319  
 Analysis Turnaround Time:  CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below:  2 weeks  1 week  2 days  1 day  
 Project Name: \_\_\_\_\_  
 Site: \_\_\_\_\_  
 P O #: \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )						Perform MS / MSD ( Y / N )						Carrier:	Date:	COC No. of COCS
						EPA 200.7 (Li)	200.8 (As, Ba, Cd, Cr, Co, Pb, Mo, Se)	EPA 300.0 (F)	EPA 200.7 (B, Ca)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	EPA 200.7 (Li)	200.8 (As, Ba, Cd, Cr, Co, Pb, Mo, Se)	EPA 300.0 (F)	EPA 200.7 (B, Ca)	EPA 300.0 (Cl, F, SO4)			
CH-CCR-M50A-41119	4/11/2019	1114	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-M51A-41019	4/10/19	848	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-w123-41119	4/11/19	1142	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-M65A-41119	4/11/19	1402	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-M66A-41119	4/11/19	1426	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-M67A-41119	4/11/19	1336	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-W126-41119	4/11/19	1220	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-M64A-41119	4/11/19	1526	G	W	2	N	X	X	X	X	X	X	X	X	X	X				
CH-CCR-FD01-41119	4/11/19	1220	G	W	2	N	X	X	X	X	X	X	X	X	X	X				



Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other \_\_\_\_\_  
 Possible Hazard Identification: \_\_\_\_\_  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  
 Special Instructions/QC Requirements & Comments: \_\_\_\_\_  
 Method 200.8 with collision cell

TEST 4-2-2

Custody Seals Intact:  Yes  No  
 Relinquished by: *Don Lavarnway* Company: *APBS* Date/Time: *4/11/19 4:15 PM*  
 Relinquished by: *Ray Solomon* Company: *Red S* Date/Time: *4/12/19*  
 Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_



# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-121047-1

**Login Number: 121047**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Maycock, Lisa**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-121053-1  
Client Project/Site: APP Work - Cholla

For:  
Arizona Public Service Company  
PO BOX 188, Ste. 4458  
Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:  
4/26/2019 2:22:03 PM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H1	Sample analysis performed past holding time.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

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**Job ID: 550-121053-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

## Narrative

**Job Narrative**  
**550-121053-1**

## Comments

No additional comments.

## Receipt

The samples were received on 4/12/2019 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.2° C.

## HPLC/IC

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

## Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

## General Chemistry

Method(s) SM 2540C: Reanalysis of the following sample was performed outside of the analytical holding time for Total Dissolved Solids (TDS) by method SM 2450C due to the original result not adhering within the expected conductivity to TDS ratio; CH-CCR-M59-40919 (550-121053-2) and (550-121053-B-2 DU). The sample was initially analyzed with in the 7 day holding time although required further analysis for confirmation due to a questionably high result. The reanalysis was performed in duplicate and the results conformed to the expected conductivity to TDS ratio; therefore, the data has been reported from the reanalysis and qualified with a H1 flag.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-121053-1	CH-CCR-M54-40919	Water	04/09/19 14:27	04/12/19 09:30
550-121053-2	CH-CCR-M59-40919	Water	04/09/19 10:00	04/12/19 09:30
550-121053-3	CH-CCR-M60-40919	Water	04/09/19 12:45	04/12/19 09:30
550-121053-4	CH-CCR-M61-40919	Water	04/09/19 11:41	04/12/19 09:30

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## Client Sample ID: CH-CCR-M54-40919

## Lab Sample ID: 550-121053-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	200	mg/L	100		300.0	Total/NA
Fluoride	1.3		0.40	mg/L	1		300.0	Total/NA
Sulfate	340	D2	200	mg/L	100		300.0	Total/NA
Boron	0.53		0.050	mg/L	1		200.7	Total/NA
Calcium	98		2.0	mg/L	1		200.7	Total/NA
Total Dissolved Solids	3100	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.7	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M59-40919

## Lab Sample ID: 550-121053-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1200	D2	200	mg/L	100		300.0	Total/NA
Fluoride	1.4		0.40	mg/L	1		300.0	Total/NA
Sulfate	330	D2	200	mg/L	100		300.0	Total/NA
Boron	0.50		0.050	mg/L	1		200.7	Total/NA
Calcium	86		2.0	mg/L	1		200.7	Total/NA
Total Dissolved Solids	2700	D2 H1	100	mg/L	1		SM 2540C	Total/NA
pH	7.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M60-40919

## Lab Sample ID: 550-121053-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1300	D2	200	mg/L	100		300.0	Total/NA
Fluoride	1.4		0.40	mg/L	1		300.0	Total/NA
Sulfate	350	D2	200	mg/L	100		300.0	Total/NA
Boron	0.51		0.050	mg/L	1		200.7	Total/NA
Calcium	84		2.0	mg/L	1		200.7	Total/NA
Total Dissolved Solids	2800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.7	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M61-40919

## Lab Sample ID: 550-121053-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1300	D2	200	mg/L	100		300.0	Total/NA
Fluoride	1.4		0.40	mg/L	1		300.0	Total/NA
Sulfate	340	D2	200	mg/L	100		300.0	Total/NA
Boron	0.50		0.050	mg/L	1		200.7	Total/NA
Calcium	88		2.0	mg/L	1		200.7	Total/NA
Total Dissolved Solids	2800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.7	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

**Client Sample ID: CH-CCR-M54-40919**

**Lab Sample ID: 550-121053-1**

Date Collected: 04/09/19 14:27

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1400	D2	200	mg/L			04/23/19 01:08	100
Fluoride	1.3		0.40	mg/L			04/19/19 23:19	1
Sulfate	340	D2	200	mg/L			04/23/19 01:08	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.53		0.050	mg/L		04/13/19 09:55	04/24/19 14:59	1
Calcium	98		2.0	mg/L		04/13/19 09:55	04/24/19 14:59	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	3100	D2	100	mg/L			04/15/19 07:57	1
pH	7.7	H5	1.7	SU			04/22/19 12:27	1
Temperature	12.0	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M59-40919**

**Lab Sample ID: 550-121053-2**

Date Collected: 04/09/19 10:00

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1200	D2	200	mg/L			04/23/19 01:26	100
Fluoride	1.4		0.40	mg/L			04/19/19 23:38	1
Sulfate	330	D2	200	mg/L			04/23/19 01:26	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.50		0.050	mg/L		04/13/19 09:55	04/24/19 15:05	1
Calcium	86		2.0	mg/L		04/13/19 09:55	04/24/19 15:05	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2700	D2 H1	100	mg/L			04/17/19 10:25	1
pH	7.9	H5	1.7	SU			04/22/19 12:27	1
Temperature	12.6	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M60-40919**

**Lab Sample ID: 550-121053-3**

Date Collected: 04/09/19 12:45

Matrix: Water

Date Received: 04/12/19 09:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1300	D2	200	mg/L			04/23/19 01:45	100
Fluoride	1.4		0.40	mg/L			04/19/19 23:56	1
Sulfate	350	D2	200	mg/L			04/23/19 01:45	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.51		0.050	mg/L		04/13/19 09:55	04/24/19 15:11	1
Calcium	84		2.0	mg/L		04/13/19 09:55	04/24/19 15:11	1

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: APP Work - Cholla

Job ID: 550-121053-1

**Client Sample ID: CH-CCR-M60-40919**

**Lab Sample ID: 550-121053-3**

Date Collected: 04/09/19 12:45

Matrix: Water

Date Received: 04/12/19 09:30

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2800	D2	100	mg/L			04/15/19 07:57	1
pH	7.7	H5	1.7	SU			04/22/19 12:27	1
Temperature	12.7	H5	0.1	Degrees C			04/22/19 12:27	1

**Client Sample ID: CH-CCR-M61-40919**

**Lab Sample ID: 550-121053-4**

Date Collected: 04/09/19 11:41

Matrix: Water

Date Received: 04/12/19 09:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1300	D2	200	mg/L			04/23/19 02:03	100
Fluoride	1.4		0.40	mg/L			04/20/19 00:14	1
Sulfate	340	D2	200	mg/L			04/23/19 02:03	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.50		0.050	mg/L		04/13/19 09:55	04/24/19 15:17	1
Calcium	88		2.0	mg/L		04/13/19 09:55	04/24/19 15:17	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2800	D2	100	mg/L			04/15/19 07:57	1
pH	7.7	H5	1.7	SU			04/22/19 12:27	1
Temperature	12.7	H5	0.1	Degrees C			04/22/19 12:27	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-175692/2**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			04/19/19 18:06	1
Fluoride	ND		0.40	mg/L			04/19/19 18:06	1
Sulfate	ND		2.0	mg/L			04/19/19 18:06	1

**Lab Sample ID: LCS 550-175692/5**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.4		mg/L		102	90 - 110
Fluoride	4.00	3.96		mg/L		99	90 - 110
Sulfate	20.0	19.8		mg/L		99	90 - 110

**Lab Sample ID: LCSD 550-175692/6**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.3		mg/L		102	90 - 110	0	20
Fluoride	4.00	3.94		mg/L		99	90 - 110	0	20
Sulfate	20.0	19.7		mg/L		99	90 - 110	0	20

**Lab Sample ID: 550-121053-4 MS**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: CH-CCR-M61-40919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.4		4.00	5.41		mg/L		99	80 - 120

**Lab Sample ID: 550-121053-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 175692**

**Client Sample ID: CH-CCR-M61-40919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.4		4.00	5.51		mg/L		102	80 - 120	2	20

**Lab Sample ID: MB 550-175831/2**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			04/22/19 19:18	1
Sulfate	ND		2.0	mg/L			04/22/19 19:18	1

**Lab Sample ID: LCS 550-175831/5**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.0		mg/L		105	90 - 110

Eurofins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: LCS 550-175831/5**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	20.0	20.4		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-175831/6**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.0		mg/L		105	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-121032-A-1 MS ^100**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	6900	D2	2000	8540	D2	mg/L		82	80 - 120
Sulfate	4000	D2	2000	5890	D2	mg/L		94	80 - 120

**Lab Sample ID: 550-121032-A-1 MSD ^100**  
**Matrix: Water**  
**Analysis Batch: 175831**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	6900	D2	2000	8530	D2	mg/L		82	80 - 120	0	20
Sulfate	4000	D2	2000	5890	D2	mg/L		94	80 - 120	0	20

## Method: 200.7 - Total Recoverable Metals by ICP

**Lab Sample ID: MB 550-174907/1-A**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		04/13/19 09:55	04/24/19 13:38	1
Calcium	ND		2.0	mg/L		04/13/19 09:55	04/24/19 13:38	1

**Lab Sample ID: LCS 550-174907/2-A**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.954		mg/L		95	85 - 115
Calcium	21.0	20.5		mg/L		98	85 - 115

**Lab Sample ID: LCSD 550-174907/3-A**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.952		mg/L		95	85 - 115	0	20

Eurolins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## Method: 200.7 - Total Recoverable Metals by ICP (Continued)

**Lab Sample ID: LCSD 550-174907/3-A**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium	21.0	20.4		mg/L		97	85 - 115	1	20

**Lab Sample ID: 550-121070-D-1-B MS**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.32		1.00	1.27		mg/L		95	70 - 130
Calcium	150	M3	21.0	154	M3	mg/L		33	70 - 130

**Lab Sample ID: 550-121070-D-1-C MSD**  
**Matrix: Water**  
**Analysis Batch: 176071**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 174907**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.32		1.00	1.28		mg/L		96	70 - 130	0	20
Calcium	150	M3	21.0	156	M3	mg/L		46	70 - 130	2	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-174932/1**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			04/15/19 07:57	1

**Lab Sample ID: LCS 550-174932/2**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	994		mg/L		99	90 - 110

**Lab Sample ID: LCSD 550-174932/3**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	980		mg/L		98	90 - 110	1	10

**Lab Sample ID: 550-121053-1 DU**  
**Matrix: Water**  
**Analysis Batch: 174932**

**Client Sample ID: CH-CCR-M54-40919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	3100	D2	2990	D2	mg/L		3	10

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: MB 550-175153/1  
Matrix: Water  
Analysis Batch: 175153

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			04/17/19 10:25	1

Lab Sample ID: LCS 550-175153/2  
Matrix: Water  
Analysis Batch: 175153

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	976		mg/L		98	90 - 110

Lab Sample ID: LCSD 550-175153/3  
Matrix: Water  
Analysis Batch: 175153

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	954		mg/L		95	90 - 110	2	10

Lab Sample ID: 550-121053-2 DU  
Matrix: Water  
Analysis Batch: 175153

Client Sample ID: CH-CCR-M59-40919  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	2700	H1 D2	2600	D2 H1	mg/L		2	10

## Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-175710/13  
Matrix: Water  
Analysis Batch: 175710

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.9	98.5 - 101.5

Lab Sample ID: LCSSRM 550-175710/25  
Matrix: Water  
Analysis Batch: 175710

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		101.0	98.5 - 101.5

Lab Sample ID: 550-121053-1 DU  
Matrix: Water  
Analysis Batch: 175710

Client Sample ID: CH-CCR-M54-40919  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.7	H5	7.7	H5	SU		0	5
Temperature	12.0	H5	11.9	H5	Degrees C		0.8	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## HPLC/IC

### Analysis Batch: 175692

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121053-1	CH-CCR-M54-40919	Total/NA	Water	300.0	
550-121053-2	CH-CCR-M59-40919	Total/NA	Water	300.0	
550-121053-3	CH-CCR-M60-40919	Total/NA	Water	300.0	
550-121053-4	CH-CCR-M61-40919	Total/NA	Water	300.0	
MB 550-175692/2	Method Blank	Total/NA	Water	300.0	
LCS 550-175692/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-175692/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121053-4 MS	CH-CCR-M61-40919	Total/NA	Water	300.0	
550-121053-4 MSD	CH-CCR-M61-40919	Total/NA	Water	300.0	

### Analysis Batch: 175831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121053-1	CH-CCR-M54-40919	Total/NA	Water	300.0	
550-121053-2	CH-CCR-M59-40919	Total/NA	Water	300.0	
550-121053-3	CH-CCR-M60-40919	Total/NA	Water	300.0	
550-121053-4	CH-CCR-M61-40919	Total/NA	Water	300.0	
MB 550-175831/2	Method Blank	Total/NA	Water	300.0	
LCS 550-175831/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-175831/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121032-A-1 MS ^100	Matrix Spike	Total/NA	Water	300.0	
550-121032-A-1 MSD ^100	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 174907

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121053-1	CH-CCR-M54-40919	Total/NA	Water	200.7	
550-121053-2	CH-CCR-M59-40919	Total/NA	Water	200.7	
550-121053-3	CH-CCR-M60-40919	Total/NA	Water	200.7	
550-121053-4	CH-CCR-M61-40919	Total/NA	Water	200.7	
MB 550-174907/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-174907/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-174907/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-121070-D-1-B MS	Matrix Spike	Total/NA	Water	200.7	
550-121070-D-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 176071

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121053-1	CH-CCR-M54-40919	Total/NA	Water	200.7	174907
550-121053-2	CH-CCR-M59-40919	Total/NA	Water	200.7	174907
550-121053-3	CH-CCR-M60-40919	Total/NA	Water	200.7	174907
550-121053-4	CH-CCR-M61-40919	Total/NA	Water	200.7	174907
MB 550-174907/1-A	Method Blank	Total/NA	Water	200.7	174907
LCS 550-174907/2-A	Lab Control Sample	Total/NA	Water	200.7	174907
LCSD 550-174907/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	174907
550-121070-D-1-B MS	Matrix Spike	Total/NA	Water	200.7	174907
550-121070-D-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	174907



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## General Chemistry

### Analysis Batch: 174932

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121053-1	CH-CCR-M54-40919	Total/NA	Water	SM 2540C	
550-121053-3	CH-CCR-M60-40919	Total/NA	Water	SM 2540C	
550-121053-4	CH-CCR-M61-40919	Total/NA	Water	SM 2540C	
MB 550-174932/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-174932/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-174932/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-121053-1 DU	CH-CCR-M54-40919	Total/NA	Water	SM 2540C	

### Analysis Batch: 175153

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121053-2	CH-CCR-M59-40919	Total/NA	Water	SM 2540C	
MB 550-175153/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-175153/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-175153/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-121053-2 DU	CH-CCR-M59-40919	Total/NA	Water	SM 2540C	

### Analysis Batch: 175710

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121053-1	CH-CCR-M54-40919	Total/NA	Water	SM 4500 H+ B	
550-121053-2	CH-CCR-M59-40919	Total/NA	Water	SM 4500 H+ B	
550-121053-3	CH-CCR-M60-40919	Total/NA	Water	SM 4500 H+ B	
550-121053-4	CH-CCR-M61-40919	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-175710/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-175710/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-121053-1 DU	CH-CCR-M54-40919	Total/NA	Water	SM 4500 H+ B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

**Client Sample ID: CH-CCR-M54-40919**

**Lab Sample ID: 550-121053-1**

**Date Collected: 04/09/19 14:27**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	175692	04/19/19 23:19	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/23/19 01:08	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 14:59	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	174932	(Start) 04/15/19 07:57 (End) 04/16/19 11:50	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M59-40919**

**Lab Sample ID: 550-121053-2**

**Date Collected: 04/09/19 10:00**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	175692	04/19/19 23:38	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/23/19 01:26	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 15:05	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	175153	(Start) 04/17/19 10:25 (End) 04/18/19 11:00	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M60-40919**

**Lab Sample ID: 550-121053-3**

**Date Collected: 04/09/19 12:45**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	175692	04/19/19 23:56	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/23/19 01:45	NEL	TAL PHX
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 15:11	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	174932	(Start) 04/15/19 07:57 (End) 04/16/19 11:50	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Client Sample ID: CH-CCR-M61-40919**

**Lab Sample ID: 550-121053-4**

**Date Collected: 04/09/19 11:41**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	175692	04/20/19 00:14	NEL	TAL PHX
Total/NA	Analysis	300.0		100	175831	04/23/19 02:03	NEL	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: APP Work - Cholla

Job ID: 550-121053-1

**Client Sample ID: CH-CCR-M61-40919**

**Lab Sample ID: 550-121053-4**

**Date Collected: 04/09/19 11:41**

**Matrix: Water**

**Date Received: 04/12/19 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			174907	04/13/19 09:55	BCV	TAL PHX
Total/NA	Analysis	200.7		1	176071	04/24/19 15:17	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	174932	04/15/19 07:57 (Start) 04/16/19 11:50 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	175710	04/22/19 12:27	MRR	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19 *

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.



# Method Summary

Client: Arizona Public Service Company  
Project/Site: APP Work - Cholla

Job ID: 550-121053-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7	Total Recoverable Metals by ICP	EPA	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Chain of Custody Record

**TestAmerica Phoenix**  
 4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

121053



TestAmerica Laboratories, Inc.

**Client Contact** APS Cholla 4801 Cholla Lake Rd Joseph City, AZ 86032 (928) 587-0319 Phone (xxx) xxx-xxxx FAX  
**Regulatory Program:**  DW  NPDES  RCRA  Other: CCR  
**Analysis Turnaround Time**  CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below:  2 weeks  1 week  2 days  1 day

Sample Identification	Sample Date	Sample Time	Sample Type (G-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 ( B, Ca )	EPA 300.0 ( Cl, F, SO4 )	SM 2540C ( TDS )	SM 4500-HB ( pH )	Date:	Carrier:	COC No.:	Sampler:	For Lab Use Only:	Job / SDG No.:
CH-CCR-M54-40919	4/9/2019	1427	G	W	2	N		X	X	X	X						
CH-CCR-M59-40919	4/9/2019	1000	G	W	2	N		X	X	X	X						
CH-CCR-M60-40919	4/9/2019	1245	G	W	2	N	X	X	X	X	X						
CH-CCR-M61-40919	4/9/2019	1141	G	W	2	N		X	X	X	X						



**Preservation Used:** 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other  
**Possible Hazard Identification:** Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-hazard  Flammable  Skin Irritant  Poison B  Unknown  Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

**Special Instructions/QC Requirements & Comments:**  
 Method 200.8 with collision cell

**Custody:** Seals Intact:  Yes  No  
 Relinquished by: *Doan Lavarney* Company: *APS* Date/Time: *4/11/19 4:45p* Received by: *Progyus* Company: *Red J* Date/Time: *4/11/19 4:45p*  
 Relinquished by: *Kevin Soliman* Company: *Red J* Date/Time: *4/12/19 4:30am* Received by: *TAPPHX* Company: *Red J* Date/Time: *4/12/19 4:30am*  
 Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Received in Laboratory by: *TH* Company: *Red J* Date/Time: *4-2-19*

**Method 200.8 with collision cell**

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-121053-1

**Login Number: 121053**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Maycock, Lisa**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.





## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-121460-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
4801 Cholla Lake Rd  
Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:  
5/1/2019 1:19:27 PM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

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**Job ID: 550-121460-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

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**Narrative**

**Job Narrative  
550-121460-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 4/18/2019 5:58 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.6° C and 2.8° C.

**HPLC/IC**

Method(s) 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W305-41719 (550-121460-3), CH-CCR-M64A-41619 (550-121460-6), CH-CCR-FD01-41619 (550-121460-7), CH-CCR-M55A-41619 (550-121460-8), CH-CCR-W301-41619 (550-121460-9), CH-CCR-W304-41619 (550-121460-11) and CH-CCR-W307-41619 (550-121460-12). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**Metals**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-121460-1	CH-CCR-M52A-41619	Water	04/16/19 16:33	04/18/19 17:58
550-121460-2	CH-CCR-M53A-41719	Water	04/17/19 13:11	04/18/19 17:58
550-121460-3	CH-CCR-W305-41719	Water	04/17/19 12:38	04/18/19 17:58
550-121460-4	CH-CCR-W306-41619	Water	04/16/19 17:34	04/18/19 17:58
550-121460-5	CH-CCR-W314-41619	Water	04/16/19 16:00	04/18/19 17:58
550-121460-6	CH-CCR-M64A-41619	Water	04/16/19 09:51	04/18/19 17:58
550-121460-7	CH-CCR-FD01-41619	Water	04/16/19 09:51	04/18/19 17:58
550-121460-8	CH-CCR-M55A-41619	Water	04/16/19 11:18	04/18/19 17:58
550-121460-9	CH-CCR-W301-41619	Water	04/16/19 15:15	04/18/19 17:58
550-121460-10	CH-CCR-W302-41719	Water	04/17/19 11:32	04/18/19 17:58
550-121460-11	CH-CCR-W304-41619	Water	04/16/19 14:22	04/18/19 17:58
550-121460-12	CH-CCR-W307-41619	Water	04/16/19 13:31	04/18/19 17:58

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Client Sample ID: CH-CCR-M52A-41619

## Lab Sample ID: 550-121460-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.1	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.30		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.019		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00047		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.080		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.027		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.021		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0017		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M53A-41719

## Lab Sample ID: 550-121460-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	2.1	D1	0.80	mg/L	2		300.0	Total/NA
Arsenic	0.0011		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0085		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.0012		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0014		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.014		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.043		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W305-41719

## Lab Sample ID: 550-121460-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.20		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00083		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0015		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.018		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.0020		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.022		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00067		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W306-41619

## Lab Sample ID: 550-121460-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.68		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0052		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00013		0.00010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00094		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.033		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0016		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W314-41619

## Lab Sample ID: 550-121460-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.87	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.29		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00021		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.094		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.016		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Client Sample ID: CH-CCR-W314-41619 (Continued)

Lab Sample ID: 550-121460-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Molybdenum	0.026		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M64A-41619

Lab Sample ID: 550-121460-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.25		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00058		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0050		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00078		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-FD01-41619

Lab Sample ID: 550-121460-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.25		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00057		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0051		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M55A-41619

Lab Sample ID: 550-121460-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.37		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0025		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.014		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.044		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00083		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0067		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.12		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W301-41619

Lab Sample ID: 550-121460-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.50		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0019		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0083		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00014		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0017		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.018		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0051		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0076		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W302-41719

Lab Sample ID: 550-121460-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.82	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.31		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00076		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.015		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0054		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.016		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Client Sample ID: CH-CCR-W304-41619

## Lab Sample ID: 550-121460-11

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.41		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.0089		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0020		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0048		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00066		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W307-41619

## Lab Sample ID: 550-121460-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.22		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0011		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00062		0.00010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.080		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0068		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00064		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Euofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-M52A-41619**

**Lab Sample ID: 550-121460-1**

Date Collected: 04/16/19 16:33

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.1	D1	0.80	mg/L			04/24/19 18:55	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.30		0.20	mg/L		04/25/19 09:27	04/26/19 20:16	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:34	1
Barium	0.019		0.00050	mg/L		04/25/19 05:05	04/26/19 04:34	1
Cadmium	0.00047		0.00010	mg/L		04/25/19 05:05	04/26/19 04:34	1
Chromium	0.080		0.0010	mg/L		04/25/19 05:05	04/30/19 00:01	1
Cobalt	0.027		0.00050	mg/L		04/25/19 05:05	04/26/19 04:34	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:34	1
Molybdenum	0.021		0.00050	mg/L		04/25/19 05:05	04/26/19 04:34	1
Selenium	0.0017		0.00050	mg/L		04/25/19 05:05	04/26/19 04:34	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:34	1

**Client Sample ID: CH-CCR-M53A-41719**

**Lab Sample ID: 550-121460-2**

Date Collected: 04/17/19 13:11

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.1	D1	0.80	mg/L			04/24/19 19:50	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 20:23	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0011		0.00050	mg/L		04/25/19 05:05	04/26/19 04:36	1
Barium	0.0085		0.00050	mg/L		04/25/19 05:05	04/26/19 04:36	1
Cadmium	0.0012		0.00010	mg/L		04/25/19 05:05	04/26/19 04:36	1
Chromium	0.0014		0.0010	mg/L		04/25/19 05:05	04/30/19 00:04	1
Cobalt	0.014		0.00050	mg/L		04/25/19 05:05	04/26/19 04:36	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:36	1
Molybdenum	0.043		0.00050	mg/L		04/25/19 05:05	04/26/19 04:36	1
Selenium	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:36	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:36	1

**Client Sample ID: CH-CCR-W305-41719**

**Lab Sample ID: 550-121460-3**

Date Collected: 04/17/19 12:38

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 20:09	2

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-W305-41719**

**Lab Sample ID: 550-121460-3**

Date Collected: 04/17/19 12:38

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.20		0.20	mg/L		04/25/19 09:27	04/26/19 20:29	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00083		0.00050	mg/L		04/25/19 05:05	04/26/19 04:38	1
Barium	0.012		0.00050	mg/L		04/25/19 05:05	04/26/19 04:38	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:38	1
Chromium	0.0015		0.0010	mg/L		04/25/19 05:05	04/30/19 00:06	1
Cobalt	0.018		0.00050	mg/L		04/25/19 05:05	04/26/19 04:38	1
Lead	0.0020		0.00050	mg/L		04/25/19 05:05	04/26/19 04:38	1
Molybdenum	0.022		0.00050	mg/L		04/25/19 05:05	04/26/19 04:38	1
Selenium	0.00067		0.00050	mg/L		04/25/19 05:05	04/26/19 04:38	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:38	1

**Client Sample ID: CH-CCR-W306-41619**

**Lab Sample ID: 550-121460-4**

Date Collected: 04/16/19 17:34

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.0	D1	0.80	mg/L			04/24/19 20:27	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.68		0.20	mg/L		04/25/19 09:27	04/26/19 20:35	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0052		0.00050	mg/L		04/25/19 05:05	04/26/19 04:40	1
Barium	0.011		0.00050	mg/L		04/25/19 05:05	04/26/19 04:40	1
Cadmium	0.00013		0.00010	mg/L		04/25/19 05:05	04/26/19 04:40	1
Chromium	ND		0.0010	mg/L		04/25/19 05:05	04/30/19 00:08	1
Cobalt	0.00094		0.00050	mg/L		04/25/19 05:05	04/26/19 04:40	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:40	1
Molybdenum	0.033		0.00050	mg/L		04/25/19 05:05	04/26/19 04:40	1
Selenium	0.0016		0.00050	mg/L		04/25/19 05:05	04/26/19 04:40	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:40	1

**Client Sample ID: CH-CCR-W314-41619**

**Lab Sample ID: 550-121460-5**

Date Collected: 04/16/19 16:00

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.87	D1	0.80	mg/L			04/24/19 20:45	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.29		0.20	mg/L		04/25/19 09:27	04/26/19 20:40	1

Eurolins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-W314-41619**

**Lab Sample ID: 550-121460-5**

Date Collected: 04/16/19 16:00

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:46	1
Barium	0.012		0.00050	mg/L		04/25/19 05:05	04/26/19 04:46	1
Cadmium	0.00021		0.00010	mg/L		04/25/19 05:05	04/26/19 04:46	1
Chromium	0.094		0.0010	mg/L		04/25/19 05:05	04/30/19 00:14	1
Cobalt	0.016		0.00050	mg/L		04/25/19 05:05	04/26/19 04:46	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:46	1
Molybdenum	0.026		0.00050	mg/L		04/25/19 05:05	04/26/19 04:46	1
Selenium	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:46	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:46	1

**Client Sample ID: CH-CCR-M64A-41619**

**Lab Sample ID: 550-121460-6**

Date Collected: 04/16/19 09:51

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 21:04	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.25		0.20	mg/L		04/25/19 09:27	04/26/19 20:46	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00058		0.00050	mg/L		04/25/19 05:05	04/26/19 04:48	1
Barium	0.012		0.00050	mg/L		04/25/19 05:05	04/26/19 04:48	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:48	1
Chromium	ND		0.0010	mg/L		04/25/19 05:05	04/30/19 00:16	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:48	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:48	1
Molybdenum	0.0050		0.00050	mg/L		04/25/19 05:05	04/26/19 04:48	1
Selenium	0.00078		0.00050	mg/L		04/25/19 05:05	04/26/19 04:48	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:48	1

**Client Sample ID: CH-CCR-FD01-41619**

**Lab Sample ID: 550-121460-7**

Date Collected: 04/16/19 09:51

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 21:22	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.25		0.20	mg/L		04/25/19 09:27	04/26/19 20:52	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00057		0.00050	mg/L		04/25/19 05:05	04/26/19 04:50	1
Barium	0.012		0.00050	mg/L		04/25/19 05:05	04/26/19 04:50	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:50	1

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Client Sample ID: CH-CCR-FD01-41619

Lab Sample ID: 550-121460-7

Date Collected: 04/16/19 09:51

Matrix: Water

Date Received: 04/18/19 17:58

### Method: 200.8 LL - Metals (ICP/MS) (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		04/25/19 05:05	04/30/19 00:18	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:50	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:50	1
<b>Molybdenum</b>	<b>0.0051</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:50	1
Selenium	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:50	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:50	1

## Client Sample ID: CH-CCR-M55A-41619

Lab Sample ID: 550-121460-8

Date Collected: 04/16/19 11:18

Matrix: Water

Date Received: 04/18/19 17:58

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 21:41	2

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Lithium</b>	<b>0.37</b>		0.20	mg/L		04/25/19 09:27	04/26/19 20:58	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Arsenic</b>	<b>0.0025</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:53	1
<b>Barium</b>	<b>0.014</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:53	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:53	1
<b>Chromium</b>	<b>0.044</b>		0.0010	mg/L		04/25/19 05:05	04/30/19 00:20	1
<b>Cobalt</b>	<b>0.00083</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:53	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:53	1
<b>Molybdenum</b>	<b>0.0067</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:53	1
<b>Selenium</b>	<b>0.12</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:53	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:53	1

## Client Sample ID: CH-CCR-W301-41619

Lab Sample ID: 550-121460-9

Date Collected: 04/16/19 15:15

Matrix: Water

Date Received: 04/18/19 17:58

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 22:36	2

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Lithium</b>	<b>0.50</b>		0.20	mg/L		04/25/19 09:27	04/26/19 21:04	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Arsenic</b>	<b>0.0019</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:55	1
<b>Barium</b>	<b>0.0083</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:55	1
<b>Cadmium</b>	<b>0.00014</b>		0.00010	mg/L		04/25/19 05:05	04/26/19 04:55	1
<b>Chromium</b>	<b>0.0017</b>		0.0010	mg/L		04/25/19 05:05	04/30/19 00:22	1
<b>Cobalt</b>	<b>0.018</b>		0.00050	mg/L		04/25/19 05:05	04/26/19 04:55	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:55	1

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# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-W301-41619**

**Lab Sample ID: 550-121460-9**

Date Collected: 04/16/19 15:15

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	0.0051		0.00050	mg/L		04/25/19 05:05	04/26/19 04:55	1
Selenium	0.0076		0.00050	mg/L		04/25/19 05:05	04/26/19 04:55	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:55	1

**Client Sample ID: CH-CCR-W302-41719**

**Lab Sample ID: 550-121460-10**

Date Collected: 04/17/19 11:32

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.82	D1	0.80	mg/L			04/24/19 22:54	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.31		0.20	mg/L		04/25/19 09:27	04/26/19 21:16	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00076		0.00050	mg/L		04/25/19 05:05	04/26/19 04:57	1
Barium	0.015		0.00050	mg/L		04/25/19 05:05	04/26/19 04:57	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:57	1
Chromium	ND		0.0010	mg/L		04/25/19 05:05	04/30/19 00:24	1
Cobalt	0.0054		0.00050	mg/L		04/25/19 05:05	04/26/19 04:57	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:57	1
Molybdenum	0.016		0.00050	mg/L		04/25/19 05:05	04/26/19 04:57	1
Selenium	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:57	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:57	1

**Client Sample ID: CH-CCR-W304-41619**

**Lab Sample ID: 550-121460-11**

Date Collected: 04/16/19 14:22

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 23:13	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.41		0.20	mg/L		04/25/19 09:27	04/26/19 21:22	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:59	1
Barium	0.0089		0.00050	mg/L		04/25/19 05:05	04/26/19 04:59	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:59	1
Chromium	ND		0.0010	mg/L		04/25/19 05:05	04/30/19 00:26	1
Cobalt	0.0020		0.00050	mg/L		04/25/19 05:05	04/26/19 04:59	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:59	1
Molybdenum	0.0048		0.00050	mg/L		04/25/19 05:05	04/26/19 04:59	1
Selenium	0.00066		0.00050	mg/L		04/25/19 05:05	04/26/19 04:59	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:59	1

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# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-W307-41619**

**Lab Sample ID: 550-121460-12**

Date Collected: 04/16/19 13:31

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 23:31	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.22		0.20	mg/L		04/25/19 09:27	04/26/19 21:28	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0011		0.00050	mg/L		04/25/19 05:05	04/26/19 05:01	1
Barium	0.012		0.00050	mg/L		04/25/19 05:05	04/26/19 05:01	1
Cadmium	0.00062		0.00010	mg/L		04/25/19 05:05	04/26/19 05:01	1
Chromium	ND		0.0010	mg/L		04/25/19 05:05	04/30/19 00:28	1
Cobalt	0.080		0.00050	mg/L		04/25/19 05:05	04/26/19 05:01	1
Lead	0.0018		0.00050	mg/L		04/25/19 05:05	04/26/19 05:01	1
Molybdenum	0.0068		0.00050	mg/L		04/25/19 05:05	04/26/19 05:01	1
Selenium	0.00064		0.00050	mg/L		04/25/19 05:05	04/26/19 05:01	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 05:01	1



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-176063/2  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			04/24/19 17:23	1

Lab Sample ID: LCS 550-176063/5  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	3.92		mg/L		98	90 - 110

Lab Sample ID: LCSD 550-176063/6  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	3.92		mg/L		98	90 - 110	0	20

Lab Sample ID: 550-121460-1 MS  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: CH-CCR-M52A-41619  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.1	D1	8.00	8.56	D1	mg/L		93	80 - 120

Lab Sample ID: 550-121460-1 MSD  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: CH-CCR-M52A-41619  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.1	D1	8.00	8.46	D1	mg/L		92	80 - 120	1	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-176048/1-A  
Matrix: Water  
Analysis Batch: 176343

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 176048

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 19:51	1

Lab Sample ID: LCS 550-176048/2-A  
Matrix: Water  
Analysis Batch: 176343

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 176048

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	1.00	0.916		mg/L		92	85 - 115

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCSD 550-176048/3-A**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	1.00	0.915		mg/L		91	85 - 115	0	20

**Lab Sample ID: 550-121404-A-2-A MS**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Lithium	ND		1.00	0.892		mg/L		89	70 - 130

**Lab Sample ID: 550-121404-A-2-B MSD**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	ND		1.00	0.905		mg/L		90	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-176032/1-A**  
**Matrix: Water**  
**Analysis Batch: 176277**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:23	1
Barium	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:23	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:23	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:23	1
Lead	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:23	1
Molybdenum	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:23	1
Selenium	ND		0.00050	mg/L		04/25/19 05:05	04/26/19 04:23	1
Thallium	ND		0.00010	mg/L		04/25/19 05:05	04/26/19 04:23	1

**Lab Sample ID: MB 550-176032/1-A**  
**Matrix: Water**  
**Analysis Batch: 176548**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		04/25/19 05:05	04/29/19 23:51	1

**Lab Sample ID: LCS 550-176032/2-A**  
**Matrix: Water**  
**Analysis Batch: 176277**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.100	0.100		mg/L		100	85 - 115
Barium	0.100	0.0902		mg/L		90	85 - 115
Cadmium	0.100	0.0988		mg/L		99	85 - 115
Cobalt	0.100	0.0989		mg/L		99	85 - 115
Lead	0.100	0.0968		mg/L		97	85 - 115
Molybdenum	0.100	0.0992		mg/L		99	85 - 115

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-176032/2-A**  
**Matrix: Water**  
**Analysis Batch: 176277**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Selenium	0.100	0.100		mg/L		100	85 - 115
Thallium	0.100	0.0997		mg/L		100	85 - 115

**Lab Sample ID: LCS 550-176032/2-A**  
**Matrix: Water**  
**Analysis Batch: 176548**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Chromium	0.100	0.0999		mg/L		100	85 - 115

**Lab Sample ID: LCSD 550-176032/3-A**  
**Matrix: Water**  
**Analysis Batch: 176277**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.100	0.0996		mg/L		100	85 - 115	1	20
Barium	0.100	0.0976		mg/L		98	85 - 115	8	20
Cadmium	0.100	0.100		mg/L		100	85 - 115	1	20
Cobalt	0.100	0.0986		mg/L		99	85 - 115	0	20
Lead	0.100	0.0976		mg/L		98	85 - 115	1	20
Molybdenum	0.100	0.100		mg/L		100	85 - 115	1	20
Selenium	0.100	0.0977		mg/L		98	85 - 115	3	20
Thallium	0.100	0.0993		mg/L		99	85 - 115	0	20

**Lab Sample ID: LCSD 550-176032/3-A**  
**Matrix: Water**  
**Analysis Batch: 176548**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chromium	0.100	0.103		mg/L		103	85 - 115	3	20

**Lab Sample ID: 550-121460-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176277**

**Client Sample ID: CH-CCR-M52A-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Arsenic	ND		0.100	0.112		mg/L		111	70 - 130
Barium	0.019		0.100	0.111		mg/L		92	70 - 130
Cadmium	0.00047		0.100	0.0903		mg/L		90	70 - 130
Cobalt	0.027		0.100	0.121		mg/L		94	70 - 130
Lead	ND		0.100	0.0852		mg/L		85	70 - 130
Molybdenum	0.021		0.100	0.127		mg/L		105	70 - 130
Selenium	0.0017		0.100	0.121		mg/L		119	70 - 130
Thallium	ND		0.100	0.0885		mg/L		88	70 - 130

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-121460-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176548**

**Client Sample ID: CH-CCR-M52A-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Chromium	0.080		0.100	0.183		mg/L		103	70 - 130

**Lab Sample ID: 550-121460-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176277**

**Client Sample ID: CH-CCR-M52A-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	ND		0.100	0.108		mg/L		107	70 - 130	4	20
Barium	0.019		0.100	0.110		mg/L		91	70 - 130	1	20
Cadmium	0.00047		0.100	0.0877		mg/L		87	70 - 130	3	20
Cobalt	0.027		0.100	0.118		mg/L		92	70 - 130	2	20
Lead	ND		0.100	0.0832		mg/L		83	70 - 130	2	20
Molybdenum	0.021		0.100	0.125		mg/L		103	70 - 130	2	20
Selenium	0.0017		0.100	0.118		mg/L		116	70 - 130	2	20
Thallium	ND		0.100	0.0871		mg/L		87	70 - 130	2	20

**Lab Sample ID: 550-121460-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176548**

**Client Sample ID: CH-CCR-M52A-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176032**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chromium	0.080		0.100	0.184		mg/L		105	70 - 130	1	20

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## HPLC/IC

### Analysis Batch: 176063

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121460-1	CH-CCR-M52A-41619	Total/NA	Water	300.0	
550-121460-2	CH-CCR-M53A-41719	Total/NA	Water	300.0	
550-121460-3	CH-CCR-W305-41719	Total/NA	Water	300.0	
550-121460-4	CH-CCR-W306-41619	Total/NA	Water	300.0	
550-121460-5	CH-CCR-W314-41619	Total/NA	Water	300.0	
550-121460-6	CH-CCR-M64A-41619	Total/NA	Water	300.0	
550-121460-7	CH-CCR-FD01-41619	Total/NA	Water	300.0	
550-121460-8	CH-CCR-M55A-41619	Total/NA	Water	300.0	
550-121460-9	CH-CCR-W301-41619	Total/NA	Water	300.0	
550-121460-10	CH-CCR-W302-41719	Total/NA	Water	300.0	
550-121460-11	CH-CCR-W304-41619	Total/NA	Water	300.0	
550-121460-12	CH-CCR-W307-41619	Total/NA	Water	300.0	
MB 550-176063/2	Method Blank	Total/NA	Water	300.0	
LCS 550-176063/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-176063/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121460-1 MS	CH-CCR-M52A-41619	Total/NA	Water	300.0	
550-121460-1 MSD	CH-CCR-M52A-41619	Total/NA	Water	300.0	

## Metals

### Prep Batch: 176032

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121460-1	CH-CCR-M52A-41619	Total/NA	Water	200.8	
550-121460-2	CH-CCR-M53A-41719	Total/NA	Water	200.8	
550-121460-3	CH-CCR-W305-41719	Total/NA	Water	200.8	
550-121460-4	CH-CCR-W306-41619	Total/NA	Water	200.8	
550-121460-5	CH-CCR-W314-41619	Total/NA	Water	200.8	
550-121460-6	CH-CCR-M64A-41619	Total/NA	Water	200.8	
550-121460-7	CH-CCR-FD01-41619	Total/NA	Water	200.8	
550-121460-8	CH-CCR-M55A-41619	Total/NA	Water	200.8	
550-121460-9	CH-CCR-W301-41619	Total/NA	Water	200.8	
550-121460-10	CH-CCR-W302-41719	Total/NA	Water	200.8	
550-121460-11	CH-CCR-W304-41619	Total/NA	Water	200.8	
550-121460-12	CH-CCR-W307-41619	Total/NA	Water	200.8	
MB 550-176032/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-176032/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-176032/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-121460-1 MS	CH-CCR-M52A-41619	Total/NA	Water	200.8	
550-121460-1 MSD	CH-CCR-M52A-41619	Total/NA	Water	200.8	

### Prep Batch: 176048

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121460-1	CH-CCR-M52A-41619	Total/NA	Water	200.7	
550-121460-2	CH-CCR-M53A-41719	Total/NA	Water	200.7	
550-121460-3	CH-CCR-W305-41719	Total/NA	Water	200.7	
550-121460-4	CH-CCR-W306-41619	Total/NA	Water	200.7	
550-121460-5	CH-CCR-W314-41619	Total/NA	Water	200.7	
550-121460-6	CH-CCR-M64A-41619	Total/NA	Water	200.7	
550-121460-7	CH-CCR-FD01-41619	Total/NA	Water	200.7	
550-121460-8	CH-CCR-M55A-41619	Total/NA	Water	200.7	
550-121460-9	CH-CCR-W301-41619	Total/NA	Water	200.7	

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Metals (Continued)

### Prep Batch: 176048 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121460-10	CH-CCR-W302-41719	Total/NA	Water	200.7	
550-121460-11	CH-CCR-W304-41619	Total/NA	Water	200.7	
550-121460-12	CH-CCR-W307-41619	Total/NA	Water	200.7	
MB 550-176048/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-176048/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-176048/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-121404-A-2-A MS	Matrix Spike	Total/NA	Water	200.7	
550-121404-A-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 176277

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121460-1	CH-CCR-M52A-41619	Total/NA	Water	200.8 LL	176032
550-121460-2	CH-CCR-M53A-41719	Total/NA	Water	200.8 LL	176032
550-121460-3	CH-CCR-W305-41719	Total/NA	Water	200.8 LL	176032
550-121460-4	CH-CCR-W306-41619	Total/NA	Water	200.8 LL	176032
550-121460-5	CH-CCR-W314-41619	Total/NA	Water	200.8 LL	176032
550-121460-6	CH-CCR-M64A-41619	Total/NA	Water	200.8 LL	176032
550-121460-7	CH-CCR-FD01-41619	Total/NA	Water	200.8 LL	176032
550-121460-8	CH-CCR-M55A-41619	Total/NA	Water	200.8 LL	176032
550-121460-9	CH-CCR-W301-41619	Total/NA	Water	200.8 LL	176032
550-121460-10	CH-CCR-W302-41719	Total/NA	Water	200.8 LL	176032
550-121460-11	CH-CCR-W304-41619	Total/NA	Water	200.8 LL	176032
550-121460-12	CH-CCR-W307-41619	Total/NA	Water	200.8 LL	176032
MB 550-176032/1-A	Method Blank	Total/NA	Water	200.8 LL	176032
LCS 550-176032/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	176032
LCSD 550-176032/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	176032
550-121460-1 MS	CH-CCR-M52A-41619	Total/NA	Water	200.8 LL	176032
550-121460-1 MSD	CH-CCR-M52A-41619	Total/NA	Water	200.8 LL	176032

### Analysis Batch: 176343

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121460-1	CH-CCR-M52A-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-2	CH-CCR-M53A-41719	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-3	CH-CCR-W305-41719	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-4	CH-CCR-W306-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-5	CH-CCR-W314-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-6	CH-CCR-M64A-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-7	CH-CCR-FD01-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-8	CH-CCR-M55A-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-9	CH-CCR-W301-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-10	CH-CCR-W302-41719	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-11	CH-CCR-W304-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121460-12	CH-CCR-W307-41619	Total/NA	Water	200.7 Rev 4.4	176048
MB 550-176048/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	176048
LCS 550-176048/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	176048
LCSD 550-176048/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	176048
550-121404-A-2-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	176048
550-121404-A-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	176048

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Metals

### Analysis Batch: 176548

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121460-1	CH-CCR-M52A-41619	Total/NA	Water	200.8 LL	176032
550-121460-2	CH-CCR-M53A-41719	Total/NA	Water	200.8 LL	176032
550-121460-3	CH-CCR-W305-41719	Total/NA	Water	200.8 LL	176032
550-121460-4	CH-CCR-W306-41619	Total/NA	Water	200.8 LL	176032
550-121460-5	CH-CCR-W314-41619	Total/NA	Water	200.8 LL	176032
550-121460-6	CH-CCR-M64A-41619	Total/NA	Water	200.8 LL	176032
550-121460-7	CH-CCR-FD01-41619	Total/NA	Water	200.8 LL	176032
550-121460-8	CH-CCR-M55A-41619	Total/NA	Water	200.8 LL	176032
550-121460-9	CH-CCR-W301-41619	Total/NA	Water	200.8 LL	176032
550-121460-10	CH-CCR-W302-41719	Total/NA	Water	200.8 LL	176032
550-121460-11	CH-CCR-W304-41619	Total/NA	Water	200.8 LL	176032
550-121460-12	CH-CCR-W307-41619	Total/NA	Water	200.8 LL	176032
MB 550-176032/1-A	Method Blank	Total/NA	Water	200.8 LL	176032
LCS 550-176032/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	176032
LCSD 550-176032/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	176032
550-121460-1 MS	CH-CCR-M52A-41619	Total/NA	Water	200.8 LL	176032
550-121460-1 MSD	CH-CCR-M52A-41619	Total/NA	Water	200.8 LL	176032



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Client Sample ID: CH-CCR-M52A-41619

## Lab Sample ID: 550-121460-1

Date Collected: 04/16/19 16:33

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 18:55	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:16	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:34	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:01	ARE	TAL PHX

## Client Sample ID: CH-CCR-M53A-41719

## Lab Sample ID: 550-121460-2

Date Collected: 04/17/19 13:11

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 19:50	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:23	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:36	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:04	ARE	TAL PHX

## Client Sample ID: CH-CCR-W305-41719

## Lab Sample ID: 550-121460-3

Date Collected: 04/17/19 12:38

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 20:09	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:29	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:38	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:06	ARE	TAL PHX

## Client Sample ID: CH-CCR-W306-41619

## Lab Sample ID: 550-121460-4

Date Collected: 04/16/19 17:34

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 20:27	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:35	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:40	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-W306-41619**

**Lab Sample ID: 550-121460-4**

**Date Collected: 04/16/19 17:34**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:08	ARE	TAL PHX

**Client Sample ID: CH-CCR-W314-41619**

**Lab Sample ID: 550-121460-5**

**Date Collected: 04/16/19 16:00**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 20:45	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:40	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:46	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:14	ARE	TAL PHX

**Client Sample ID: CH-CCR-M64A-41619**

**Lab Sample ID: 550-121460-6**

**Date Collected: 04/16/19 09:51**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 21:04	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:46	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:48	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:16	ARE	TAL PHX

**Client Sample ID: CH-CCR-FD01-41619**

**Lab Sample ID: 550-121460-7**

**Date Collected: 04/16/19 09:51**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 21:22	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:52	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:50	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:18	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-M55A-41619**

**Lab Sample ID: 550-121460-8**

**Date Collected: 04/16/19 11:18**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 21:41	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 20:58	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:53	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:20	ARE	TAL PHX

**Client Sample ID: CH-CCR-W301-41619**

**Lab Sample ID: 550-121460-9**

**Date Collected: 04/16/19 15:15**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 22:36	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:04	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:55	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:22	ARE	TAL PHX

**Client Sample ID: CH-CCR-W302-41719**

**Lab Sample ID: 550-121460-10**

**Date Collected: 04/17/19 11:32**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 22:54	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:16	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:57	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:24	ARE	TAL PHX

**Client Sample ID: CH-CCR-W304-41619**

**Lab Sample ID: 550-121460-11**

**Date Collected: 04/16/19 14:22**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 23:13	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:22	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 04:59	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

**Client Sample ID: CH-CCR-W304-41619**

**Lab Sample ID: 550-121460-11**

**Date Collected: 04/16/19 14:22**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:26	ARE	TAL PHX

**Client Sample ID: CH-CCR-W307-41619**

**Lab Sample ID: 550-121460-12**

**Date Collected: 04/16/19 13:31**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 23:31	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:28	SRA	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176277	04/26/19 05:01	ARE	TAL PHX
Total/NA	Prep	200.8			176032	04/25/19 05:05	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176548	04/30/19 00:28	ARE	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19 *

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121460-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Chain of Custody Record

**TestAmerica Phoenix**  
 4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303



121460

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

TestAmerica Laboratories, Inc.

Client Contact	Doug Lavarway	928-587-0319	Analysis Turnaround Time	<input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS	Lab Contact:	Doug Lavarway	Date:	4/18/2019	Carrier:	
4801 Cholla Lake Rd	Joseph City, AZ 86032	(928) 587-0319	Phone	TAT if different from Below						
		(xxx) xxx-xxxx	FAX	2 weeks	Filtered Sample ( Y / N )					
Project Name:				1 week	Perform MS / MSD ( Y / N )					
Site:				2 days	EPA 200.7 (Li)					
P O # 300579155				1 day	200.8 (As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)					
					EPA 300.0 (F)					

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	COG No. of COCs
CH-CCR-M52A-41619	4/16/2019	1633	G	W	2	N	X X X X	
CH-CCR-M53A-41719	4/17/19	1311	G	W	2	N	X X X X	
CH-CCR-W305-41719	4/17/19	1238	G	W	2	N	X X X X	
CH-CCR-W306-41619	4/16/19	1734	G	W	2	N	X X X X	
CH-CCR-W314-41619	4/16/19	1600	G	W	2	N	X X X X	
CH-CCR-M64A-41619	4/16/19	951	G	W	2	N	X X X X	
CH-CCR-FD01-41619	4/16/19	951	G	W	2	N	X X X X	
CH-CCR-M55A-41619	4/16/19	1118	G	W	2	N	X X X X	
CH-CCR-W301-41619	4/16/19	1515	G	W	2	N	X X X X	
CH-CCR-W302-41719	4/17/19	1132	G	W	2	N	X X X X	
CH-CCR-W304-41619	4/16/19	1422	G	W	2	N	X X X X	
CH-CCR-W307-41619	4/16/19	1331	G	W	2	N	X X X X	



Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

2.6C, 2.8C) R

Special Instructions/QC Requirements & Comments:  
 Method 200.8 with collision cell

Custody Seals Intact:  Yes  No

Custody Seal No.:

Relinquished by: *Doug Lavarway* Company: *APS* Date/Time: *4/18/1758* Received by: *[Signature]* Date/Time: *[Signature]* Company: *PHHX* Date/Time: *4-16-19 1758*

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Cooler Temp. (C): \_\_\_\_\_ Obsd. \_\_\_\_\_ Corrd. \_\_\_\_\_ Therm ID No. \_\_\_\_\_

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013



# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-121460-1

**Login Number: 121460**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-121461-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
4801 Cholla Lake Rd  
Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:  
5/20/2019 11:10:46 AM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
L3	The associated blank spike recovery was above method acceptance limits.
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
R6	LFB/LFBD RPD exceeded method control limit. Recovery met acceptance criteria.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

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**Job ID: 550-121461-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

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**Narrative**

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**Job Narrative  
550-121461-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 4/18/2019 5:58 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.6° C and 2.8° C.

**HPLC/IC**

Method(s) 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W308-41619 (550-121461-1) and CH-CCR-W317-41719 (550-121461-3). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**Metals**

Method(s) 200.8 LL: The laboratory control sample (LCS) associated with preparation batch 550-177869 and analytical batch 550-178330 was outside acceptance criteria for Barium. Re-extraction and/or re-analysis could not be performed; therefore, the data have been reported. The batch matrix spike/matrix spike duplicate (MS/MSD) was within acceptance limits and may be used to evaluate matrix performance.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-121461-1	CH-CCR-W308-41619	Water	04/16/19 11:51	04/18/19 17:58
550-121461-2	CH-CCR-W309-41619	Water	04/16/19 12:51	04/18/19 17:58
550-121461-3	CH-CCR-W317-41719	Water	04/17/19 14:01	04/18/19 17:58
550-121461-4	CH-CCR-FD03-41719	Water	04/17/19 14:01	04/18/19 17:58

- 1
- 2
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- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Client Sample ID: CH-CCR-W308-41619

## Lab Sample ID: 550-121461-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.35		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00083		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0067		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.010		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.053	M1	0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W309-41619

## Lab Sample ID: 550-121461-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.30		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0051		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0062	L3 R6	0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.061		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.22	M1	0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W317-41719

## Lab Sample ID: 550-121461-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0035		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.032		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0028		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-FD03-41719

## Lab Sample ID: 550-121461-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0039		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.033		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0028		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

**Client Sample ID: CH-CCR-W308-41619**

**Lab Sample ID: 550-121461-1**

Date Collected: 04/16/19 11:51

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/24/19 23:49	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.35		0.20	mg/L		04/25/19 09:27	04/26/19 21:34	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00083		0.00050	mg/L		04/25/19 05:11	04/26/19 05:18	1
Barium	0.0067		0.00050	mg/L		04/25/19 05:11	04/30/19 00:45	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:18	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 00:45	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:18	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:18	1
Molybdenum	0.010		0.00050	mg/L		04/25/19 05:11	04/26/19 05:18	1
Selenium	0.053	M1	0.00050	mg/L		04/25/19 05:11	04/26/19 05:18	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:18	1

**Client Sample ID: CH-CCR-W309-41619**

**Lab Sample ID: 550-121461-2**

Date Collected: 04/16/19 12:51

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.0	D1	0.80	mg/L			04/25/19 00:45	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.30		0.20	mg/L		04/25/19 09:27	04/26/19 21:40	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0051		0.00050	mg/L		04/25/19 05:11	04/30/19 00:58	1
Barium	0.0062	L3 R6	0.00050	mg/L		05/14/19 09:46	05/17/19 05:06	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/30/19 00:58	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 00:58	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/30/19 00:58	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/30/19 00:58	1
Molybdenum	0.061		0.00050	mg/L		04/25/19 05:11	04/30/19 00:58	1
Selenium	0.22	M1	0.00050	mg/L		05/14/19 09:46	05/17/19 05:06	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/30/19 00:58	1

**Client Sample ID: CH-CCR-W317-41719**

**Lab Sample ID: 550-121461-3**

Date Collected: 04/17/19 14:01

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/25/19 01:03	2

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

**Client Sample ID: CH-CCR-W317-41719**

**Lab Sample ID: 550-121461-3**

Date Collected: 04/17/19 14:01

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 21:46	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0035		0.00050	mg/L		04/25/19 05:11	04/26/19 05:33	1
Barium	0.032		0.00050	mg/L		04/25/19 05:11	04/30/19 01:00	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:33	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 01:00	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:33	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:33	1
Molybdenum	0.0028		0.00050	mg/L		04/25/19 05:11	04/26/19 05:33	1
Selenium	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:33	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:33	1

**Client Sample ID: CH-CCR-FD03-41719**

**Lab Sample ID: 550-121461-4**

Date Collected: 04/17/19 14:01

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			04/25/19 01:21	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 21:52	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0039		0.00050	mg/L		04/25/19 05:11	04/26/19 05:35	1
Barium	0.033		0.00050	mg/L		04/25/19 05:11	04/30/19 01:02	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:35	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 01:02	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:35	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:35	1
Molybdenum	0.0028		0.00050	mg/L		04/25/19 05:11	04/26/19 05:35	1
Selenium	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:35	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:35	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-176063/2  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			04/24/19 17:23	1

Lab Sample ID: LCS 550-176063/5  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	3.92		mg/L		98	90 - 110

Lab Sample ID: LCSD 550-176063/6  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	3.92		mg/L		98	90 - 110	0	20

Lab Sample ID: 550-121461-1 MS  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: CH-CCR-W308-41619  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND	D1 D5	8.00	7.98	D1	mg/L		96	80 - 120

Lab Sample ID: 550-121461-1 MSD  
Matrix: Water  
Analysis Batch: 176063

Client Sample ID: CH-CCR-W308-41619  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND	D1 D5	8.00	7.96	D1	mg/L		96	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-176048/1-A  
Matrix: Water  
Analysis Batch: 176343

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 176048

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 19:51	1

Lab Sample ID: LCS 550-176048/2-A  
Matrix: Water  
Analysis Batch: 176343

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 176048

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	1.00	0.916		mg/L		92	85 - 115

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCSD 550-176048/3-A**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	1.00	0.915		mg/L		91	85 - 115	0	20

**Lab Sample ID: 550-121404-A-2-A MS**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Lithium	ND		1.00	0.892		mg/L		89	70 - 130

**Lab Sample ID: 550-121404-A-2-B MSD**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	ND		1.00	0.905		mg/L		90	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-176033/1-A**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:07	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Molybdenum	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Selenium	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:07	1

**Lab Sample ID: MB 550-176033/1-A**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		0.00050	mg/L		04/25/19 05:11	04/30/19 00:35	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 00:35	1

**Lab Sample ID: LCS 550-176033/2-A**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.100	0.0990		mg/L		99	85 - 115
Cadmium	0.100	0.0966		mg/L		97	85 - 115
Cobalt	0.100	0.0974		mg/L		97	85 - 115
Lead	0.100	0.0943		mg/L		94	85 - 115
Molybdenum	0.100	0.0975		mg/L		98	85 - 115
Selenium	0.100	0.106		mg/L		106	85 - 115

Eurofins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-176033/2-A**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Thallium	0.100	0.0964		mg/L		96	85 - 115

**Lab Sample ID: LCS 550-176033/2-A**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.100	0.0912		mg/L		91	85 - 115
Chromium	0.100	0.105		mg/L		105	85 - 115

**Lab Sample ID: LCSD 550-176033/3-A**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.0997		mg/L		100	85 - 115	1	20
Cadmium	0.100	0.0985		mg/L		98	85 - 115	2	20
Cobalt	0.100	0.0966		mg/L		97	85 - 115	1	20
Lead	0.100	0.0942		mg/L		94	85 - 115	0	20
Molybdenum	0.100	0.0970		mg/L		97	85 - 115	1	20
Selenium	0.100	0.106		mg/L		106	85 - 115	1	20
Thallium	0.100	0.0970		mg/L		97	85 - 115	1	20

**Lab Sample ID: LCSD 550-176033/3-A**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	0.100	0.0864		mg/L		86	85 - 115	5	20
Chromium	0.100	0.106		mg/L		106	85 - 115	1	20

**Lab Sample ID: 550-121461-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: CH-CCR-W308-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.00083		0.100	0.111		mg/L		111	70 - 130
Cadmium	ND		0.100	0.0894		mg/L		89	70 - 130
Cobalt	ND		0.100	0.0949		mg/L		95	70 - 130
Lead	ND		0.100	0.0853		mg/L		85	70 - 130
Molybdenum	0.010		0.100	0.114		mg/L		104	70 - 130
Selenium	0.053	M1	0.100	0.183	M1	mg/L		131	70 - 130
Thallium	ND		0.100	0.0893		mg/L		89	70 - 130

**Lab Sample ID: 550-121461-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: CH-CCR-W308-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.0067		0.100	0.0986		mg/L		92	70 - 130

Eurofins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-121461-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: CH-CCR-W308-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	ND		0.100	0.107		mg/L		107	70 - 130

**Lab Sample ID: 550-121461-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: CH-CCR-W308-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Arsenic	0.00083		0.100	0.110		mg/L		109	70 - 130	1	20
Cadmium	ND		0.100	0.0883		mg/L		88	70 - 130	1	20
Cobalt	ND		0.100	0.0936		mg/L		94	70 - 130	1	20
Lead	ND		0.100	0.0837		mg/L		84	70 - 130	2	20
Molybdenum	0.010		0.100	0.112		mg/L		102	70 - 130	2	20
Selenium	0.053	M1	0.100	0.181		mg/L		129	70 - 130	1	20
Thallium	ND		0.100	0.0871		mg/L		87	70 - 130	2	20

**Lab Sample ID: 550-121461-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: CH-CCR-W308-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Barium	0.0067		0.100	0.102		mg/L		95	70 - 130	3	20
Chromium	ND		0.100	0.102		mg/L		102	70 - 130	5	20

**Lab Sample ID: MB 550-177869/1-A**  
**Matrix: Water**  
**Analysis Batch: 178330**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 177869**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		0.00050	mg/L		05/14/19 09:46	05/17/19 04:56	1
Selenium	ND		0.00050	mg/L		05/14/19 09:46	05/17/19 04:56	1

**Lab Sample ID: LCS 550-177869/2-A**  
**Matrix: Water**  
**Analysis Batch: 178330**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 177869**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.100	0.0906		mg/L		91	85 - 115
Selenium	0.100	0.0967		mg/L		97	85 - 115

**Lab Sample ID: LCSD 550-177869/3-A**  
**Matrix: Water**  
**Analysis Batch: 178330**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 177869**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Selenium	0.100	0.103		mg/L		103	85 - 115	6	20

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-121461-2 MS**  
**Matrix: Water**  
**Analysis Batch: 178330**

**Client Sample ID: CH-CCR-W309-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 177869**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Barium	0.0062	L3 R6	0.100	0.111		mg/L		105	70 - 130
Selenium	0.22	M1	0.100	0.349		mg/L		128	70 - 130

**Lab Sample ID: 550-121461-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 178330**

**Client Sample ID: CH-CCR-W309-41619**  
**Prep Type: Total/NA**  
**Prep Batch: 177869**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Barium	0.0062	L3 R6	0.100	0.110		mg/L		104	70 - 130	1	20
Selenium	0.22	M1	0.100	0.365	M1	mg/L		145	70 - 130	5	20



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## HPLC/IC

### Analysis Batch: 176063

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-1	CH-CCR-W308-41619	Total/NA	Water	300.0	
550-121461-2	CH-CCR-W309-41619	Total/NA	Water	300.0	
550-121461-3	CH-CCR-W317-41719	Total/NA	Water	300.0	
550-121461-4	CH-CCR-FD03-41719	Total/NA	Water	300.0	
MB 550-176063/2	Method Blank	Total/NA	Water	300.0	
LCS 550-176063/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-176063/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121461-1 MS	CH-CCR-W308-41619	Total/NA	Water	300.0	
550-121461-1 MSD	CH-CCR-W308-41619	Total/NA	Water	300.0	

## Metals

### Prep Batch: 176033

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-1	CH-CCR-W308-41619	Total/NA	Water	200.8	
550-121461-2	CH-CCR-W309-41619	Total/NA	Water	200.8	
550-121461-3	CH-CCR-W317-41719	Total/NA	Water	200.8	
550-121461-4	CH-CCR-FD03-41719	Total/NA	Water	200.8	
MB 550-176033/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-176033/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-176033/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-121461-1 MS	CH-CCR-W308-41619	Total/NA	Water	200.8	
550-121461-1 MSD	CH-CCR-W308-41619	Total/NA	Water	200.8	

### Prep Batch: 176048

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-1	CH-CCR-W308-41619	Total/NA	Water	200.7	
550-121461-2	CH-CCR-W309-41619	Total/NA	Water	200.7	
550-121461-3	CH-CCR-W317-41719	Total/NA	Water	200.7	
550-121461-4	CH-CCR-FD03-41719	Total/NA	Water	200.7	
MB 550-176048/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-176048/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-176048/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-121404-A-2-A MS	Matrix Spike	Total/NA	Water	200.7	
550-121404-A-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 176278

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-1	CH-CCR-W308-41619	Total/NA	Water	200.8 LL	176033
550-121461-3	CH-CCR-W317-41719	Total/NA	Water	200.8 LL	176033
550-121461-4	CH-CCR-FD03-41719	Total/NA	Water	200.8 LL	176033
MB 550-176033/1-A	Method Blank	Total/NA	Water	200.8 LL	176033
LCS 550-176033/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	176033
LCSD 550-176033/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	176033
550-121461-1 MS	CH-CCR-W308-41619	Total/NA	Water	200.8 LL	176033
550-121461-1 MSD	CH-CCR-W308-41619	Total/NA	Water	200.8 LL	176033

### Analysis Batch: 176343

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-1	CH-CCR-W308-41619	Total/NA	Water	200.7 Rev 4.4	176048
550-121461-2	CH-CCR-W309-41619	Total/NA	Water	200.7 Rev 4.4	176048

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Metals (Continued)

### Analysis Batch: 176343 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-3	CH-CCR-W317-41719	Total/NA	Water	200.7 Rev 4.4	176048
550-121461-4	CH-CCR-FD03-41719	Total/NA	Water	200.7 Rev 4.4	176048
MB 550-176048/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	176048
LCS 550-176048/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	176048
LCSD 550-176048/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	176048
550-121404-A-2-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	176048
550-121404-A-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	176048

### Analysis Batch: 176549

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-1	CH-CCR-W308-41619	Total/NA	Water	200.8 LL	176033
550-121461-2	CH-CCR-W309-41619	Total/NA	Water	200.8 LL	176033
550-121461-3	CH-CCR-W317-41719	Total/NA	Water	200.8 LL	176033
550-121461-4	CH-CCR-FD03-41719	Total/NA	Water	200.8 LL	176033
MB 550-176033/1-A	Method Blank	Total/NA	Water	200.8 LL	176033
LCS 550-176033/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	176033
LCSD 550-176033/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	176033
550-121461-1 MS	CH-CCR-W308-41619	Total/NA	Water	200.8 LL	176033
550-121461-1 MSD	CH-CCR-W308-41619	Total/NA	Water	200.8 LL	176033

### Prep Batch: 177869

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-2	CH-CCR-W309-41619	Total/NA	Water	200.8	
MB 550-177869/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-177869/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-177869/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-121461-2 MS	CH-CCR-W309-41619	Total/NA	Water	200.8	
550-121461-2 MSD	CH-CCR-W309-41619	Total/NA	Water	200.8	

### Analysis Batch: 178330

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121461-2	CH-CCR-W309-41619	Total/NA	Water	200.8 LL	177869
MB 550-177869/1-A	Method Blank	Total/NA	Water	200.8 LL	177869
LCS 550-177869/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	177869
LCSD 550-177869/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	177869
550-121461-2 MS	CH-CCR-W309-41619	Total/NA	Water	200.8 LL	177869
550-121461-2 MSD	CH-CCR-W309-41619	Total/NA	Water	200.8 LL	177869

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Client Sample ID: CH-CCR-W308-41619

Lab Sample ID: 550-121461-1

Date Collected: 04/16/19 11:51

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/24/19 23:49	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:34	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:18	ARE	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 00:45	ARE	TAL PHX

## Client Sample ID: CH-CCR-W309-41619

Lab Sample ID: 550-121461-2

Date Collected: 04/16/19 12:51

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/25/19 00:45	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:40	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 00:58	ARE	TAL PHX
Total/NA	Prep	200.8			177869	05/14/19 09:46	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	178330	05/17/19 05:06	ARE	TAL PHX

## Client Sample ID: CH-CCR-W317-41719

Lab Sample ID: 550-121461-3

Date Collected: 04/17/19 14:01

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/25/19 01:03	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:46	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:33	ARE	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 01:00	ARE	TAL PHX

## Client Sample ID: CH-CCR-FD03-41719

Lab Sample ID: 550-121461-4

Date Collected: 04/17/19 14:01

Matrix: Water

Date Received: 04/18/19 17:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	176063	04/25/19 01:21	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:52	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:35	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

**Client Sample ID: CH-CCR-FD03-41719**

**Lab Sample ID: 550-121461-4**

**Date Collected: 04/17/19 14:01**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 01:02	ARE	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

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# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19 *

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- 10
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- 12
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- 14

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121461-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Chain of Custody Record

TestAmerica Phoenix

4625 E Cotton Center Blvd  
Suite 189


Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

121461

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

TestAmerica Laboratories, Inc.



APS Cholla 4801 Cholla Lake Rd Joseph City, AZ 86032 (928) 587-0319 (xxx) xxx-xxxx Project Name: Site: P O # 300579155		Client Contact Doug Lavarway 928-587-0319		Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below _____ <input type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Doug Lavarway 928-587-0319		Date: 4/18/2019		COC No: _____ of _____ COCs	
Sample Identification		Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	EPA 200.7 (Li)	200.8 (As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 300.0 (F)
CH-CCR-W308-41619	-01	4/16/2019	1151	G	W	2	N	X	X	X	
CH-CCR-W309-41619	-02	4/16/19	1251	G	W	2	N	X	X	X	
CH-CCR-W317-41719	-03	4/17/19	1401	G	W	2	N	X	X	X	
CH-CCR-FD03-41719	-04	4/17/19	1401	G	W	2	N	X	X	X	
 <p>550-121461 Chain of Custody</p>											
<p>Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4= HNO3, 5= NaOH, 6= Other _____</p> <p>Possible Hazard Identification: _____</p> <p>Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.</p> <p><input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison 8 <input type="checkbox"/> Unknown</p> <p>Special Instructions/QC Requirements &amp; Comments: _____</p> <p>Method 200.8 with collision cell</p>											
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obsd: _____		Therm ID No: _____					
Relinquished by: Doug Lavarway		Company: APS		Date/Time: 4/18/2019		Received by: [Signature]		Company: [Signature]		Date/Time: 4/18/2019	
Relinquished by: _____		Company: _____		Date/Time: _____		Received in Laboratory by: [Signature]		Company: [Signature]		Date/Time: 4/18/2019	

(2.6°C, 2.8°C) pc



## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-121461-1

**Login Number: 121461**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-121462-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
4801 Cholla Lake Rd  
Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:  
5/1/2019 2:00:37 PM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

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**Job ID: 550-121462-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

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**Narrative**

**Job Narrative  
550-121462-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 4/18/2019 5:58 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.6° C and 2.8° C.

**HPLC/IC**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**Metals**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

- 1
- 2
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- 12
- 13
- 14

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-121462-1	CH-CCR-M56A-41819	Water	04/18/19 09:58	04/18/19 17:58
550-121462-2	CH-CCR-M57A-41719	Water	04/17/19 15:28	04/18/19 17:58
550-121462-3	CH-CCR-M58A-41719	Water	04/17/19 14:59	04/18/19 17:58
550-121462-4	CH-CCR-M62A-41819	Water	04/18/19 09:10	04/18/19 17:58
550-121462-5	CH-CCR-FD04-41819	Water	04/18/19 09:10	04/18/19 17:58

- 1
- 2
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- 12
- 13
- 14

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Client Sample ID: CH-CCR-M56A-41819

## Lab Sample ID: 550-121462-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0011		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.055		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.076		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0013		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.014		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00062		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M57A-41719

## Lab Sample ID: 550-121462-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.53		0.40	mg/L	1		300.0	Total/NA
Arsenic	0.0026		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.041		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.045		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0050		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0078		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.00069		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M58A-41719

## Lab Sample ID: 550-121462-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0039		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.059		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M62A-41819

## Lab Sample ID: 550-121462-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.47		0.40	mg/L	1		300.0	Total/NA
Arsenic	0.0033		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.068		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0026		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-FD04-41819

## Lab Sample ID: 550-121462-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0031		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.068		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0025		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

**Client Sample ID: CH-CCR-M56A-41819**

**Lab Sample ID: 550-121462-1**

Date Collected: 04/18/19 09:58

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			04/25/19 02:17	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/25/19 09:27	04/26/19 21:57	1
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 21:57	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/25/19 05:11	04/26/19 05:24	1
Arsenic	0.0011		0.00050	mg/L		04/25/19 05:11	04/26/19 05:24	1
Barium	0.055		0.00050	mg/L		04/25/19 05:11	04/30/19 00:51	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:24	1
Chromium	0.076		0.0010	mg/L		04/25/19 05:11	04/30/19 00:51	1
Cobalt	0.0013		0.00050	mg/L		04/25/19 05:11	04/26/19 05:24	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:24	1
Molybdenum	0.014		0.00050	mg/L		04/25/19 05:11	04/26/19 05:24	1
Selenium	0.00062		0.00050	mg/L		04/25/19 05:11	04/26/19 05:24	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:24	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/25/19 13:52	04/25/19 17:16	1

**Client Sample ID: CH-CCR-M57A-41719**

**Lab Sample ID: 550-121462-2**

Date Collected: 04/17/19 15:28

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.53		0.40	mg/L			04/25/19 03:12	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/25/19 09:27	04/26/19 22:03	1
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 22:03	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/25/19 05:11	04/26/19 05:37	1
Arsenic	0.0026		0.00050	mg/L		04/25/19 05:11	04/26/19 05:37	1
Barium	0.041		0.00050	mg/L		04/25/19 05:11	04/30/19 01:04	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:37	1
Chromium	0.045		0.0010	mg/L		04/25/19 05:11	04/30/19 01:04	1
Cobalt	0.0050		0.00050	mg/L		04/25/19 05:11	04/26/19 05:37	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:37	1
Molybdenum	0.0078		0.00050	mg/L		04/25/19 05:11	04/26/19 05:37	1
Selenium	0.00069		0.00050	mg/L		04/25/19 05:11	04/26/19 05:37	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:37	1

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

**Client Sample ID: CH-CCR-M57A-41719**

**Lab Sample ID: 550-121462-2**

Date Collected: 04/17/19 15:28

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/25/19 13:52	04/25/19 17:18	1

**Client Sample ID: CH-CCR-M58A-41719**

**Lab Sample ID: 550-121462-3**

Date Collected: 04/17/19 14:59

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			04/25/19 03:30	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/25/19 09:27	04/26/19 22:09	1
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 22:09	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/25/19 05:11	04/26/19 05:39	1
Arsenic	0.0039		0.00050	mg/L		04/25/19 05:11	04/26/19 05:39	1
Barium	0.059		0.00050	mg/L		04/25/19 05:11	04/30/19 01:06	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:39	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 01:06	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:39	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:39	1
Molybdenum	0.0018		0.00050	mg/L		04/25/19 05:11	04/26/19 05:39	1
Selenium	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:39	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:39	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/25/19 13:52	04/25/19 17:19	1

**Client Sample ID: CH-CCR-M62A-41819**

**Lab Sample ID: 550-121462-4**

Date Collected: 04/18/19 09:10

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.47		0.40	mg/L			04/25/19 03:49	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/25/19 09:34	04/26/19 23:05	1
Lithium	ND		0.20	mg/L		04/25/19 09:34	04/26/19 23:05	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/25/19 05:11	04/26/19 05:41	1
Arsenic	0.0033		0.00050	mg/L		04/25/19 05:11	04/26/19 05:41	1
Barium	0.068		0.00050	mg/L		04/25/19 05:11	04/30/19 01:08	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:41	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 01:08	1

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

**Client Sample ID: CH-CCR-M62A-41819**

**Lab Sample ID: 550-121462-4**

Date Collected: 04/18/19 09:10

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:41	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:41	1
<b>Molybdenum</b>	<b>0.0026</b>		0.00050	mg/L		04/25/19 05:11	04/26/19 05:41	1
Selenium	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:41	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:41	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/25/19 13:52	04/25/19 17:21	1

**Client Sample ID: CH-CCR-FD04-41819**

**Lab Sample ID: 550-121462-5**

Date Collected: 04/18/19 09:10

Matrix: Water

Date Received: 04/18/19 17:58

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			04/25/19 07:44	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/25/19 09:34	04/26/19 23:11	1
Lithium	ND		0.20	mg/L		04/25/19 09:34	04/26/19 23:11	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/25/19 05:11	04/26/19 05:44	1
<b>Arsenic</b>	<b>0.0031</b>		0.00050	mg/L		04/25/19 05:11	04/26/19 05:44	1
<b>Barium</b>	<b>0.068</b>		0.00050	mg/L		04/25/19 05:11	04/30/19 01:10	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:44	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 01:10	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:44	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:44	1
<b>Molybdenum</b>	<b>0.0025</b>		0.00050	mg/L		04/25/19 05:11	04/26/19 05:44	1
Selenium	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:44	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:44	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		04/25/19 13:52	04/25/19 17:22	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-176063/2**  
**Matrix: Water**  
**Analysis Batch: 176063**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			04/24/19 17:23	1

**Lab Sample ID: LCS 550-176063/5**  
**Matrix: Water**  
**Analysis Batch: 176063**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	3.92		mg/L		98	90 - 110

**Lab Sample ID: LCSD 550-176063/6**  
**Matrix: Water**  
**Analysis Batch: 176063**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	3.92		mg/L		98	90 - 110	0	20

**Lab Sample ID: 550-121462-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176063**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND		4.00	4.17		mg/L		96	80 - 120

**Lab Sample ID: 550-121462-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176063**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND		4.00	4.21		mg/L		97	80 - 120	1	20

**Lab Sample ID: MB 550-176070/2**  
**Matrix: Water**  
**Analysis Batch: 176070**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			04/24/19 16:40	1

**Lab Sample ID: LCS 550-176070/5**  
**Matrix: Water**  
**Analysis Batch: 176070**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	4.03		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-176070/6**  
**Matrix: Water**  
**Analysis Batch: 176070**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	4.03		mg/L		101	90 - 110	0	20

Eurofins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: 550-121727-A-3 MS ^5**  
**Matrix: Water**  
**Analysis Batch: 176070**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	12	D1	20.0	32.6	D1	mg/L		101	80 - 120

**Lab Sample ID: 550-121727-A-3 MSD ^5**  
**Matrix: Water**  
**Analysis Batch: 176070**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	12	D1	20.0	32.5	D1	mg/L		101	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-176048/1-A**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/25/19 09:27	04/26/19 19:51	1
Lithium	ND		0.20	mg/L		04/25/19 09:27	04/26/19 19:51	1

**Lab Sample ID: LCS 550-176048/2-A**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	1.00	1.02		mg/L		102	85 - 115
Lithium	1.00	0.916		mg/L		92	85 - 115

**Lab Sample ID: LCSD 550-176048/3-A**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	1.00	1.03		mg/L		103	85 - 115	1	20
Lithium	1.00	0.915		mg/L		91	85 - 115	0	20

**Lab Sample ID: 550-121404-A-2-A MS**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	ND		1.00	1.02		mg/L		102	70 - 130
Lithium	ND		1.00	0.892		mg/L		89	70 - 130

**Lab Sample ID: 550-121404-A-2-B MSD**  
**Matrix: Water**  
**Analysis Batch: 176343**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 176048**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	ND		1.00	1.03		mg/L		103	70 - 130	1	20
Lithium	ND		1.00	0.905		mg/L		90	70 - 130	1	20

Eurolins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: MB 550-176049/1-A**  
**Matrix: Water**  
**Analysis Batch: 176345**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176049**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		04/25/19 09:34	04/26/19 22:48	1
Lithium	ND		0.20	mg/L		04/25/19 09:34	04/26/19 22:48	1

**Lab Sample ID: LCS 550-176049/2-A**  
**Matrix: Water**  
**Analysis Batch: 176345**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176049**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	1.00	1.00		mg/L		100	85 - 115
Lithium	1.00	0.931		mg/L		93	85 - 115

**Lab Sample ID: LCSD 550-176049/3-A**  
**Matrix: Water**  
**Analysis Batch: 176345**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176049**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	1.00	1.01		mg/L		101	85 - 115	0	20
Lithium	1.00	0.931		mg/L		93	85 - 115	0	20

**Lab Sample ID: 550-121516-A-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 176345**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 176049**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		1.00	1.01		mg/L		101	70 - 130
Lithium	ND		1.00	0.998		mg/L		92	70 - 130

**Lab Sample ID: 550-121516-A-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 176345**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 176049**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		1.00	1.01		mg/L		101	70 - 130	0	20
Lithium	ND		1.00	0.993		mg/L		92	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-176033/1-A**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		04/25/19 05:11	04/26/19 05:07	1
Arsenic	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Cadmium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:07	1
Cobalt	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Lead	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Molybdenum	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Selenium	ND		0.00050	mg/L		04/25/19 05:11	04/26/19 05:07	1
Thallium	ND		0.00010	mg/L		04/25/19 05:11	04/26/19 05:07	1

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-176033/1-A**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		0.00050	mg/L		04/25/19 05:11	04/30/19 00:35	1
Chromium	ND		0.0010	mg/L		04/25/19 05:11	04/30/19 00:35	1

**Lab Sample ID: LCS 550-176033/2-A**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.100	0.0985		mg/L		98	85 - 115
Arsenic	0.100	0.0990		mg/L		99	85 - 115
Cadmium	0.100	0.0966		mg/L		97	85 - 115
Cobalt	0.100	0.0974		mg/L		97	85 - 115
Lead	0.100	0.0943		mg/L		94	85 - 115
Molybdenum	0.100	0.0975		mg/L		98	85 - 115
Selenium	0.100	0.106		mg/L		106	85 - 115
Thallium	0.100	0.0964		mg/L		96	85 - 115

**Lab Sample ID: LCS 550-176033/2-A**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.100	0.0912		mg/L		91	85 - 115
Chromium	0.100	0.105		mg/L		105	85 - 115

**Lab Sample ID: LCSD 550-176033/3-A**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Antimony	0.100	0.0983		mg/L		98	85 - 115	0	20
Arsenic	0.100	0.0997		mg/L		100	85 - 115	1	20
Cadmium	0.100	0.0985		mg/L		98	85 - 115	2	20
Cobalt	0.100	0.0966		mg/L		97	85 - 115	1	20
Lead	0.100	0.0942		mg/L		94	85 - 115	0	20
Molybdenum	0.100	0.0970		mg/L		97	85 - 115	1	20
Selenium	0.100	0.106		mg/L		106	85 - 115	1	20
Thallium	0.100	0.0970		mg/L		97	85 - 115	1	20

**Lab Sample ID: LCSD 550-176033/3-A**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Barium	0.100	0.0864		mg/L		86	85 - 115	5	20
Chromium	0.100	0.106		mg/L		106	85 - 115	1	20



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-121462-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	Limits	%Rec.
	Result	Qualifier	Added	Result	Qualifier					
Antimony	ND		0.100	0.101		mg/L		101	70 - 130	
Arsenic	0.0011		0.100	0.107		mg/L		106	70 - 130	
Cadmium	ND		0.100	0.0921		mg/L		92	70 - 130	
Cobalt	0.0013		0.100	0.0943		mg/L		93	70 - 130	
Lead	ND		0.100	0.0866		mg/L		87	70 - 130	
Molybdenum	0.014		0.100	0.118		mg/L		103	70 - 130	
Selenium	0.00062		0.100	0.115		mg/L		114	70 - 130	
Thallium	ND		0.100	0.0890		mg/L		89	70 - 130	

**Lab Sample ID: 550-121462-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	Limits	%Rec.
	Result	Qualifier	Added	Result	Qualifier					
Barium	0.055		0.100	0.155		mg/L		100	70 - 130	
Chromium	0.076		0.100	0.181		mg/L		104	70 - 130	

**Lab Sample ID: 550-121462-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176278**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
Antimony	ND		0.100	0.102		mg/L		102	70 - 130	1	20
Arsenic	0.0011		0.100	0.108		mg/L		107	70 - 130	1	20
Cadmium	ND		0.100	0.0921		mg/L		92	70 - 130	0	20
Cobalt	0.0013		0.100	0.0960		mg/L		95	70 - 130	2	20
Lead	ND		0.100	0.0872		mg/L		87	70 - 130	1	20
Molybdenum	0.014		0.100	0.118		mg/L		103	70 - 130	0	20
Selenium	0.00062		0.100	0.115		mg/L		114	70 - 130	0	20
Thallium	ND		0.100	0.0904		mg/L		90	70 - 130	2	20

**Lab Sample ID: 550-121462-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176549**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**  
**Prep Batch: 176033**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
Barium	0.055		0.100	0.160		mg/L		105	70 - 130	3	20
Chromium	0.076		0.100	0.179		mg/L		103	70 - 130	1	20

## Method: 245.1 - Mercury (CVAA)

**Lab Sample ID: MB 550-176097/12-A**  
**Matrix: Water**  
**Analysis Batch: 176127**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 176097**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Hg	ND		0.00020	mg/L		04/25/19 13:52	04/25/19 17:09	1

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Method: 245.1 - Mercury (CVAA) (Continued)

**Lab Sample ID: LCS 550-176097/13-A**  
**Matrix: Water**  
**Analysis Batch: 176127**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 176097**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Hg	0.00500	0.00528		mg/L		106	85 - 115

**Lab Sample ID: LCSD 550-176097/14-A**  
**Matrix: Water**  
**Analysis Batch: 176127**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 176097**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.00500	0.00529		mg/L		106	85 - 115	0	20

**Lab Sample ID: 550-121462-1 MS**  
**Matrix: Water**  
**Analysis Batch: 176127**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**  
**Prep Batch: 176097**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Hg	ND		0.00500	0.00560		mg/L		112	70 - 130

**Lab Sample ID: 550-121462-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 176127**

**Client Sample ID: CH-CCR-M56A-41819**  
**Prep Type: Total/NA**  
**Prep Batch: 176097**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.00500	0.00558		mg/L		112	70 - 130	0	20

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## HPLC/IC

### Analysis Batch: 176063

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	300.0	
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	300.0	
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	300.0	
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	300.0	
MB 550-176063/2	Method Blank	Total/NA	Water	300.0	
LCS 550-176063/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-176063/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121462-1 MS	CH-CCR-M56A-41819	Total/NA	Water	300.0	
550-121462-1 MSD	CH-CCR-M56A-41819	Total/NA	Water	300.0	

### Analysis Batch: 176070

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	300.0	
MB 550-176070/2	Method Blank	Total/NA	Water	300.0	
LCS 550-176070/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-176070/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-121727-A-3 MS ^5	Matrix Spike	Total/NA	Water	300.0	
550-121727-A-3 MSD ^5	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 176033

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	200.8	
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	200.8	
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	200.8	
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	200.8	
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	200.8	
MB 550-176033/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-176033/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-176033/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-121462-1 MS	CH-CCR-M56A-41819	Total/NA	Water	200.8	
550-121462-1 MSD	CH-CCR-M56A-41819	Total/NA	Water	200.8	

### Prep Batch: 176048

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	200.7	
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	200.7	
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	200.7	
MB 550-176048/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-176048/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-176048/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-121404-A-2-A MS	Matrix Spike	Total/NA	Water	200.7	
550-121404-A-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Prep Batch: 176049

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	200.7	
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	200.7	
MB 550-176049/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-176049/2-A	Lab Control Sample	Total/NA	Water	200.7	

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# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Metals (Continued)

### Prep Batch: 176049 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 550-176049/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-121516-A-1-A MS	Matrix Spike	Total/NA	Water	200.7	
550-121516-A-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Prep Batch: 176097

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	245.1	
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	245.1	
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	245.1	
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	245.1	
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	245.1	
MB 550-176097/12-A	Method Blank	Total/NA	Water	245.1	
LCS 550-176097/13-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-176097/14-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-121462-1 MS	CH-CCR-M56A-41819	Total/NA	Water	245.1	
550-121462-1 MSD	CH-CCR-M56A-41819	Total/NA	Water	245.1	

### Analysis Batch: 176127

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	245.1	176097
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	245.1	176097
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	245.1	176097
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	245.1	176097
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	245.1	176097
MB 550-176097/12-A	Method Blank	Total/NA	Water	245.1	176097
LCS 550-176097/13-A	Lab Control Sample	Total/NA	Water	245.1	176097
LCSD 550-176097/14-A	Lab Control Sample Dup	Total/NA	Water	245.1	176097
550-121462-1 MS	CH-CCR-M56A-41819	Total/NA	Water	245.1	176097
550-121462-1 MSD	CH-CCR-M56A-41819	Total/NA	Water	245.1	176097

### Analysis Batch: 176278

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	200.8 LL	176033
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	200.8 LL	176033
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	200.8 LL	176033
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	200.8 LL	176033
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	200.8 LL	176033
MB 550-176033/1-A	Method Blank	Total/NA	Water	200.8 LL	176033
LCS 550-176033/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	176033
LCSD 550-176033/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	176033
550-121462-1 MS	CH-CCR-M56A-41819	Total/NA	Water	200.8 LL	176033
550-121462-1 MSD	CH-CCR-M56A-41819	Total/NA	Water	200.8 LL	176033

### Analysis Batch: 176343

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	200.7 Rev 4.4	176048
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	200.7 Rev 4.4	176048
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	200.7 Rev 4.4	176048
MB 550-176048/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	176048
LCS 550-176048/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	176048
LCSD 550-176048/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	176048

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Metals (Continued)

### Analysis Batch: 176343 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121404-A-2-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	176048
550-121404-A-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	176048

### Analysis Batch: 176345

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	200.7 Rev 4.4	176049
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	200.7 Rev 4.4	176049
MB 550-176049/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	176049
LCS 550-176049/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	176049
LCSD 550-176049/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	176049
550-121516-A-1-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	176049
550-121516-A-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	176049

### Analysis Batch: 176549

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-121462-1	CH-CCR-M56A-41819	Total/NA	Water	200.8 LL	176033
550-121462-2	CH-CCR-M57A-41719	Total/NA	Water	200.8 LL	176033
550-121462-3	CH-CCR-M58A-41719	Total/NA	Water	200.8 LL	176033
550-121462-4	CH-CCR-M62A-41819	Total/NA	Water	200.8 LL	176033
550-121462-5	CH-CCR-FD04-41819	Total/NA	Water	200.8 LL	176033
MB 550-176033/1-A	Method Blank	Total/NA	Water	200.8 LL	176033
LCS 550-176033/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	176033
LCSD 550-176033/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	176033
550-121462-1 MS	CH-CCR-M56A-41819	Total/NA	Water	200.8 LL	176033
550-121462-1 MSD	CH-CCR-M56A-41819	Total/NA	Water	200.8 LL	176033

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

**Client Sample ID: CH-CCR-M56A-41819**

**Lab Sample ID: 550-121462-1**

**Date Collected: 04/18/19 09:58**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	176063	04/25/19 02:17	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 21:57	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:24	ARE	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 00:51	ARE	TAL PHX
Total/NA	Prep	245.1			176097	04/25/19 13:52	JTG	TAL PHX
Total/NA	Analysis	245.1		1	176127	04/25/19 17:16	JTG	TAL PHX

**Client Sample ID: CH-CCR-M57A-41719**

**Lab Sample ID: 550-121462-2**

**Date Collected: 04/17/19 15:28**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	176063	04/25/19 03:12	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 22:03	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:37	ARE	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 01:04	ARE	TAL PHX
Total/NA	Prep	245.1			176097	04/25/19 13:52	JTG	TAL PHX
Total/NA	Analysis	245.1		1	176127	04/25/19 17:18	JTG	TAL PHX

**Client Sample ID: CH-CCR-M58A-41719**

**Lab Sample ID: 550-121462-3**

**Date Collected: 04/17/19 14:59**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	176063	04/25/19 03:30	NEL	TAL PHX
Total/NA	Prep	200.7			176048	04/25/19 09:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176343	04/26/19 22:09	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:39	ARE	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 01:06	ARE	TAL PHX
Total/NA	Prep	245.1			176097	04/25/19 13:52	JTG	TAL PHX
Total/NA	Analysis	245.1		1	176127	04/25/19 17:19	JTG	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

**Client Sample ID: CH-CCR-M62A-41819**

**Lab Sample ID: 550-121462-4**

**Date Collected: 04/18/19 09:10**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	176063	04/25/19 03:49	NEL	TAL PHX
Total/NA	Prep	200.7			176049	04/25/19 09:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176345	04/26/19 23:05	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:41	ARE	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 01:08	ARE	TAL PHX
Total/NA	Prep	245.1			176097	04/25/19 13:52	JTG	TAL PHX
Total/NA	Analysis	245.1		1	176127	04/25/19 17:21	JTG	TAL PHX

**Client Sample ID: CH-CCR-FD04-41819**

**Lab Sample ID: 550-121462-5**

**Date Collected: 04/18/19 09:10**

**Matrix: Water**

**Date Received: 04/18/19 17:58**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	176070	04/25/19 07:44	NEL	TAL PHX
Total/NA	Prep	200.7			176049	04/25/19 09:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	176345	04/26/19 23:11	SRA	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176278	04/26/19 05:44	ARE	TAL PHX
Total/NA	Prep	200.8			176033	04/25/19 05:11	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	176549	04/30/19 01:10	ARE	TAL PHX
Total/NA	Prep	245.1			176097	04/25/19 13:52	JTG	TAL PHX
Total/NA	Analysis	245.1		1	176127	04/25/19 17:22	JTG	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19 *

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-121462-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
245.1	Mercury (CVAA)	EPA	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX
245.1	Preparation, Mercury	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

TestAmerica Phoenix  
 4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

121462

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

TestAmerica Laboratories, Inc.

APS Cholla	Client Contact	Doug Lavarrway	928-567-0319	Analysis Turnaround Time	<input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS	Lab Contact:	Doug Lavarrway	Date:	04/18/2019	COC No.:	of COCs
4801 Cholla Lake Rd	Joseph City, AZ 86032			TAT if different from Below	<input type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day	Carrier:		Sampler:		For Lab Use Only:	
(928) 567-0319	Phone					Walk-in Client:		Lab Sampling:		Job / SDG No.:	
(xxx) xxx-xxxx	FAX										
Project Name:											
Site:											
P O # 300579155											

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grav)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 (Be, Li)	EPA 200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 245.1 (Hg)	EPA 300.0 (F)
CH-CCR-M56A-41819	4/18/2019	958	G	W	2	N	X	X	X	X	X
CH-CCR-M57A-41719	4/17/19	1528	G	W	2	N	X	X	X	X	X
CH-CCR-M58A-41719	4/17/19	1459	G	W	2	N	X	X	X	X	X
CH-CCR-M62A-41819	4/18/19	910	G	W	2	N	X	X	X	X	X
CH-CCR-FD04-41819	4/18/19	910	G	W	2	N	X	X	X	X	X



Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:

Method 200.8 with collision cell

Custody Seals Intact:  Yes  No

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

2.6°C, 2.8°C PC

Relinquished by:	Company:	Custody Seal No.:	Date/Time:	Received by:	Cooler Temp. (°C):	Obs'd:	Corrd.:	Therm ID No.:
Dos Lavarrway	APS		4/18/1756					
Relinquished by:	Company:		Date/Time:	Received in Laboratory by:				

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-121462-1

**Login Number: 121462**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-127215-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
Country Rd 6675 Stn 4915  
Fruitland, New Mexico 87416

Attn: Pamela J Norris



Authorized for release by:  
8/16/2019 11:48:18 AM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)



# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

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## Job ID: 550-127215-1

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Laboratory: Eurofins TestAmerica, Phoenix

### Narrative

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#### Job Narrative 550-127215-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 8/3/2019 7:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.3° C.

#### Receipt Exceptions

The following sample was submitted for analysis; however, it was not listed on the Chain-of-Custody (COC):  
550-127215-09CH-CCR-FD02-8119 (550-127215-9)

#### HPLC/IC

Method(s) 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W305-8119 (550-127215-3), CH-CCR-M64A-8119 (550-127215-6), CH-CCR-FD01-8119 (550-127215-7) and CH-CCR-M55A-8119 (550-127215-8). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags..

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

#### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
550-127215-1	CH-CCR-M52A-8119	Water	08/01/19 17:08	08/03/19 07:50	
550-127215-2	CH-CCR-M53A-8119	Water	08/01/19 16:16	08/03/19 07:50	
550-127215-3	CH-CCR-W305-8119	Water	08/01/19 15:43	08/03/19 07:50	
550-127215-4	CH-CCR-W306-8119	Water	08/01/19 13:37	08/03/19 07:50	
550-127215-5	CH-CCR-W314-8119	Water	08/01/19 17:40	08/03/19 07:50	
550-127215-6	CH-CCR-M64A-8119	Water	08/01/19 12:20	08/03/19 07:50	
550-127215-7	CH-CCR-FD01-8119	Water	08/01/19 12:20	08/03/19 07:50	
550-127215-8	CH-CCR-M55A-8119	Water	08/01/19 18:17	08/03/19 07:50	
550-127215-9	CH-CCR-FD02-8119	Water	08/01/19 16:16	08/03/19 07:50	

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Client Sample ID: CH-CCR-M52A-8119

## Lab Sample ID: 550-127215-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5000	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2800	D2	400	mg/L	200		300.0	Total/NA
Boron	3.5		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	880		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	12000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	6.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M53A-8119

## Lab Sample ID: 550-127215-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2200	D2	400	mg/L	200		300.0	Total/NA
Fluoride	2.3	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	3.2		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	590		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	7800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W305-8119

## Lab Sample ID: 550-127215-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2400	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.33		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	670		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	7000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W306-8119

## Lab Sample ID: 550-127215-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1900	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.99	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200		300.0	Total/NA
Boron	1.1		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	390		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	19000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W314-8119

## Lab Sample ID: 550-127215-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2700	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.84	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2200	D2	400	mg/L	200		300.0	Total/NA
Boron	1.2		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	740		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	7600	D2	100	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Client Sample ID: CH-CCR-W314-8119 (Continued)

Lab Sample ID: 550-127215-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.4	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M64A-8119

Lab Sample ID: 550-127215-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4200	D2	400	mg/L	200		300.0	Total/NA
Sulfate	4300	D2	400	mg/L	200		300.0	Total/NA
Boron	1.3		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	450		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD01-8119

Lab Sample ID: 550-127215-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4300	D2	400	mg/L	200		300.0	Total/NA
Sulfate	4300	D2	400	mg/L	200		300.0	Total/NA
Boron	1.3		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	450		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M55A-8119

Lab Sample ID: 550-127215-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4200	D2	400	mg/L	200		300.0	Total/NA
Sulfate	3300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.41		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	680		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	11000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD02-8119

Lab Sample ID: 550-127215-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2200	D2	400	mg/L	200		300.0	Total/NA
Fluoride	2.3	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3000	D2	400	mg/L	200		300.0	Total/NA
Boron	3.2		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	600		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	8500	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.4	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Client Sample ID: CH-CCR-M52A-8119

## Lab Sample ID: 550-127215-1

Date Collected: 08/01/19 17:08

Matrix: Water

Date Received: 08/03/19 07:50

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5000	D2	400	mg/L			08/07/19 21:14	200
Fluoride	1.0	D1	0.80	mg/L			08/07/19 20:55	2
Sulfate	2800	D2	400	mg/L			08/07/19 21:14	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.5		0.050	mg/L		08/07/19 14:21	08/10/19 00:50	1
Calcium	880		2.0	mg/L		08/07/19 14:21	08/10/19 00:50	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	100	mg/L			08/05/19 15:14	1
pH	6.9	H5	1.7	SU			08/07/19 09:30	1
Temperature	9.9	H5	0.1	Degrees C			08/07/19 09:30	1

## Client Sample ID: CH-CCR-M53A-8119

## Lab Sample ID: 550-127215-2

Date Collected: 08/01/19 16:16

Matrix: Water

Date Received: 08/03/19 07:50

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2200	D2	400	mg/L			08/07/19 21:50	200
Fluoride	2.3	D1	0.80	mg/L			08/07/19 21:32	2
Sulfate	2900	D2	400	mg/L			08/07/19 21:50	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.2		0.050	mg/L		08/07/19 14:21	08/10/19 00:53	1
Calcium	590		2.0	mg/L		08/07/19 14:21	08/10/19 00:53	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7800	D2	100	mg/L			08/05/19 15:14	1
pH	7.5	H5	1.7	SU			08/07/19 09:30	1
Temperature	9.6	H5	0.1	Degrees C			08/07/19 09:30	1

## Client Sample ID: CH-CCR-W305-8119

## Lab Sample ID: 550-127215-3

Date Collected: 08/01/19 15:43

Matrix: Water

Date Received: 08/03/19 07:50

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2400	D2	400	mg/L			08/07/19 22:27	200
Fluoride	ND	D1 D5	0.80	mg/L			08/07/19 22:09	2
Sulfate	2300	D2	400	mg/L			08/07/19 22:27	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.33		0.050	mg/L		08/07/19 14:21	08/10/19 00:57	1
Calcium	670		2.0	mg/L		08/07/19 14:21	08/10/19 00:57	1

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

**Client Sample ID: CH-CCR-W305-8119**

**Lab Sample ID: 550-127215-3**

Date Collected: 08/01/19 15:43

Matrix: Water

Date Received: 08/03/19 07:50

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7000	D2	100	mg/L			08/05/19 15:14	1
pH	7.3	H5	1.7	SU			08/07/19 09:30	1
Temperature	9.9	H5	0.1	Degrees C			08/07/19 09:30	1

**Client Sample ID: CH-CCR-W306-8119**

**Lab Sample ID: 550-127215-4**

Date Collected: 08/01/19 13:37

Matrix: Water

Date Received: 08/03/19 07:50

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1900	D2	400	mg/L			08/07/19 23:41	200
Fluoride	0.99	D1	0.80	mg/L			08/07/19 23:22	2
Sulfate	12000	D2	400	mg/L			08/07/19 23:41	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.1		0.050	mg/L		08/07/19 14:21	08/10/19 01:06	1
Calcium	390		2.0	mg/L		08/07/19 14:21	08/10/19 01:06	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	19000	D2	200	mg/L			08/05/19 15:14	1
pH	7.9	H5	1.7	SU			08/07/19 09:30	1
Temperature	9.9	H5	0.1	Degrees C			08/07/19 09:30	1

**Client Sample ID: CH-CCR-W314-8119**

**Lab Sample ID: 550-127215-5**

Date Collected: 08/01/19 17:40

Matrix: Water

Date Received: 08/03/19 07:50

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2700	D2	400	mg/L			08/08/19 00:18	200
Fluoride	0.84	D1	0.80	mg/L			08/07/19 23:59	2
Sulfate	2200	D2	400	mg/L			08/08/19 00:18	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.2		0.050	mg/L		08/07/19 14:21	08/10/19 01:10	1
Calcium	740		2.0	mg/L		08/07/19 14:21	08/10/19 01:10	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7600	D2	100	mg/L			08/05/19 15:14	1
pH	7.4	H5	1.7	SU			08/07/19 09:30	1
Temperature	9.4	H5	0.1	Degrees C			08/07/19 09:30	1

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Client Sample ID: CH-CCR-M64A-8119

## Lab Sample ID: 550-127215-6

Date Collected: 08/01/19 12:20

Matrix: Water

Date Received: 08/03/19 07:50

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4200	D2	400	mg/L			08/08/19 01:31	200
Fluoride	ND	D1 D5	0.80	mg/L			08/08/19 00:36	2
Sulfate	4300	D2	400	mg/L			08/08/19 01:31	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.3		0.050	mg/L		08/07/19 14:21	08/10/19 01:13	1
Calcium	450		2.0	mg/L		08/07/19 14:21	08/10/19 01:13	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	200	mg/L			08/05/19 15:14	1
pH	7.4	H5	1.7	SU			08/07/19 09:30	1
Temperature	10.0	H5	0.1	Degrees C			08/07/19 09:30	1

## Client Sample ID: CH-CCR-FD01-8119

## Lab Sample ID: 550-127215-7

Date Collected: 08/01/19 12:20

Matrix: Water

Date Received: 08/03/19 07:50

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4300	D2	400	mg/L			08/08/19 03:22	200
Fluoride	ND	D1 D5	0.80	mg/L			08/08/19 03:03	2
Sulfate	4300	D2	400	mg/L			08/08/19 03:22	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.3		0.050	mg/L		08/07/19 14:21	08/10/19 01:17	1
Calcium	450		2.0	mg/L		08/07/19 14:21	08/10/19 01:17	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	200	mg/L			08/05/19 15:14	1
pH	7.4	H5	1.7	SU			08/07/19 09:30	1
Temperature	9.8	H5	0.1	Degrees C			08/07/19 09:30	1

## Client Sample ID: CH-CCR-M55A-8119

## Lab Sample ID: 550-127215-8

Date Collected: 08/01/19 18:17

Matrix: Water

Date Received: 08/03/19 07:50

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4200	D2	400	mg/L			08/08/19 03:59	200
Fluoride	ND	D1 D5	0.80	mg/L			08/08/19 03:40	2
Sulfate	3300	D2	400	mg/L			08/08/19 03:59	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.41		0.050	mg/L		08/07/19 14:21	08/10/19 01:20	1
Calcium	680		2.0	mg/L		08/07/19 14:21	08/10/19 01:20	1



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

**Client Sample ID: CH-CCR-M55A-8119**

**Lab Sample ID: 550-127215-8**

Date Collected: 08/01/19 18:17

Matrix: Water

Date Received: 08/03/19 07:50

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	200	mg/L			08/05/19 15:14	1
pH	7.3	H5	1.7	SU			08/07/19 09:30	1
Temperature	10.5	H5	0.1	Degrees C			08/07/19 09:30	1

**Client Sample ID: CH-CCR-FD02-8119**

**Lab Sample ID: 550-127215-9**

Date Collected: 08/01/19 16:16

Matrix: Water

Date Received: 08/03/19 07:50

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2200	D2	400	mg/L			08/08/19 04:35	200
Fluoride	2.3	D1	0.80	mg/L			08/08/19 04:17	2
Sulfate	3000	D2	400	mg/L			08/08/19 04:35	200

## Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.2		0.050	mg/L		08/07/19 14:21	08/10/19 01:24	1
Calcium	600		2.0	mg/L		08/07/19 14:21	08/10/19 01:24	1

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	8500	D2	100	mg/L			08/05/19 15:14	1
pH	7.3	H5	1.7	SU			08/07/19 09:30	1
Temperature	10.4	H5	0.1	Degrees C			08/07/19 09:30	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-185912/2**  
**Matrix: Water**  
**Analysis Batch: 185912**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			08/07/19 18:10	1
Fluoride	ND		0.40	mg/L			08/07/19 18:10	1
Sulfate	ND		2.0	mg/L			08/07/19 18:10	1

**Lab Sample ID: LCS 550-185912/5**  
**Matrix: Water**  
**Analysis Batch: 185912**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.9		mg/L		104	90 - 110
Fluoride	4.00	4.09		mg/L		102	90 - 110
Sulfate	20.0	20.3		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-185912/6**  
**Matrix: Water**  
**Analysis Batch: 185912**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.9		mg/L		104	90 - 110	0	20
Fluoride	4.00	4.10		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-127215-6 MS**  
**Matrix: Water**  
**Analysis Batch: 185912**

**Client Sample ID: CH-CCR-M64A-8119**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND	D1 D5	8.00	7.90	D1	mg/L		96	80 - 120

**Lab Sample ID: 550-127215-6 MS**  
**Matrix: Water**  
**Analysis Batch: 185912**

**Client Sample ID: CH-CCR-M64A-8119**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	4200	D2	4000	8580	D2	mg/L		109	80 - 120
Sulfate	4300	D2	4000	8490	D2	mg/L		105	80 - 120

**Lab Sample ID: 550-127215-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 185912**

**Client Sample ID: CH-CCR-M64A-8119**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND	D1 D5	8.00	7.88	D1	mg/L		95	80 - 120	0	20

**Lab Sample ID: 550-127215-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 185912**

**Client Sample ID: CH-CCR-M64A-8119**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	4200	D2	4000	8490	D2	mg/L		107	80 - 120	1	20

Eurofins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-127215-6 MSD  
 Matrix: Water  
 Analysis Batch: 185912

Client Sample ID: CH-CCR-M64A-8119  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	4300	D2	4000	8390	D2	mg/L		103	80 - 120	1	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-185770/1-A  
 Matrix: Water  
 Analysis Batch: 186148

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 185770

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		08/07/19 14:21	08/10/19 00:25	1
Calcium	ND		2.0	mg/L		08/07/19 14:21	08/10/19 00:25	1

Lab Sample ID: LCS 550-185770/2-A  
 Matrix: Water  
 Analysis Batch: 186148

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 185770

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.944		mg/L		94	85 - 115
Calcium	21.0	20.4		mg/L		97	85 - 115

Lab Sample ID: LCSD 550-185770/3-A  
 Matrix: Water  
 Analysis Batch: 186148

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA  
 Prep Batch: 185770

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.937		mg/L		94	85 - 115	1	20
Calcium	21.0	20.4		mg/L		97	85 - 115	0	20

Lab Sample ID: 550-127328-R-1-B MS  
 Matrix: Water  
 Analysis Batch: 186148

Client Sample ID: Matrix Spike  
 Prep Type: Total/NA  
 Prep Batch: 185770

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.38		1.00	1.34		mg/L		95	70 - 130
Calcium	99		21.0	116	M3	mg/L		80	70 - 130

Lab Sample ID: 550-127328-R-1-C MSD  
 Matrix: Water  
 Analysis Batch: 186148

Client Sample ID: Matrix Spike Duplicate  
 Prep Type: Total/NA  
 Prep Batch: 185770

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.38		1.00	1.33		mg/L		95	70 - 130	0	20
Calcium	99		21.0	116	M3	mg/L		84	70 - 130	1	20

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-185511/1  
Matrix: Water  
Analysis Batch: 185511

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			08/05/19 15:14	1

Lab Sample ID: LCS 550-185511/2  
Matrix: Water  
Analysis Batch: 185511

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	994		mg/L		99	90 - 110

Lab Sample ID: LCSD 550-185511/3  
Matrix: Water  
Analysis Batch: 185511

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	1000		mg/L		100	90 - 110	1	10

Lab Sample ID: 550-127149-A-1 DU  
Matrix: Water  
Analysis Batch: 185511

Client Sample ID: Duplicate  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	1300		1370		mg/L		6	10

Lab Sample ID: 550-127215-6 DU  
Matrix: Water  
Analysis Batch: 185511

Client Sample ID: CH-CCR-M64A-8119  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	12000	D2	12000	D2	mg/L		0.4	10

## Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-185737/13  
Matrix: Water  
Analysis Batch: 185737

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.7	98.5 - 101.5

Lab Sample ID: LCSSRM 550-185737/25  
Matrix: Water  
Analysis Batch: 185737

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.4	98.5 - 101.5

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: LCSSRM 550-185737/30**  
**Matrix: Water**  
**Analysis Batch: 185737**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.0	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-185737/42**  
**Matrix: Water**  
**Analysis Batch: 185737**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.3	98.5 - 101.5

**Lab Sample ID: 550-127131-A-11 DU**  
**Matrix: Water**  
**Analysis Batch: 185737**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.8	H5	7.8	H5	SU		0.1	5
Temperature	9.6	H5	10.0	H5	Degrees C		4	

**Lab Sample ID: 550-127215-4 DU**  
**Matrix: Water**  
**Analysis Batch: 185737**

**Client Sample ID: CH-CCR-W306-8119**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.9	H5	7.9	H5	SU		0.6	5
Temperature	9.9	H5	10.0	H5	Degrees C		1	

**Lab Sample ID: 550-127215-6 DU**  
**Matrix: Water**  
**Analysis Batch: 185737**

**Client Sample ID: CH-CCR-M64A-8119**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.4	H5	7.4	H5	SU		0.4	5
Temperature	10.0	H5	10.1	H5	Degrees C		1	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## HPLC/IC

### Analysis Batch: 185912

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127215-1	CH-CCR-M52A-8119	Total/NA	Water	300.0	
550-127215-1	CH-CCR-M52A-8119	Total/NA	Water	300.0	
550-127215-2	CH-CCR-M53A-8119	Total/NA	Water	300.0	
550-127215-2	CH-CCR-M53A-8119	Total/NA	Water	300.0	
550-127215-3	CH-CCR-W305-8119	Total/NA	Water	300.0	
550-127215-3	CH-CCR-W305-8119	Total/NA	Water	300.0	
550-127215-4	CH-CCR-W306-8119	Total/NA	Water	300.0	
550-127215-4	CH-CCR-W306-8119	Total/NA	Water	300.0	
550-127215-5	CH-CCR-W314-8119	Total/NA	Water	300.0	
550-127215-5	CH-CCR-W314-8119	Total/NA	Water	300.0	
550-127215-6	CH-CCR-M64A-8119	Total/NA	Water	300.0	
550-127215-6	CH-CCR-M64A-8119	Total/NA	Water	300.0	
550-127215-7	CH-CCR-FD01-8119	Total/NA	Water	300.0	
550-127215-7	CH-CCR-FD01-8119	Total/NA	Water	300.0	
550-127215-8	CH-CCR-M55A-8119	Total/NA	Water	300.0	
550-127215-8	CH-CCR-M55A-8119	Total/NA	Water	300.0	
550-127215-9	CH-CCR-FD02-8119	Total/NA	Water	300.0	
550-127215-9	CH-CCR-FD02-8119	Total/NA	Water	300.0	
MB 550-185912/2	Method Blank	Total/NA	Water	300.0	
LCS 550-185912/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-185912/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-127215-6 MS	CH-CCR-M64A-8119	Total/NA	Water	300.0	
550-127215-6 MS	CH-CCR-M64A-8119	Total/NA	Water	300.0	
550-127215-6 MSD	CH-CCR-M64A-8119	Total/NA	Water	300.0	
550-127215-6 MSD	CH-CCR-M64A-8119	Total/NA	Water	300.0	

## Metals

### Prep Batch: 185770

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127215-1	CH-CCR-M52A-8119	Total/NA	Water	200.7	
550-127215-2	CH-CCR-M53A-8119	Total/NA	Water	200.7	
550-127215-3	CH-CCR-W305-8119	Total/NA	Water	200.7	
550-127215-4	CH-CCR-W306-8119	Total/NA	Water	200.7	
550-127215-5	CH-CCR-W314-8119	Total/NA	Water	200.7	
550-127215-6	CH-CCR-M64A-8119	Total/NA	Water	200.7	
550-127215-7	CH-CCR-FD01-8119	Total/NA	Water	200.7	
550-127215-8	CH-CCR-M55A-8119	Total/NA	Water	200.7	
550-127215-9	CH-CCR-FD02-8119	Total/NA	Water	200.7	
MB 550-185770/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-185770/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-185770/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-127328-R-1-B MS	Matrix Spike	Total/NA	Water	200.7	
550-127328-R-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 186148

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127215-1	CH-CCR-M52A-8119	Total/NA	Water	200.7 Rev 4.4	185770
550-127215-2	CH-CCR-M53A-8119	Total/NA	Water	200.7 Rev 4.4	185770
550-127215-3	CH-CCR-W305-8119	Total/NA	Water	200.7 Rev 4.4	185770
550-127215-4	CH-CCR-W306-8119	Total/NA	Water	200.7 Rev 4.4	185770

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Metals (Continued)

### Analysis Batch: 186148 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127215-5	CH-CCR-W314-8119	Total/NA	Water	200.7 Rev 4.4	185770
550-127215-6	CH-CCR-M64A-8119	Total/NA	Water	200.7 Rev 4.4	185770
550-127215-7	CH-CCR-FD01-8119	Total/NA	Water	200.7 Rev 4.4	185770
550-127215-8	CH-CCR-M55A-8119	Total/NA	Water	200.7 Rev 4.4	185770
550-127215-9	CH-CCR-FD02-8119	Total/NA	Water	200.7 Rev 4.4	185770
MB 550-185770/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	185770
LCS 550-185770/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	185770
LCSD 550-185770/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	185770
550-127328-R-1-B MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	185770
550-127328-R-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	185770

## General Chemistry

### Analysis Batch: 185511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127215-1	CH-CCR-M52A-8119	Total/NA	Water	SM 2540C	
550-127215-2	CH-CCR-M53A-8119	Total/NA	Water	SM 2540C	
550-127215-3	CH-CCR-W305-8119	Total/NA	Water	SM 2540C	
550-127215-4	CH-CCR-W306-8119	Total/NA	Water	SM 2540C	
550-127215-5	CH-CCR-W314-8119	Total/NA	Water	SM 2540C	
550-127215-6	CH-CCR-M64A-8119	Total/NA	Water	SM 2540C	
550-127215-7	CH-CCR-FD01-8119	Total/NA	Water	SM 2540C	
550-127215-8	CH-CCR-M55A-8119	Total/NA	Water	SM 2540C	
550-127215-9	CH-CCR-FD02-8119	Total/NA	Water	SM 2540C	
MB 550-185511/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-185511/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-185511/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-127149-A-1 DU	Duplicate	Total/NA	Water	SM 2540C	
550-127215-6 DU	CH-CCR-M64A-8119	Total/NA	Water	SM 2540C	

### Analysis Batch: 185737

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127215-1	CH-CCR-M52A-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-2	CH-CCR-M53A-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-3	CH-CCR-W305-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-4	CH-CCR-W306-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-5	CH-CCR-W314-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-6	CH-CCR-M64A-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-7	CH-CCR-FD01-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-8	CH-CCR-M55A-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-9	CH-CCR-FD02-8119	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-185737/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-185737/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-185737/30	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-185737/42	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-127131-A-11 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	
550-127215-4 DU	CH-CCR-W306-8119	Total/NA	Water	SM 4500 H+ B	
550-127215-6 DU	CH-CCR-M64A-8119	Total/NA	Water	SM 4500 H+ B	



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

**Client Sample ID: CH-CCR-M52A-8119**

**Lab Sample ID: 550-127215-1**

**Date Collected: 08/01/19 17:08**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/07/19 20:55	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/07/19 21:14	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 00:50	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511	(Start) 08/05/19 15:14 (End) 08/06/19 11:15	DGS	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-M53A-8119**

**Lab Sample ID: 550-127215-2**

**Date Collected: 08/01/19 16:16**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/07/19 21:32	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/07/19 21:50	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 00:53	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511	(Start) 08/05/19 15:14 (End) 08/06/19 11:15	DGS	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-W305-8119**

**Lab Sample ID: 550-127215-3**

**Date Collected: 08/01/19 15:43**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/07/19 22:09	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/07/19 22:27	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 00:57	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511	(Start) 08/05/19 15:14 (End) 08/06/19 11:15	DGS	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-W306-8119**

**Lab Sample ID: 550-127215-4**

**Date Collected: 08/01/19 13:37**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/07/19 23:22	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/07/19 23:41	NEL	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

**Client Sample ID: CH-CCR-W306-8119**

**Lab Sample ID: 550-127215-4**

**Date Collected: 08/01/19 13:37**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 01:06	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511	08/05/19 15:14 (Start) 08/06/19 11:15 (End)	DGS	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-W314-8119**

**Lab Sample ID: 550-127215-5**

**Date Collected: 08/01/19 17:40**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/07/19 23:59	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/08/19 00:18	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 01:10	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511	08/05/19 15:14 (Start) 08/06/19 11:15 (End)	DGS	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-M64A-8119**

**Lab Sample ID: 550-127215-6**

**Date Collected: 08/01/19 12:20**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/08/19 00:36	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/08/19 01:31	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 01:13	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511	08/05/19 15:14 (Start) 08/06/19 11:15 (End)	DGS	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-FD01-8119**

**Lab Sample ID: 550-127215-7**

**Date Collected: 08/01/19 12:20**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/08/19 03:03	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/08/19 03:22	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 01:17	SRA	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

**Client Sample ID: CH-CCR-FD01-8119**

**Lab Sample ID: 550-127215-7**

**Date Collected: 08/01/19 12:20**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	185511		DGS	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-M55A-8119**

**Lab Sample ID: 550-127215-8**

**Date Collected: 08/01/19 18:17**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/08/19 03:40	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/08/19 03:59	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 01:20	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511		DGS	TAL PHX
					(Start)	08/05/19 15:14		
					(End)	08/06/19 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Client Sample ID: CH-CCR-FD02-8119**

**Lab Sample ID: 550-127215-9**

**Date Collected: 08/01/19 16:16**

**Matrix: Water**

**Date Received: 08/03/19 07:50**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	185912	08/08/19 04:17	NEL	TAL PHX
Total/NA	Analysis	300.0		200	185912	08/08/19 04:35	NEL	TAL PHX
Total/NA	Prep	200.7			185770	08/07/19 14:21	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186148	08/10/19 01:24	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	185511		DGS	TAL PHX
					(Start)	08/05/19 15:14		
					(End)	08/06/19 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	185737	08/07/19 09:30	MDS	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-20

- 1
- 2
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# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127215-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

**Chain of Custody Record**

127215

**TestAmerica**

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

Client Contact: APS Cholla  
 Doug Lavarway  
 928-587-0319  
 Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 (B, Ca)	EPA 300.0 (Cl, F, SO4)	SM 2450C (TDS)	SM 4500HB (pH)	Carrier:	COG No. of COCS	Sampler:	For Lab Use Only: Walk-in Client: Lab Sampling:	Job / SDG No.:	Sample Specific Notes:
CH-CGR-M52A-8119	8/1/2019	1708	G	W	2	N	X	X	X	X	X	8/1/19					-01
CH-CGR-M53A-8119	8/1/2019	1616	G	W	2	N	X	X	X	X	X						-02
CH-CGR-W305-8119	8/1/2019	1543	G	W	2	N	X	X	X	X	X						-03
CH-CGR-W306-8119	8/1/2019	1337	G	W	2	N	X	X	X	X	X						-04
CH-CGR-W314-8119	8/1/2019	1740	G	W	2	N	X	X	X	X	X						-05
CH-CGR-M64A-8119	8/1/2019	1220	G	W	2	N	X	X	X	X	X						-06
CH-CGR-FD01-8119	8/1/2019	1220	G	W	2	N	X	X	X	X	X						-07
CH-CGR-M55A-8119	8/1/2019	1817	G	W	2	N	X	X	X	X	X						-08
																	-09



550-127215 Chain of Custody

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other  
 Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months  
 e retained longer than 1 month)

Method 200.8 with collision cell  
 Cooler Temp. (°C): Obsd: 2.3°C  
 Therm ID No.: D.B. Modern id

Relinquished by: Doug Lavarway  
 Company: APS  
 Date/Time: 8/1/19  
 Received by: [Signature]  
 Date/Time: [Signature]

Relinquished by: [Signature]  
 Company: APHE  
 Date/Time: 8-3-19 0750  
 Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013



# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-127215-1

**Login Number: 127215**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Doerr, Bret C**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Received extra samples not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.





## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-127722-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
Country Rd 6675 Stn 4915  
Fruitland, New Mexico 87416

Attn: Pamela J Norris



Authorized for release by:  
8/31/2019 10:44:35 AM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

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**Job ID: 550-127722-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

## Narrative

**Job Narrative  
550-127722-1**

### Comments

No additional comments.

### Receipt

The samples were received on 8/12/2019 12:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8° C.

### HPLC/IC

Method(s) 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-M56A-8919 (550-127722-1), CH-CCR-M57A-8919 (550-127722-2) and CH-CCR-M58A-8919 (550-127722-3). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
550-127722-1	CH-CCR-M56A-8919	Water	08/09/19 15:18	08/12/19 12:40	
550-127722-2	CH-CCR-M57A-8919	Water	08/09/19 14:12	08/12/19 12:40	
550-127722-3	CH-CCR-M58A-8919	Water	08/09/19 13:44	08/12/19 12:40	
550-127722-4	CH-CCR-M62A-8919	Water	08/09/19 15:51	08/12/19 12:40	
550-127722-5	CH-CCR-FD01-8919	Water	08/09/19 14:12	08/12/19 12:40	

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Client Sample ID: CH-CCR-M56A-8919

## Lab Sample ID: 550-127722-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1700	D2	400	mg/L	200		300.0	Total/NA
Sulfate	1100	D2	400	mg/L	200		300.0	Total/NA
Boron	0.33		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0085		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.078		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.023		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0012		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	4200	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M57A-8919

## Lab Sample ID: 550-127722-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1900	D2	400	mg/L	200		300.0	Total/NA
Sulfate	1300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.56		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	470		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0019		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.039		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.038		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0040		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0068		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	4700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.0	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M58A-8919

## Lab Sample ID: 550-127722-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2100	D2	400	mg/L	200		300.0	Total/NA
Sulfate	530	D2	400	mg/L	200		300.0	Total/NA
Boron	0.22		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0038		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.066		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	4200	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M62A-8919

## Lab Sample ID: 550-127722-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2900	D2	200	mg/L	100		300.0	Total/NA
Sulfate	590	D2	200	mg/L	100		300.0	Total/NA
Boron	0.21		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	450		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0031		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.067		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Client Sample ID: CH-CCR-M62A-8919 (Continued)

## Lab Sample ID: 550-127722-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chromium	0.0037		0.0010	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0028		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	5300	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD01-8919

## Lab Sample ID: 550-127722-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1900	D2	200	mg/L	100		300.0	Total/NA
Sulfate	1300	D2	200	mg/L	100		300.0	Total/NA
Boron	0.55		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	450		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0021		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.040		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.043		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0039		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0071		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	5000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.0	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

**Client Sample ID: CH-CCR-M56A-8919**

**Lab Sample ID: 550-127722-1**

Date Collected: 08/09/19 15:18

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1700	D2	400	mg/L			08/19/19 21:24	200
Fluoride	ND	D1 D5	0.80	mg/L			08/19/19 21:05	2
Sulfate	1100	D2	400	mg/L			08/19/19 21:24	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.33		0.050	mg/L		08/13/19 14:05	08/15/19 12:09	1
Calcium	300		2.0	mg/L		08/13/19 14:05	08/15/19 12:09	1
Lithium	ND		0.20	mg/L		08/13/19 14:05	08/15/19 12:09	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0085		0.00050	mg/L		08/13/19 11:28	08/21/19 23:57	1
Barium	0.078		0.00050	mg/L		08/13/19 11:28	08/16/19 01:39	1
Chromium	0.023		0.0010	mg/L		08/24/19 12:44	08/31/19 03:59	1
Cobalt	0.0012		0.00050	mg/L		08/13/19 11:28	08/21/19 23:57	1
Molybdenum	0.011		0.00050	mg/L		08/13/19 11:28	08/16/19 01:39	1
Thallium	ND		0.00010	mg/L		08/13/19 11:28	08/15/19 09:30	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4200	D2	100	mg/L			08/16/19 10:02	1
pH	7.3	H5	1.7	SU			08/15/19 12:25	1
Temperature	12.2	H5	0.1	Degrees C			08/15/19 12:25	1

**Client Sample ID: CH-CCR-M57A-8919**

**Lab Sample ID: 550-127722-2**

Date Collected: 08/09/19 14:12

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1900	D2	400	mg/L			08/19/19 22:01	200
Fluoride	ND	D1 D5	0.80	mg/L			08/19/19 21:42	2
Sulfate	1300	D2	400	mg/L			08/19/19 22:01	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.56		0.050	mg/L		08/13/19 14:05	08/15/19 12:13	1
Calcium	470		2.0	mg/L		08/13/19 14:05	08/15/19 12:13	1
Lithium	ND		0.20	mg/L		08/13/19 14:05	08/15/19 12:13	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0019		0.00050	mg/L		08/13/19 11:28	08/21/19 23:59	1
Barium	0.039		0.00050	mg/L		08/13/19 11:28	08/16/19 01:41	1
Chromium	0.038		0.0010	mg/L		08/24/19 12:44	08/30/19 02:25	1
Cobalt	0.0040		0.00050	mg/L		08/13/19 11:28	08/21/19 23:59	1
Molybdenum	0.0068		0.00050	mg/L		08/13/19 11:28	08/16/19 01:41	1
Thallium	ND		0.00010	mg/L		08/13/19 11:28	08/15/19 09:32	1

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# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

**Client Sample ID: CH-CCR-M57A-8919**

**Lab Sample ID: 550-127722-2**

Date Collected: 08/09/19 14:12

Matrix: Water

Date Received: 08/12/19 12:40

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4700	D2	100	mg/L			08/16/19 10:02	1
pH	7.0	H5	1.7	SU			08/15/19 12:25	1
Temperature	13.0	H5	0.1	Degrees C			08/15/19 12:25	1

**Client Sample ID: CH-CCR-M58A-8919**

**Lab Sample ID: 550-127722-3**

Date Collected: 08/09/19 13:44

Matrix: Water

Date Received: 08/12/19 12:40

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2100	D2	400	mg/L			08/19/19 22:37	200
Fluoride	ND	D1 D5	0.80	mg/L			08/19/19 22:19	2
Sulfate	530	D2	400	mg/L			08/19/19 22:37	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.22		0.050	mg/L		08/13/19 14:05	08/15/19 12:16	1
Calcium	300		2.0	mg/L		08/13/19 14:05	08/15/19 12:16	1
Lithium	ND		0.20	mg/L		08/13/19 14:05	08/15/19 12:16	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0038		0.00050	mg/L		08/13/19 11:28	08/22/19 00:01	1
Barium	0.066		0.00050	mg/L		08/13/19 11:28	08/16/19 01:43	1
Chromium	ND		0.0010	mg/L		08/24/19 12:44	08/30/19 02:27	1
Cobalt	ND		0.00050	mg/L		08/13/19 11:28	08/22/19 00:01	1
Molybdenum	0.0018		0.00050	mg/L		08/13/19 11:28	08/16/19 01:43	1
Thallium	ND		0.00010	mg/L		08/13/19 11:28	08/15/19 09:34	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4200	D2	100	mg/L			08/16/19 10:02	1
pH	7.4	H5	1.7	SU			08/15/19 12:25	1
Temperature	13.1	H5	0.1	Degrees C			08/15/19 12:25	1

**Client Sample ID: CH-CCR-M62A-8919**

**Lab Sample ID: 550-127722-4**

Date Collected: 08/09/19 15:51

Matrix: Water

Date Received: 08/12/19 12:40

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2900	D2	200	mg/L			08/20/19 00:28	100
Fluoride	ND		0.40	mg/L			08/19/19 23:33	1
Sulfate	590	D2	200	mg/L			08/20/19 00:28	100

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.21		0.050	mg/L		08/13/19 14:05	08/15/19 12:20	1
Calcium	450		2.0	mg/L		08/13/19 14:05	08/15/19 12:20	1
Lithium	ND		0.20	mg/L		08/13/19 14:05	08/15/19 12:20	1

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

**Client Sample ID: CH-CCR-M62A-8919**

**Lab Sample ID: 550-127722-4**

Date Collected: 08/09/19 15:51

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0031		0.00050	mg/L		08/13/19 11:28	08/21/19 05:19	1
Barium	0.067		0.00050	mg/L		08/13/19 11:28	08/16/19 01:36	1
Chromium	0.0037		0.0010	mg/L		08/13/19 11:28	08/21/19 05:19	1
Cobalt	ND		0.00050	mg/L		08/13/19 11:28	08/21/19 05:19	1
Molybdenum	0.0028		0.00050	mg/L		08/13/19 11:28	08/16/19 01:36	1
Thallium	ND		0.00010	mg/L		08/13/19 11:28	08/15/19 09:27	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5300	D2	100	mg/L			08/16/19 10:02	1
pH	7.3	H5	1.7	SU			08/15/19 12:25	1
Temperature	13.7	H5	0.1	Degrees C			08/15/19 12:25	1

**Client Sample ID: CH-CCR-FD01-8919**

**Lab Sample ID: 550-127722-5**

Date Collected: 08/09/19 14:12

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1900	D2	200	mg/L			08/20/19 01:41	100
Fluoride	ND		0.40	mg/L			08/20/19 01:23	1
Sulfate	1300	D2	200	mg/L			08/20/19 01:41	100

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.55		0.050	mg/L		08/13/19 14:05	08/15/19 12:23	1
Calcium	450		2.0	mg/L		08/13/19 14:05	08/15/19 12:23	1
Lithium	ND		0.20	mg/L		08/13/19 14:05	08/15/19 12:23	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0021		0.00050	mg/L		08/13/19 11:28	08/22/19 00:03	1
Barium	0.040		0.00050	mg/L		08/13/19 11:28	08/16/19 01:49	1
Chromium	0.043		0.0010	mg/L		08/24/19 12:44	08/30/19 02:29	1
Cobalt	0.0039		0.00050	mg/L		08/13/19 11:28	08/22/19 00:03	1
Molybdenum	0.0071		0.00050	mg/L		08/13/19 11:28	08/16/19 01:49	1
Thallium	ND		0.00010	mg/L		08/13/19 11:28	08/15/19 09:40	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5000	D2	100	mg/L			08/16/19 10:02	1
pH	7.0	H5	1.7	SU			08/15/19 12:25	1
Temperature	13.8	H5	0.1	Degrees C			08/15/19 12:25	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-187023/2**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			08/19/19 18:20	1
Fluoride	ND		0.40	mg/L			08/19/19 18:20	1
Sulfate	ND		2.0	mg/L			08/19/19 18:20	1

**Lab Sample ID: LCS 550-187023/5**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.5		mg/L		102	90 - 110
Fluoride	4.00	4.05		mg/L		101	90 - 110
Sulfate	20.0	20.0		mg/L		100	90 - 110

**Lab Sample ID: LCSD 550-187023/6**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.4		mg/L		102	90 - 110	0	20
Fluoride	4.00	4.04		mg/L		101	90 - 110	0	20
Sulfate	20.0	19.9		mg/L		100	90 - 110	0	20

**Lab Sample ID: 550-127722-4 MS**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND		4.00	4.34		mg/L		101	80 - 120

**Lab Sample ID: 550-127722-4 MS**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	2900	D2	2000	4920	D2	mg/L		102	80 - 120
Sulfate	590	D2	2000	2620	D2	mg/L		102	80 - 120

**Lab Sample ID: 550-127722-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND		4.00	4.32		mg/L		100	80 - 120	0	20

**Lab Sample ID: 550-127722-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2900	D2	2000	4930	D2	mg/L		103	80 - 120	0	20

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-127722-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	590	D2	2000	2640	D2	mg/L		103	80 - 120	1	20

**Lab Sample ID: 550-127723-A-6 MS ^2**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.1	D1	8.00	9.08	D1	mg/L		100	80 - 120

**Lab Sample ID: 550-127723-A-6 MS ^200**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	1600	D2	4000	5910	D2	mg/L		108	80 - 120
Sulfate	3200	D2	4000	7300	D2	mg/L		102	80 - 120

**Lab Sample ID: 550-127723-A-6 MSD ^2**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.1	D1	8.00	9.21	D1	mg/L		102	80 - 120	1	20

**Lab Sample ID: 550-127723-A-6 MSD ^200**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	1600	D2	4000	5930	D2	mg/L		109	80 - 120	0	20
Sulfate	3200	D2	4000	7330	D2	mg/L		103	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-186304/1-A**  
**Matrix: Water**  
**Analysis Batch: 186608**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 186304**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		08/13/19 14:05	08/15/19 11:29	1
Calcium	ND		2.0	mg/L		08/13/19 14:05	08/15/19 11:29	1
Lithium	ND		0.20	mg/L		08/13/19 14:05	08/15/19 11:29	1

**Lab Sample ID: LCS 550-186304/2-A**  
**Matrix: Water**  
**Analysis Batch: 186608**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 186304**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.990		mg/L		99	85 - 115
Calcium	21.0	20.8		mg/L		99	85 - 115

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCS 550-186304/2-A**  
**Matrix: Water**  
**Analysis Batch: 186608**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 186304**  
**%Rec. Limits**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Lithium	1.00	0.978		mg/L		98	85 - 115

**Lab Sample ID: LCSD 550-186304/3-A**  
**Matrix: Water**  
**Analysis Batch: 186608**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 186304**  
**%Rec. RPD Limit**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	0.979		mg/L		98	85 - 115	1	20
Calcium	21.0	20.5		mg/L		98	85 - 115	1	20
Lithium	1.00	0.968		mg/L		97	85 - 115	1	20

**Lab Sample ID: 550-127542-G-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 186608**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 186304**  
**%Rec. Limits**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Boron	0.067		1.00	1.09		mg/L		103	70 - 130
Calcium	540	M3	21.0	532	M3	mg/L		-55	70 - 130
Lithium	ND		1.00	1.07		mg/L		101	70 - 130

**Lab Sample ID: 550-127542-G-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 186608**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 186304**  
**%Rec. RPD Limit**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	0.067		1.00	1.09		mg/L		102	70 - 130	1	20
Calcium	540	M3	21.0	533	M3	mg/L		-50	70 - 130	0	20
Lithium	ND		1.00	1.06		mg/L		100	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-186279/1-A**  
**Matrix: Water**  
**Analysis Batch: 186672**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**  
**MB MB RL Unit D Prepared Analyzed Dil Fac**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Thallium	ND		0.00010	mg/L		08/13/19 11:28	08/15/19 09:17	1

**Lab Sample ID: MB 550-186279/1-A**  
**Matrix: Water**  
**Analysis Batch: 186686**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**  
**MB MB RL Unit D Prepared Analyzed Dil Fac**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		0.00050	mg/L		08/13/19 11:28	08/16/19 01:26	1
Molybdenum	ND		0.00050	mg/L		08/13/19 11:28	08/16/19 01:26	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: MB 550-186279/1-A**  
**Matrix: Water**  
**Analysis Batch: 187247**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		08/13/19 11:28	08/21/19 05:09	1
Chromium	ND		0.0010	mg/L		08/13/19 11:28	08/21/19 05:09	1
Cobalt	ND		0.00050	mg/L		08/13/19 11:28	08/21/19 05:09	1

**Lab Sample ID: MB 550-186279/1-A**  
**Matrix: Water**  
**Analysis Batch: 187261**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		08/13/19 11:28	08/21/19 23:45	1
Cobalt	ND		0.00050	mg/L		08/13/19 11:28	08/21/19 23:45	1

**Lab Sample ID: LCS 550-186279/2-A**  
**Matrix: Water**  
**Analysis Batch: 186672**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Thallium	0.100	0.0927		mg/L		93	85 - 115

**Lab Sample ID: LCS 550-186279/2-A**  
**Matrix: Water**  
**Analysis Batch: 186686**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.100	0.106		mg/L		106	85 - 115
Molybdenum	0.100	0.0975		mg/L		98	85 - 115

**Lab Sample ID: LCS 550-186279/2-A**  
**Matrix: Water**  
**Analysis Batch: 187247**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.0938		mg/L		94	85 - 115
Chromium	0.100	0.100		mg/L		100	85 - 115
Cobalt	0.100	0.0873		mg/L		87	85 - 115

**Lab Sample ID: LCS 550-186279/2-A**  
**Matrix: Water**  
**Analysis Batch: 187261**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.0982		mg/L		98	85 - 115
Cobalt	0.100	0.0906		mg/L		91	85 - 115

**Lab Sample ID: LCSD 550-186279/3-A**  
**Matrix: Water**  
**Analysis Batch: 186672**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Thallium	0.100	0.0953		mg/L		95	85 - 115	3	20

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: LCSD 550-186279/3-A**  
**Matrix: Water**  
**Analysis Batch: 186686**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	%Rec. RPD Limit	
Barium	0.100	0.107		mg/L		107	85 - 115	0	20	
Molybdenum	0.100	0.100		mg/L		100	85 - 115	3	20	

**Lab Sample ID: LCSD 550-186279/3-A**  
**Matrix: Water**  
**Analysis Batch: 187247**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	%Rec. RPD Limit	
Arsenic	0.100	0.0977		mg/L		98	85 - 115	4	20	
Chromium	0.100	0.0871		mg/L		87	85 - 115	14	20	
Cobalt	0.100	0.0905		mg/L		91	85 - 115	4	20	

**Lab Sample ID: LCSD 550-186279/3-A**  
**Matrix: Water**  
**Analysis Batch: 187261**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	%Rec. RPD Limit	
Arsenic	0.100	0.0927		mg/L		93	85 - 115	6	20	
Cobalt	0.100	0.0906		mg/L		91	85 - 115	0	20	

**Lab Sample ID: 550-127722-4 MS**  
**Matrix: Water**  
**Analysis Batch: 186672**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits	%Rec. RPD Limit	
Thallium	ND		0.100	0.0880		mg/L		88	70 - 130		

**Lab Sample ID: 550-127722-4 MS**  
**Matrix: Water**  
**Analysis Batch: 186686**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits	%Rec. RPD Limit	
Barium	0.067		0.100	0.178		mg/L		110	70 - 130		
Molybdenum	0.0028		0.100	0.105		mg/L		102	70 - 130		

**Lab Sample ID: 550-127722-4 MS**  
**Matrix: Water**  
**Analysis Batch: 187247**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits	%Rec. RPD Limit	
Arsenic	0.0031		0.100	0.104		mg/L		100	70 - 130		
Chromium	0.0037		0.100	0.0887		mg/L		85	70 - 130		
Cobalt	ND		0.100	0.0853		mg/L		85	70 - 130		

**Lab Sample ID: 550-127722-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 186672**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
											%Rec.
Thallium	ND		0.100	0.0850		mg/L		85	70 - 130	4	20

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: 550-127722-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 186686**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	0.067		0.100	0.178		mg/L		111	70 - 130	1	20
Molybdenum	0.0028		0.100	0.106		mg/L		103	70 - 130	1	20

**Lab Sample ID: 550-127722-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 187247**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**  
**Prep Batch: 186279**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.0031		0.100	0.105		mg/L		102	70 - 130	2	20
Chromium	0.0037		0.100	0.0896		mg/L		86	70 - 130	1	20
Cobalt	ND		0.100	0.0857		mg/L		85	70 - 130	0	20

**Lab Sample ID: MB 550-187542/1-A**  
**Matrix: Water**  
**Analysis Batch: 188115**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		08/24/19 12:44	08/30/19 01:00	1

**Lab Sample ID: MB 550-187542/1-A**  
**Matrix: Water**  
**Analysis Batch: 188269**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		08/24/19 12:44	08/31/19 03:28	1

**Lab Sample ID: LCS 550-187542/2-A**  
**Matrix: Water**  
**Analysis Batch: 188115**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	0.100	0.0952		mg/L		95	85 - 115

**Lab Sample ID: LCS 550-187542/2-A**  
**Matrix: Water**  
**Analysis Batch: 188269**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	0.100	0.0964		mg/L		96	85 - 115

**Lab Sample ID: LCSD 550-187542/3-A**  
**Matrix: Water**  
**Analysis Batch: 188115**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	0.100	0.0927		mg/L		93	85 - 115	3	20

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCSD 550-187542/3-A**  
**Matrix: Water**  
**Analysis Batch: 188269**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	0.100	0.0929		mg/L		93	85 - 115	4	20

**Lab Sample ID: 550-127546-B-2-C MS ^T**  
**Matrix: Water**  
**Analysis Batch: 188269**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	0.0052		0.100	0.0998		mg/L		95	70 - 130

**Lab Sample ID: 550-127546-B-2-D MSD ^T**  
**Matrix: Water**  
**Analysis Batch: 188269**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 187542**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	0.0052		0.100	0.101		mg/L		96	70 - 130	1	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-186709/1**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			08/16/19 10:02	1

**Lab Sample ID: LCS 550-186709/2**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	960		mg/L		96	90 - 110

**Lab Sample ID: LCSD 550-186709/3**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	1000		mg/L		100	90 - 110	4	10

**Lab Sample ID: 550-127722-4 DU**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	5300	D2	5490	D2	mg/L		4	10

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-186615/13**  
**Matrix: Water**  
**Analysis Batch: 186615**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		99.9	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-186615/25**  
**Matrix: Water**  
**Analysis Batch: 186615**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.9	98.5 - 101.5

**Lab Sample ID: 550-127722-4 DU**  
**Matrix: Water**  
**Analysis Batch: 186615**

**Client Sample ID: CH-CCR-M62A-8919**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.3	H5	7.3	H5	SU		0	5
Temperature	13.7	H5	14.0	H5	Degrees C		2	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## HPLC/IC

### Analysis Batch: 187023

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	300.0	
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	300.0	
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	300.0	
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	300.0	
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	300.0	
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	300.0	
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	300.0	
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	300.0	
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	300.0	
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	300.0	
MB 550-187023/2	Method Blank	Total/NA	Water	300.0	
LCS 550-187023/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-187023/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-127722-4 MS	CH-CCR-M62A-8919	Total/NA	Water	300.0	
550-127722-4 MS	CH-CCR-M62A-8919	Total/NA	Water	300.0	
550-127722-4 MSD	CH-CCR-M62A-8919	Total/NA	Water	300.0	
550-127722-4 MSD	CH-CCR-M62A-8919	Total/NA	Water	300.0	
550-127723-A-6 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-127723-A-6 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-127723-A-6 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-127723-A-6 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 186279

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.8	
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.8	
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.8	
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	200.8	
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.8	
MB 550-186279/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-186279/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-186279/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-127722-4 MS	CH-CCR-M62A-8919	Total/NA	Water	200.8	
550-127722-4 MSD	CH-CCR-M62A-8919	Total/NA	Water	200.8	

### Prep Batch: 186304

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.7	
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.7	
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.7	
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	200.7	
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.7	
MB 550-186304/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-186304/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-186304/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-127542-G-1-A MS	Matrix Spike	Total/NA	Water	200.7	
550-127542-G-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Metals

### Analysis Batch: 186608

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.7 Rev 4.4	186304
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.7 Rev 4.4	186304
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.7 Rev 4.4	186304
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	200.7 Rev 4.4	186304
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.7 Rev 4.4	186304
MB 550-186304/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	186304
LCS 550-186304/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	186304
LCSD 550-186304/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	186304
550-127542-G-1-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	186304
550-127542-G-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	186304

### Analysis Batch: 186672

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.8 LL	186279
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.8 LL	186279
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.8 LL	186279
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.8 LL	186279
MB 550-186279/1-A	Method Blank	Total/NA	Water	200.8 LL	186279
LCS 550-186279/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	186279
LCSD 550-186279/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	186279
550-127722-4 MS	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279
550-127722-4 MSD	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279

### Analysis Batch: 186686

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.8 LL	186279
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.8 LL	186279
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.8 LL	186279
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.8 LL	186279
MB 550-186279/1-A	Method Blank	Total/NA	Water	200.8 LL	186279
LCS 550-186279/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	186279
LCSD 550-186279/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	186279
550-127722-4 MS	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279
550-127722-4 MSD	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279

### Analysis Batch: 187247

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279
MB 550-186279/1-A	Method Blank	Total/NA	Water	200.8 LL	186279
LCS 550-186279/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	186279
LCSD 550-186279/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	186279
550-127722-4 MS	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279
550-127722-4 MSD	CH-CCR-M62A-8919	Total/NA	Water	200.8 LL	186279

### Analysis Batch: 187261

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.8 LL	186279
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.8 LL	186279
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.8 LL	186279

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# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Metals (Continued)

### Analysis Batch: 187261 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.8 LL	186279
MB 550-186279/1-A	Method Blank	Total/NA	Water	200.8 LL	186279
LCS 550-186279/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	186279
LCSD 550-186279/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	186279

### Prep Batch: 187542

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.8	
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.8	
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.8	
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.8	
MB 550-187542/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-187542/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-187542/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-127546-B-2-C MS ^T	Matrix Spike	Total/NA	Water	200.8	
550-127546-B-2-D MSD ^T	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Analysis Batch: 188115

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-187542/1-A	Method Blank	Total/NA	Water	200.8 LL	187542
LCS 550-187542/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	187542
LCSD 550-187542/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	187542

### Analysis Batch: 188134

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	200.8 LL	187542
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	200.8 LL	187542
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	200.8 LL	187542

### Analysis Batch: 188269

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	200.8 LL	187542
MB 550-187542/1-A	Method Blank	Total/NA	Water	200.8 LL	187542
LCS 550-187542/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	187542
LCSD 550-187542/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	187542
550-127546-B-2-C MS ^T	Matrix Spike	Total/NA	Water	200.8 LL	187542
550-127546-B-2-D MSD ^T	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	187542

## General Chemistry

### Analysis Batch: 186615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	SM 4500 H+ B	
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	SM 4500 H+ B	
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	SM 4500 H+ B	
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	SM 4500 H+ B	
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-186615/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-186615/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-127722-4 DU	CH-CCR-M62A-8919	Total/NA	Water	SM 4500 H+ B	



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## General Chemistry

### Analysis Batch: 186709

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127722-1	CH-CCR-M56A-8919	Total/NA	Water	SM 2540C	
550-127722-2	CH-CCR-M57A-8919	Total/NA	Water	SM 2540C	
550-127722-3	CH-CCR-M58A-8919	Total/NA	Water	SM 2540C	
550-127722-4	CH-CCR-M62A-8919	Total/NA	Water	SM 2540C	
550-127722-5	CH-CCR-FD01-8919	Total/NA	Water	SM 2540C	
MB 550-186709/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-186709/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-186709/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-127722-4 DU	CH-CCR-M62A-8919	Total/NA	Water	SM 2540C	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

**Client Sample ID: CH-CCR-M56A-8919**

**Lab Sample ID: 550-127722-1**

**Date Collected: 08/09/19 15:18**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/19/19 21:05	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/19/19 21:24	NEL	TAL PHX
Total/NA	Prep	200.7			186304	08/13/19 14:05	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186608	08/15/19 12:09	SRA	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186672	08/15/19 09:30	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186686	08/16/19 01:39	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	187261	08/21/19 23:57	ARE	TAL PHX
Total/NA	Prep	200.8			187542	08/24/19 12:44	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	188269	08/31/19 03:59	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	186709		YET	TAL PHX
					(Start)	08/16/19 10:02		
					(End)	08/20/19 09:40		
Total/NA	Analysis	SM 4500 H+ B		1	186615	08/15/19 12:25	MRR	TAL PHX

**Client Sample ID: CH-CCR-M57A-8919**

**Lab Sample ID: 550-127722-2**

**Date Collected: 08/09/19 14:12**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/19/19 21:42	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/19/19 22:01	NEL	TAL PHX
Total/NA	Prep	200.7			186304	08/13/19 14:05	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186608	08/15/19 12:13	SRA	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186672	08/15/19 09:32	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186686	08/16/19 01:41	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	187261	08/21/19 23:59	ARE	TAL PHX
Total/NA	Prep	200.8			187542	08/24/19 12:44	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	188134	08/30/19 02:25	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186709		YET	TAL PHX
					(Start)	08/16/19 10:02		
					(End)	08/20/19 09:40		
Total/NA	Analysis	SM 4500 H+ B		1	186615	08/15/19 12:25	MRR	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

**Client Sample ID: CH-CCR-M58A-8919**

**Lab Sample ID: 550-127722-3**

**Date Collected: 08/09/19 13:44**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/19/19 22:19	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/19/19 22:37	NEL	TAL PHX
Total/NA	Prep	200.7			186304	08/13/19 14:05	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186608	08/15/19 12:16	SRA	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186672	08/15/19 09:34	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186686	08/16/19 01:43	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	187261	08/22/19 00:01	ARE	TAL PHX
Total/NA	Prep	200.8			187542	08/24/19 12:44	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	188134	08/30/19 02:27	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186709		YET	TAL PHX
					(Start)	08/16/19 10:02		
					(End)	08/20/19 09:40		
Total/NA	Analysis	SM 4500 H+ B		1	186615	08/15/19 12:25	MRR	TAL PHX

**Client Sample ID: CH-CCR-M62A-8919**

**Lab Sample ID: 550-127722-4**

**Date Collected: 08/09/19 15:51**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	187023	08/19/19 23:33	NEL	TAL PHX
Total/NA	Analysis	300.0		100	187023	08/20/19 00:28	NEL	TAL PHX
Total/NA	Prep	200.7			186304	08/13/19 14:05	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186608	08/15/19 12:20	SRA	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186672	08/15/19 09:27	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186686	08/16/19 01:36	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	187247	08/21/19 05:19	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	186709		YET	TAL PHX
					(Start)	08/16/19 10:02		
					(End)	08/20/19 09:40		
Total/NA	Analysis	SM 4500 H+ B		1	186615	08/15/19 12:25	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD01-8919**

**Lab Sample ID: 550-127722-5**

**Date Collected: 08/09/19 14:12**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	187023	08/20/19 01:23	NEL	TAL PHX
Total/NA	Analysis	300.0		100	187023	08/20/19 01:41	NEL	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

**Client Sample ID: CH-CCR-FD01-8919**

**Lab Sample ID: 550-127722-5**

**Date Collected: 08/09/19 14:12**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			186304	08/13/19 14:05	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186608	08/15/19 12:23	SRA	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186672	08/15/19 09:40	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	186686	08/16/19 01:49	ARE	TAL PHX
Total/NA	Prep	200.8			186279	08/13/19 11:28	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	187261	08/22/19 00:03	ARE	TAL PHX
Total/NA	Prep	200.8			187542	08/24/19 12:44	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	188134	08/30/19 02:29	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186709		YET	TAL PHX
					(Start)	08/16/19 10:02		
					(End)	08/20/19 09:40		
Total/NA	Analysis	SM 4500 H+ B		1	186615	08/15/19 12:25	MRR	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State Program	AZ0728	06-09-20

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127722-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
Phone 602.437.3340 fax 602.454.9303

**Chain of Custody Record**

Regulatory Program:  DW  NPDES  RCRA  Other: **CCR**

127722

**TestAmerica**

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact		Doug Lavraway		928-587-0319		Analysis Turnaround Time		Doug Lavraway		Date:		COC No. _____ of _____ COCs	
4801 Cholla Lake Rd		Joseph City, AZ 86032		Phone (928) 587-0319		FAX (xxx) xxx-xxxx		Project Name:		Site:		Sampler: _____	
P O #		Sample Identification		Sample Date		Sample Time		Sample Type (C-Comp, G-Grav)		Matrix		# of Cont.	

Sample ID	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	EPA 200.7 (B, Ca, Li)	200.8 (As, Ba, Cr, Co, Mo, Ti)	EPA 300.0 (Cl, F, SO4)	SM 2450C (TDS)	SM 4500HB (pH)
1 CH-CCR-M56A-8919	8/9/2019	1518	G	W	N	X	X	X	X	X	X	X
2 CH-CCR-M57A-8919	8/9/2019	1412	G	W	N	X	X	X	X	X	X	X
3 CH-CCR-M58A-8919	8/9/2019	1344	G	W	N	X	X	X	X	X	X	X
4 CH-CCR-M62A-8919	8/9/2019	1551	G	W	N	X	X	X	X	X	X	X
5 CH-CCR-FD01-8919	8/9/2019	1412	G	W	N	X	X	X	X	X	X	X



**Preservation Used:** 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other \_\_\_\_\_

**Possible Hazard Identification:** Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

**Special Instructions/QC Requirements & Comments:**

Method 200.8 with collision cell

Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No	Custody Seal No.:	Cooler Temp. (°C):	Obsd.:	Therm ID No.:
Relinquished by: <i>Doug Lavraway</i>	Company: <i>APS</i>	Date/Time: <i>8/15/19</i>	Received by: <i>[Signature]</i>	Company: <i>APS</i>
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: <i>[Signature]</i>	Company: <i>APS</i>
Relinquished by:	Company:	Date/Time:		

CRD



# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-127722-1

**Login Number: 127722**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Maycock, Lisa**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-127723-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
Country Rd 6675 Stn 4915  
Fruitland, New Mexico 87416

Attn: Pamela J Norris



Authorized for release by:  
8/26/2019 10:51:08 AM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

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**Job ID: 550-127723-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

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**Narrative**

**Job Narrative  
550-127723-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 8/12/2019 12:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8° C.

**HPLC/IC**

Method(s) 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W301-8919 (550-127723-1), CH-CCR-W304-8819 (550-127723-3), CH-CCR-W307-8819 (550-127723-4) and CH-CCR-W308-8819 (550-127723-5). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**Metals**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**General Chemistry**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
550-127723-1	CH-CCR-W301-8919	Water	08/09/19 11:18	08/12/19 12:40	
550-127723-2	CH-CCR-W302-8919	Water	08/09/19 11:55	08/12/19 12:40	
550-127723-3	CH-CCR-W304-8819	Water	08/08/19 15:02	08/12/19 12:40	
550-127723-4	CH-CCR-W307-8819	Water	08/08/19 14:15	08/12/19 12:40	
550-127723-5	CH-CCR-W308-8819	Water	08/08/19 13:15	08/12/19 12:40	
550-127723-6	CH-CCR-W309-8819	Water	08/08/19 12:05	08/12/19 12:40	
550-127723-7	CH-CCR-W317-8919	Water	08/09/19 12:51	08/12/19 12:40	
550-127723-8	CH-CCR-FD01-8819	Water	08/08/19 12:05	08/12/19 12:40	

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Client Sample ID: CH-CCR-W301-8919

## Lab Sample ID: 550-127723-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6200	D2	400	mg/L	200		300.0	Total/NA
Sulfate	3500	D2	400	mg/L	200		300.0	Total/NA
Boron	0.72		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	810		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	14000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	6.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W302-8919

## Lab Sample ID: 550-127723-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2700	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.80		0.80	mg/L	2		300.0	Total/NA
Sulfate	2300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.66		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	610		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	7700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	6.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W304-8819

## Lab Sample ID: 550-127723-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3200	D2	400	mg/L	200		300.0	Total/NA
Sulfate	3000	D2	400	mg/L	200		300.0	Total/NA
Boron	0.54		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	630		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	8700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W307-8819

## Lab Sample ID: 550-127723-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2600	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2600	D2	400	mg/L	200		300.0	Total/NA
Boron	2.6		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	850		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	7800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W308-8819

## Lab Sample ID: 550-127723-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3000	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2700	D2	400	mg/L	200		300.0	Total/NA
Boron	0.48		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	850		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	8700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Client Sample ID: CH-CCR-W309-8819

## Lab Sample ID: 550-127723-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.1	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3200	D2	400	mg/L	200		300.0	Total/NA
Boron	0.50		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	470		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	7300	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W317-8919

## Lab Sample ID: 550-127723-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1500	D2	200	mg/L	100		300.0	Total/NA
Sulfate	700	D2	200	mg/L	100		300.0	Total/NA
Boron	0.22		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	360		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	3400	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD01-8819

## Lab Sample ID: 550-127723-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.0		0.80	mg/L	2		300.0	Total/NA
Sulfate	3200	D2	400	mg/L	200		300.0	Total/NA
Boron	0.48		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	450		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	7200	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

**Client Sample ID: CH-CCR-W301-8919**

**Lab Sample ID: 550-127723-1**

Date Collected: 08/09/19 11:18

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6200	D2	400	mg/L			08/20/19 02:18	200
Fluoride	ND	D1 D5	0.80	mg/L			08/20/19 02:00	2
Sulfate	3500	D2	400	mg/L			08/20/19 02:18	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.72		0.050	mg/L		08/13/19 14:09	08/20/19 06:31	1
Calcium	810		2.0	mg/L		08/13/19 14:09	08/20/19 06:31	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	14000	D2	200	mg/L			08/16/19 10:02	1
pH	7.2	H5	1.7	SU			08/19/19 13:30	1
Temperature	6.9	H5	0.1	Degrees C			08/19/19 13:30	1

**Client Sample ID: CH-CCR-W302-8919**

**Lab Sample ID: 550-127723-2**

Date Collected: 08/09/19 11:55

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2700	D2	400	mg/L			08/20/19 03:32	200
Fluoride	0.80		0.80	mg/L			08/20/19 03:13	2
Sulfate	2300	D2	400	mg/L			08/20/19 03:32	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.66		0.050	mg/L		08/13/19 14:09	08/20/19 06:35	1
Calcium	610		2.0	mg/L		08/13/19 14:09	08/20/19 06:35	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7700	D2	100	mg/L			08/16/19 10:02	1
pH	7.3	H5	1.7	SU			08/19/19 13:30	1
Temperature	6.8	H5	0.1	Degrees C			08/19/19 13:30	1

**Client Sample ID: CH-CCR-W304-8819**

**Lab Sample ID: 550-127723-3**

Date Collected: 08/08/19 15:02

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3200	D2	400	mg/L			08/20/19 04:09	200
Fluoride	ND	D1 D5	0.80	mg/L			08/20/19 03:50	2
Sulfate	3000	D2	400	mg/L			08/20/19 04:09	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.54		0.050	mg/L		08/13/19 14:09	08/20/19 06:39	1
Calcium	630		2.0	mg/L		08/13/19 14:09	08/20/19 06:39	1

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

**Client Sample ID: CH-CCR-W304-8819**

**Lab Sample ID: 550-127723-3**

Date Collected: 08/08/19 15:02

Matrix: Water

Date Received: 08/12/19 12:40

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	8700	D2	100	mg/L			08/15/19 08:35	1
pH	7.3	H5	1.7	SU			08/19/19 13:30	1
Temperature	7.5	H5	0.1	Degrees C			08/19/19 13:30	1

**Client Sample ID: CH-CCR-W307-8819**

**Lab Sample ID: 550-127723-4**

Date Collected: 08/08/19 14:15

Matrix: Water

Date Received: 08/12/19 12:40

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2600	D2	400	mg/L			08/20/19 04:45	200
Fluoride	ND	D1 D5	0.80	mg/L			08/20/19 04:27	2
Sulfate	2600	D2	400	mg/L			08/20/19 04:45	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.6		0.050	mg/L		08/13/19 14:09	08/20/19 06:48	1
Calcium	850		2.0	mg/L		08/13/19 14:09	08/20/19 06:48	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7800	D2	100	mg/L			08/15/19 08:35	1
pH	7.2	H5	1.7	SU			08/19/19 13:30	1
Temperature	7.9	H5	0.1	Degrees C			08/19/19 13:30	1

**Client Sample ID: CH-CCR-W308-8819**

**Lab Sample ID: 550-127723-5**

Date Collected: 08/08/19 13:15

Matrix: Water

Date Received: 08/12/19 12:40

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3000	D2	400	mg/L			08/20/19 05:22	200
Fluoride	ND	D1 D5	0.80	mg/L			08/20/19 05:04	2
Sulfate	2700	D2	400	mg/L			08/20/19 05:22	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.48		0.050	mg/L		08/13/19 14:09	08/20/19 06:51	1
Calcium	850		2.0	mg/L		08/13/19 14:09	08/20/19 06:51	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	8700	D2	100	mg/L			08/15/19 08:35	1
pH	7.2	H5	1.7	SU			08/19/19 13:30	1
Temperature	8.8	H5	0.1	Degrees C			08/19/19 13:30	1

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

**Client Sample ID: CH-CCR-W309-8819**

**Lab Sample ID: 550-127723-6**

Date Collected: 08/08/19 12:05

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1600	D2	400	mg/L			08/20/19 07:50	200
Fluoride	1.1	D1	0.80	mg/L			08/20/19 06:54	2
Sulfate	3200	D2	400	mg/L			08/20/19 07:50	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.50		0.050	mg/L		08/13/19 14:09	08/20/19 06:55	1
Calcium	470		2.0	mg/L		08/13/19 14:09	08/20/19 06:55	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7300	D2	100	mg/L			08/15/19 08:35	1
pH	7.5	H5	1.7	SU			08/19/19 13:30	1
Temperature	8.8	H5	0.1	Degrees C			08/19/19 13:30	1

**Client Sample ID: CH-CCR-W317-8919**

**Lab Sample ID: 550-127723-7**

Date Collected: 08/09/19 12:51

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1500	D2	200	mg/L			08/20/19 05:59	100
Fluoride	ND		0.40	mg/L			08/20/19 05:41	1
Sulfate	700	D2	200	mg/L			08/20/19 05:59	100

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.22		0.050	mg/L		08/13/19 14:09	08/20/19 06:59	1
Calcium	360		2.0	mg/L		08/13/19 14:09	08/20/19 06:59	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	3400	D2	100	mg/L			08/16/19 10:02	1
pH	7.4	H5	1.7	SU			08/19/19 13:30	1
Temperature	9.2	H5	0.1	Degrees C			08/19/19 13:30	1

**Client Sample ID: CH-CCR-FD01-8819**

**Lab Sample ID: 550-127723-8**

Date Collected: 08/08/19 12:05

Matrix: Water

Date Received: 08/12/19 12:40

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1600	D2	400	mg/L			08/20/19 09:03	200
Fluoride	1.0		0.80	mg/L			08/20/19 08:45	2
Sulfate	3200	D2	400	mg/L			08/20/19 09:03	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.48		0.050	mg/L		08/13/19 14:09	08/20/19 07:02	1
Calcium	450		2.0	mg/L		08/13/19 14:09	08/20/19 07:02	1

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# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

**Client Sample ID: CH-CCR-FD01-8819**

**Lab Sample ID: 550-127723-8**

**Date Collected: 08/08/19 12:05**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7200	D2	100	mg/L			08/15/19 08:35	1
pH	7.5	H5	1.7	SU			08/19/19 13:30	1
Temperature	9.7	H5	0.1	Degrees C			08/19/19 13:30	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-187023/2**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			08/19/19 18:20	1
Fluoride	ND		0.40	mg/L			08/19/19 18:20	1
Sulfate	ND		2.0	mg/L			08/19/19 18:20	1

**Lab Sample ID: LCS 550-187023/5**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.5		mg/L		102	90 - 110
Fluoride	4.00	4.05		mg/L		101	90 - 110
Sulfate	20.0	20.0		mg/L		100	90 - 110

**Lab Sample ID: LCSD 550-187023/6**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.4		mg/L		102	90 - 110	0	20
Fluoride	4.00	4.04		mg/L		101	90 - 110	0	20
Sulfate	20.0	19.9		mg/L		100	90 - 110	0	20

**Lab Sample ID: 550-127722-A-4 MS**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND		4.00	4.34		mg/L		101	80 - 120

**Lab Sample ID: 550-127722-A-4 MS ^100**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	2900	D2	2000	4920	D2	mg/L		102	80 - 120
Sulfate	590	D2	2000	2620	D2	mg/L		102	80 - 120

**Lab Sample ID: 550-127722-A-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND		4.00	4.32		mg/L		100	80 - 120	0	20

**Lab Sample ID: 550-127722-A-4 MSD ^100**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2900	D2	2000	4930	D2	mg/L		103	80 - 120	0	20

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-127722-A-4 MSD ^100**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	590	D2	2000	2640	D2	mg/L		103	80 - 120	1	20

**Lab Sample ID: 550-127723-6 MS**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-W309-8819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.1	D1	8.00	9.08	D1	mg/L		100	80 - 120

**Lab Sample ID: 550-127723-6 MS**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-W309-8819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	1600	D2	4000	5910	D2	mg/L		108	80 - 120
Sulfate	3200	D2	4000	7300	D2	mg/L		102	80 - 120

**Lab Sample ID: 550-127723-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-W309-8819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.1	D1	8.00	9.21	D1	mg/L		102	80 - 120	1	20

**Lab Sample ID: 550-127723-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 187023**

**Client Sample ID: CH-CCR-W309-8819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	1600	D2	4000	5930	D2	mg/L		109	80 - 120	0	20
Sulfate	3200	D2	4000	7330	D2	mg/L		103	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-186308/1-A**  
**Matrix: Water**  
**Analysis Batch: 186998**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 186308**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		08/13/19 14:09	08/20/19 06:12	1
Calcium	ND		2.0	mg/L		08/13/19 14:09	08/20/19 06:12	1

**Lab Sample ID: LCS 550-186308/2-A**  
**Matrix: Water**  
**Analysis Batch: 186998**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 186308**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	1.03		mg/L		103	85 - 115
Calcium	21.0	21.8		mg/L		104	85 - 115



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCSD 550-186308/3-A**  
**Matrix: Water**  
**Analysis Batch: 186998**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 186308**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	1.04		mg/L		104	85 - 115	1	20
Calcium	21.0	22.0		mg/L		105	85 - 115	1	20

**Lab Sample ID: 550-127747-H-1-B MS**  
**Matrix: Water**  
**Analysis Batch: 186998**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 186308**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Boron	ND		1.00	1.09		mg/L		105	70 - 130
Calcium	78		21.0	95.9		mg/L		87	70 - 130

**Lab Sample ID: 550-127747-H-1-C MSD**  
**Matrix: Water**  
**Analysis Batch: 186998**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 186308**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	ND		1.00	1.08		mg/L		104	70 - 130	1	20
Calcium	78		21.0	97.5		mg/L		95	70 - 130	2	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-186558/1**  
**Matrix: Water**  
**Analysis Batch: 186558**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			08/15/19 08:35	1

**Lab Sample ID: LCS 550-186558/2**  
**Matrix: Water**  
**Analysis Batch: 186558**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Total Dissolved Solids	1000	976		mg/L		98	90 - 110

**Lab Sample ID: LCSD 550-186558/3**  
**Matrix: Water**  
**Analysis Batch: 186558**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Total Dissolved Solids	1000	980		mg/L		98	90 - 110	0	10

**Lab Sample ID: 550-127723-6 DU**  
**Matrix: Water**  
**Analysis Batch: 186558**

**Client Sample ID: CH-CCR-W309-8819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Total Dissolved Solids	7300	D2	7130	D2	mg/L		2	10

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# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

**Lab Sample ID: MB 550-186709/1**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			08/16/19 10:02	1

**Lab Sample ID: LCS 550-186709/2**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	960		mg/L		96	90 - 110

**Lab Sample ID: LCSD 550-186709/3**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	1000		mg/L		100	90 - 110	4	10

**Lab Sample ID: 550-127722-A-4 DU**  
**Matrix: Water**  
**Analysis Batch: 186709**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	5300	D2	5490	D2	mg/L		4	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-186902/1**  
**Matrix: Water**  
**Analysis Batch: 186902**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		99.3	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-186902/12**  
**Matrix: Water**  
**Analysis Batch: 186902**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.4	98.5 - 101.5

**Lab Sample ID: 550-127723-6 DU**  
**Matrix: Water**  
**Analysis Batch: 186902**

**Client Sample ID: CH-CCR-W309-8819**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.5	H5	7.4	H5	SU		0.3	5
Temperature	8.8	H5	9.0	H5	Degrees C		2	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## HPLC/IC

### Analysis Batch: 187023

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127723-1	CH-CCR-W301-8919	Total/NA	Water	300.0	
550-127723-1	CH-CCR-W301-8919	Total/NA	Water	300.0	
550-127723-2	CH-CCR-W302-8919	Total/NA	Water	300.0	
550-127723-2	CH-CCR-W302-8919	Total/NA	Water	300.0	
550-127723-3	CH-CCR-W304-8819	Total/NA	Water	300.0	
550-127723-3	CH-CCR-W304-8819	Total/NA	Water	300.0	
550-127723-4	CH-CCR-W307-8819	Total/NA	Water	300.0	
550-127723-4	CH-CCR-W307-8819	Total/NA	Water	300.0	
550-127723-5	CH-CCR-W308-8819	Total/NA	Water	300.0	
550-127723-5	CH-CCR-W308-8819	Total/NA	Water	300.0	
550-127723-6	CH-CCR-W309-8819	Total/NA	Water	300.0	
550-127723-6	CH-CCR-W309-8819	Total/NA	Water	300.0	
550-127723-7	CH-CCR-W317-8919	Total/NA	Water	300.0	
550-127723-7	CH-CCR-W317-8919	Total/NA	Water	300.0	
550-127723-8	CH-CCR-FD01-8819	Total/NA	Water	300.0	
550-127723-8	CH-CCR-FD01-8819	Total/NA	Water	300.0	
MB 550-187023/2	Method Blank	Total/NA	Water	300.0	
LCS 550-187023/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-187023/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-127722-A-4 MS	Matrix Spike	Total/NA	Water	300.0	
550-127722-A-4 MS ^100	Matrix Spike	Total/NA	Water	300.0	
550-127722-A-4 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-127722-A-4 MSD ^100	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-127723-6 MS	CH-CCR-W309-8819	Total/NA	Water	300.0	
550-127723-6 MS	CH-CCR-W309-8819	Total/NA	Water	300.0	
550-127723-6 MSD	CH-CCR-W309-8819	Total/NA	Water	300.0	
550-127723-6 MSD	CH-CCR-W309-8819	Total/NA	Water	300.0	

## Metals

### Prep Batch: 186308

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127723-1	CH-CCR-W301-8919	Total/NA	Water	200.7	
550-127723-2	CH-CCR-W302-8919	Total/NA	Water	200.7	
550-127723-3	CH-CCR-W304-8819	Total/NA	Water	200.7	
550-127723-4	CH-CCR-W307-8819	Total/NA	Water	200.7	
550-127723-5	CH-CCR-W308-8819	Total/NA	Water	200.7	
550-127723-6	CH-CCR-W309-8819	Total/NA	Water	200.7	
550-127723-7	CH-CCR-W317-8919	Total/NA	Water	200.7	
550-127723-8	CH-CCR-FD01-8819	Total/NA	Water	200.7	
MB 550-186308/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-186308/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-186308/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-127747-H-1-B MS	Matrix Spike	Total/NA	Water	200.7	
550-127747-H-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 186998

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127723-1	CH-CCR-W301-8919	Total/NA	Water	200.7 Rev 4.4	186308
550-127723-2	CH-CCR-W302-8919	Total/NA	Water	200.7 Rev 4.4	186308
550-127723-3	CH-CCR-W304-8819	Total/NA	Water	200.7 Rev 4.4	186308

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Metals (Continued)

### Analysis Batch: 186998 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127723-4	CH-CCR-W307-8819	Total/NA	Water	200.7 Rev 4.4	186308
550-127723-5	CH-CCR-W308-8819	Total/NA	Water	200.7 Rev 4.4	186308
550-127723-6	CH-CCR-W309-8819	Total/NA	Water	200.7 Rev 4.4	186308
550-127723-7	CH-CCR-W317-8919	Total/NA	Water	200.7 Rev 4.4	186308
550-127723-8	CH-CCR-FD01-8819	Total/NA	Water	200.7 Rev 4.4	186308
MB 550-186308/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	186308
LCS 550-186308/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	186308
LCSD 550-186308/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	186308
550-127747-H-1-B MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	186308
550-127747-H-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	186308

## General Chemistry

### Analysis Batch: 186558

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127723-3	CH-CCR-W304-8819	Total/NA	Water	SM 2540C	
550-127723-4	CH-CCR-W307-8819	Total/NA	Water	SM 2540C	
550-127723-5	CH-CCR-W308-8819	Total/NA	Water	SM 2540C	
550-127723-6	CH-CCR-W309-8819	Total/NA	Water	SM 2540C	
550-127723-8	CH-CCR-FD01-8819	Total/NA	Water	SM 2540C	
MB 550-186558/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-186558/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-186558/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-127723-6 DU	CH-CCR-W309-8819	Total/NA	Water	SM 2540C	

### Analysis Batch: 186709

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127723-1	CH-CCR-W301-8919	Total/NA	Water	SM 2540C	
550-127723-2	CH-CCR-W302-8919	Total/NA	Water	SM 2540C	
550-127723-7	CH-CCR-W317-8919	Total/NA	Water	SM 2540C	
MB 550-186709/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-186709/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-186709/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-127722-A-4 DU	Duplicate	Total/NA	Water	SM 2540C	

### Analysis Batch: 186902

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-127723-1	CH-CCR-W301-8919	Total/NA	Water	SM 4500 H+ B	
550-127723-2	CH-CCR-W302-8919	Total/NA	Water	SM 4500 H+ B	
550-127723-3	CH-CCR-W304-8819	Total/NA	Water	SM 4500 H+ B	
550-127723-4	CH-CCR-W307-8819	Total/NA	Water	SM 4500 H+ B	
550-127723-5	CH-CCR-W308-8819	Total/NA	Water	SM 4500 H+ B	
550-127723-6	CH-CCR-W309-8819	Total/NA	Water	SM 4500 H+ B	
550-127723-7	CH-CCR-W317-8919	Total/NA	Water	SM 4500 H+ B	
550-127723-8	CH-CCR-FD01-8819	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-186902/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-186902/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-127723-6 DU	CH-CCR-W309-8819	Total/NA	Water	SM 4500 H+ B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

**Client Sample ID: CH-CCR-W301-8919**

**Lab Sample ID: 550-127723-1**

**Date Collected: 08/09/19 11:18**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/20/19 02:00	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/20/19 02:18	NEL	TAL PHX
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 06:31	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186709	(Start) 08/16/19 10:02 (End) 08/20/19 09:40	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Client Sample ID: CH-CCR-W302-8919**

**Lab Sample ID: 550-127723-2**

**Date Collected: 08/09/19 11:55**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/20/19 03:13	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/20/19 03:32	NEL	TAL PHX
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 06:35	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186709	(Start) 08/16/19 10:02 (End) 08/20/19 09:40	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Client Sample ID: CH-CCR-W304-8819**

**Lab Sample ID: 550-127723-3**

**Date Collected: 08/08/19 15:02**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/20/19 03:50	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/20/19 04:09	NEL	TAL PHX
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 06:39	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186558	(Start) 08/15/19 08:35 (End) 08/16/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Client Sample ID: CH-CCR-W307-8819**

**Lab Sample ID: 550-127723-4**

**Date Collected: 08/08/19 14:15**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/20/19 04:27	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/20/19 04:45	NEL	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

**Client Sample ID: CH-CCR-W307-8819**

**Lab Sample ID: 550-127723-4**

**Date Collected: 08/08/19 14:15**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 06:48	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186558	08/15/19 08:35 08/16/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Client Sample ID: CH-CCR-W308-8819**

**Lab Sample ID: 550-127723-5**

**Date Collected: 08/08/19 13:15**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/20/19 05:04	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/20/19 05:22	NEL	TAL PHX
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 06:51	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186558	08/15/19 08:35 08/16/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Client Sample ID: CH-CCR-W309-8819**

**Lab Sample ID: 550-127723-6**

**Date Collected: 08/08/19 12:05**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/20/19 06:54	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/20/19 07:50	NEL	TAL PHX
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 06:55	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186558	08/15/19 08:35 08/16/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Client Sample ID: CH-CCR-W317-8919**

**Lab Sample ID: 550-127723-7**

**Date Collected: 08/09/19 12:51**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	187023	08/20/19 05:41	NEL	TAL PHX
Total/NA	Analysis	300.0		100	187023	08/20/19 05:59	NEL	TAL PHX
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 06:59	SRA	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

**Client Sample ID: CH-CCR-W317-8919**

**Lab Sample ID: 550-127723-7**

**Date Collected: 08/09/19 12:51**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	186709		YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD01-8819**

**Lab Sample ID: 550-127723-8**

**Date Collected: 08/08/19 12:05**

**Matrix: Water**

**Date Received: 08/12/19 12:40**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	187023	08/20/19 08:45	NEL	TAL PHX
Total/NA	Analysis	300.0		200	187023	08/20/19 09:03	NEL	TAL PHX
Total/NA	Prep	200.7			186308	08/13/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	186998	08/20/19 07:02	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	186558		YET	TAL PHX
					(Start)	08/15/19 08:35		
					(End)	08/16/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	186902	08/19/19 13:30	MRR	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State Program	AZ0728	06-09-20

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-127723-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

**Chain of Custody Record**

127723



THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program:  DOW  NPDES  RCRA  Other: **CCR**

**Client Contact**  
APL Cholla  
4801 Cholla Lake Rd  
Joseph City, AZ 86032  
(928) 587-0319  
Phone  
FAX  
Project Name:  
Site:  
P O #

**Doug Lavarnway**  
928-587-0319

**Doug Lavarnway**  
Lab Contact:

**Date:**

**COC No:**

**Analysis Turnaround Time**  
 CALENDAR DAYS  
 WORKING DAYS  
TA T if different from Below

**Carrier:**

**Sampler:**  
**For Lab Use Only:**  
Walk-In Client:  
Lab Sampling:  
Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (G=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	EPA 200.7 (B, Ca)	EPA 300.0 (Cl, F, SO4)	SM 2450C (TDS)	SM 4500HB (pH)
1 CH-CCR-W301-8919	8/9/2019	1118	G	W	N	X	X	X	X		
2 CH-CCR-W302-8919	8/9/19	1155	G	W	N	X	X	X	X		
3 CH-CCR-W304-8819	8/8/19	1502	G	W	N	X	X	X	X		
4 CH-CCR-W307-8819	8/8/19	1415	G	W	N	X	X	X	X		
5 CH-CCR-W308-8819	8/8/19	1315	G	W	N	X	X	X	X		
6 CH-CCR-W309-8819	8/8/19	1205	G	W	N	X	X	X	X		
7 CH-CCR-W317-8919	8/9/19	1251	G	W	N	X	X	X	X		
8 CH-CCR-FD01-8819	8/8/19	1205	G	W	N	X	X	X	X		



550-127723 Chain of Custody

**Preservation Used:** 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

**Possible Hazard Identification:**  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-hazard  Flammable  Skin Irritant  Poison B  Unknown

**Special Instructions/QC Requirements & Comments:**  
Method 200.8 with collision cell

Custody Seals Intact:  Yes  No

Cooler Temp. (°C): Obsd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_

Relinquished by: *Bob Lavarnway*

Received by: *APL* Date/Time: *8/12/2019*

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_

Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-127723-1

**Login Number: 127723**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Maycock, Lisa**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-132142-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
PO BOX 188, Ste. 4458  
Joseph City, Arizona 86032

Attn: Jim Edwards



Authorized for release by:  
11/5/2019 1:43:37 PM

Ken Baker, Project Manager II  
(602)659-7624  
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### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)



# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

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## Job ID: 550-132142-1

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Laboratory: Eurofins TestAmerica, Phoenix

### Narrative

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#### Job Narrative 550-132142-1

### Comments

No additional comments.

### Receipt

The samples were received on 10/25/2019 10:08 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 6.4° C.

### Receipt Exceptions

The following samples were received at the laboratory outside the required temperature criteria: CH-CCR-M54-102219 (550-132142-1), CH-CCR-M54-102219 (550-132142-1[DU]), CH-CCR-M54-102219 (550-132142-1[MS]), CH-CCR-M54-102219 (550-132142-1[MSD]), CH-CCR-M59-102319 (550-132142-2), CH-CCR-M60-102219 (550-132142-3), CH-CCR-M61-102219 (550-132142-4) and CH-CCR-FD01-102319 (550-132142-5). The client was contacted regarding this issue, and the laboratory was instructed to <CHOOSE\_ONE> proceed with/cancel analysis.

### HPLC/IC

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

### Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
550-132142-1	CH-CCR-M54-102219	Water	10/22/19 11:49	10/25/19 10:08	
550-132142-2	CH-CCR-M59-102319	Water	10/23/19 10:57	10/25/19 10:08	
550-132142-3	CH-CCR-M60-102219	Water	10/22/19 14:07	10/25/19 10:08	
550-132142-4	CH-CCR-M61-102219	Water	10/22/19 15:17	10/25/19 10:08	
550-132142-5	CH-CCR-FD01-102319	Water	10/23/19 10:57	10/25/19 10:08	

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## Client Sample ID: CH-CCR-M54-102319

## Lab Sample ID: 550-132142-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1500	D2	100	mg/L	50		300.0	Total/NA
Fluoride	1.3		0.40	mg/L	1		300.0	Total/NA
Sulfate	350	D2	100	mg/L	50		300.0	Total/NA
Boron	0.49		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	95		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	2900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M59-102319

## Lab Sample ID: 550-132142-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	100	mg/L	50		300.0	Total/NA
Fluoride	1.3		0.40	mg/L	1		300.0	Total/NA
Sulfate	350	D2	100	mg/L	50		300.0	Total/NA
Boron	0.48		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	84		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	2800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M60-102319

## Lab Sample ID: 550-132142-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	100	mg/L	50		300.0	Total/NA
Fluoride	1.4		0.40	mg/L	1		300.0	Total/NA
Sulfate	360	D2	100	mg/L	50		300.0	Total/NA
Boron	0.50		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	85		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	2800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.6	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M61-102319

## Lab Sample ID: 550-132142-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	100	mg/L	50		300.0	Total/NA
Fluoride	1.4		0.40	mg/L	1		300.0	Total/NA
Sulfate	350	D2	100	mg/L	50		300.0	Total/NA
Boron	0.48		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	87		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	2700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	6.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD01-102319

## Lab Sample ID: 550-132142-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	100	mg/L	50		300.0	Total/NA
Fluoride	1.3		0.40	mg/L	1		300.0	Total/NA
Sulfate	350	D2	100	mg/L	50		300.0	Total/NA
Boron	0.48		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	85		2.0	mg/L	1		200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

**Client Sample ID: CH-CCR-FD01-102319 (Continued)**

**Lab Sample ID: 550-132142-5**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	2600	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

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# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

**Client Sample ID: CH-CCR-M54-102219**

**Lab Sample ID: 550-132142-1**

Date Collected: 10/22/19 11:49

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1500	D2	100	mg/L			10/29/19 20:57	50
Fluoride	1.3		0.40	mg/L			10/29/19 20:02	1
Sulfate	350	D2	100	mg/L			10/29/19 20:57	50

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.49		0.050	mg/L		10/26/19 10:38	10/29/19 18:30	1
Calcium	95		2.0	mg/L		10/26/19 10:38	10/29/19 18:30	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2900	D2	100	mg/L			10/28/19 09:32	1
pH	7.4	H5	1.7	SU			10/31/19 14:07	1
Temperature	7.5	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-M59-102319**

**Lab Sample ID: 550-132142-2**

Date Collected: 10/23/19 10:57

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1400	D2	100	mg/L			10/29/19 22:11	50
Fluoride	1.3		0.40	mg/L			10/29/19 21:53	1
Sulfate	350	D2	100	mg/L			10/29/19 22:11	50

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.48		0.050	mg/L		10/26/19 10:38	10/29/19 18:34	1
Calcium	84		2.0	mg/L		10/26/19 10:38	10/29/19 18:34	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2800	D2	100	mg/L			10/28/19 09:32	1
pH	7.5	H5	1.7	SU			10/31/19 14:07	1
Temperature	7.7	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-M60-102219**

**Lab Sample ID: 550-132142-3**

Date Collected: 10/22/19 14:07

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1400	D2	100	mg/L			10/29/19 22:48	50
Fluoride	1.4		0.40	mg/L			10/29/19 22:30	1
Sulfate	360	D2	100	mg/L			10/29/19 22:48	50

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.50		0.050	mg/L		10/26/19 10:38	10/29/19 18:38	1
Calcium	85		2.0	mg/L		10/26/19 10:38	10/29/19 18:38	1

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

**Client Sample ID: CH-CCR-M60-102219**

**Lab Sample ID: 550-132142-3**

Date Collected: 10/22/19 14:07

Matrix: Water

Date Received: 10/25/19 10:08

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2800	D2	100	mg/L			10/28/19 09:32	1
pH	7.6	H5	1.7	SU			10/31/19 14:07	1
Temperature	7.8	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-M61-102219**

**Lab Sample ID: 550-132142-4**

Date Collected: 10/22/19 15:17

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1400	D2	100	mg/L			10/30/19 00:02	50
Fluoride	1.4		0.40	mg/L			10/29/19 23:43	1
Sulfate	350	D2	100	mg/L			10/30/19 00:02	50

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.48		0.050	mg/L		10/26/19 10:38	10/29/19 18:41	1
Calcium	87		2.0	mg/L		10/26/19 10:38	10/29/19 18:41	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2700	D2	100	mg/L			10/28/19 09:32	1
pH	7.8	H5	1.7	SU			10/31/19 14:07	1
Temperature	6.7	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-FD01-102319**

**Lab Sample ID: 550-132142-5**

Date Collected: 10/23/19 10:57

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1400	D2	100	mg/L			10/30/19 00:38	50
Fluoride	1.3		0.40	mg/L			10/30/19 00:20	1
Sulfate	350	D2	100	mg/L			10/30/19 00:38	50

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.48		0.050	mg/L		10/26/19 10:38	10/29/19 18:45	1
Calcium	85		2.0	mg/L		10/26/19 10:38	10/29/19 18:45	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2600	D2	100	mg/L			10/28/19 09:32	1
pH	7.8	H5	1.7	SU			10/31/19 14:07	1
Temperature	7.9	H5	0.1	Degrees C			10/31/19 14:07	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-193979/2**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			10/29/19 18:30	1
Fluoride	ND		0.40	mg/L			10/29/19 18:30	1
Sulfate	ND		2.0	mg/L			10/29/19 18:30	1

**Lab Sample ID: LCS 550-193979/5**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.0		mg/L		105	90 - 110
Fluoride	4.00	4.11		mg/L		103	90 - 110
Sulfate	20.0	20.5		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-193979/6**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.1		mg/L		105	90 - 110	0	20
Fluoride	4.00	4.13		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.6		mg/L		103	90 - 110	0	20

**Lab Sample ID: 550-132142-1 MS**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M54-102219**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.3		4.00	5.30		mg/L		99	80 - 120

**Lab Sample ID: 550-132142-1 MS**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M54-102219**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	1500	D2	1000	2580	D2	mg/L		105	80 - 120
Sulfate	350	D2	1000	1410	D2	mg/L		105	80 - 120

**Lab Sample ID: 550-132142-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M54-102219**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.3		4.00	5.37		mg/L		101	80 - 120	1	20

**Lab Sample ID: 550-132142-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M54-102219**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	1500	D2	1000	2580	D2	mg/L		106	80 - 120	0	20

Eurofins TestAmerica, Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-132142-1 MSD  
Matrix: Water  
Analysis Batch: 193979

Client Sample ID: CH-CCR-M54-102219  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	350	D2	1000	1410	D2	mg/L		106	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-193615/1-A  
Matrix: Water  
Analysis Batch: 193957

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 193615

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		10/26/19 10:38	10/29/19 18:15	1
Calcium	ND		2.0	mg/L		10/26/19 10:38	10/29/19 18:15	1

Lab Sample ID: LCS 550-193615/2-A  
Matrix: Water  
Analysis Batch: 193957

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 193615

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.938		mg/L		94	85 - 115
Calcium	21.0	20.4		mg/L		97	85 - 115

Lab Sample ID: LCSD 550-193615/3-A  
Matrix: Water  
Analysis Batch: 193957

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA  
Prep Batch: 193615

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.948		mg/L		95	85 - 115	1	20
Calcium	21.0	20.6		mg/L		98	85 - 115	1	20

Lab Sample ID: 550-132142-1 MS  
Matrix: Water  
Analysis Batch: 193957

Client Sample ID: CH-CCR-M54-102219  
Prep Type: Total/NA  
Prep Batch: 193615

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.49		1.00	1.47		mg/L		98	70 - 130
Calcium	95		21.0	113	M3	mg/L		85	70 - 130

Lab Sample ID: 550-132142-1 MSD  
Matrix: Water  
Analysis Batch: 193957

Client Sample ID: CH-CCR-M54-102219  
Prep Type: Total/NA  
Prep Batch: 193615

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.49		1.00	1.45		mg/L		96	70 - 130	1	20
Calcium	95		21.0	110	M3	mg/L		73	70 - 130	2	20

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-193702/1  
Matrix: Water  
Analysis Batch: 193702

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			10/28/19 09:32	1

Lab Sample ID: LCS 550-193702/2  
Matrix: Water  
Analysis Batch: 193702

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	996		mg/L		100	90 - 110

Lab Sample ID: LCSD 550-193702/3  
Matrix: Water  
Analysis Batch: 193702

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	978		mg/L		98	90 - 110	2	10

Lab Sample ID: 550-132142-1 DU  
Matrix: Water  
Analysis Batch: 193702

Client Sample ID: CH-CCR-M54-102219  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	2900	D2	2840	D2	mg/L		0.7	10

## Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-194181/1  
Matrix: Water  
Analysis Batch: 194181

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.6	98.5 - 101.5

Lab Sample ID: LCSSRM 550-194181/12  
Matrix: Water  
Analysis Batch: 194181

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.7	98.5 - 101.5

Lab Sample ID: 550-132142-1 DU  
Matrix: Water  
Analysis Batch: 194181

Client Sample ID: CH-CCR-M54-102219  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.4	H5	7.4	H5	SU		0.3	5
Temperature	7.5	H5	7.6	H5	Degrees C		1	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## HPLC/IC

### Analysis Batch: 193979

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132142-1	CH-CCR-M54-102219	Total/NA	Water	300.0	
550-132142-1	CH-CCR-M54-102219	Total/NA	Water	300.0	
550-132142-2	CH-CCR-M59-102319	Total/NA	Water	300.0	
550-132142-2	CH-CCR-M59-102319	Total/NA	Water	300.0	
550-132142-3	CH-CCR-M60-102219	Total/NA	Water	300.0	
550-132142-3	CH-CCR-M60-102219	Total/NA	Water	300.0	
550-132142-4	CH-CCR-M61-102219	Total/NA	Water	300.0	
550-132142-4	CH-CCR-M61-102219	Total/NA	Water	300.0	
550-132142-5	CH-CCR-FD01-102319	Total/NA	Water	300.0	
550-132142-5	CH-CCR-FD01-102319	Total/NA	Water	300.0	
MB 550-193979/2	Method Blank	Total/NA	Water	300.0	
LCS 550-193979/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-193979/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-132142-1 MS	CH-CCR-M54-102219	Total/NA	Water	300.0	
550-132142-1 MS	CH-CCR-M54-102219	Total/NA	Water	300.0	
550-132142-1 MSD	CH-CCR-M54-102219	Total/NA	Water	300.0	
550-132142-1 MSD	CH-CCR-M54-102219	Total/NA	Water	300.0	

## Metals

### Prep Batch: 193615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132142-1	CH-CCR-M54-102219	Total/NA	Water	200.7	
550-132142-2	CH-CCR-M59-102319	Total/NA	Water	200.7	
550-132142-3	CH-CCR-M60-102219	Total/NA	Water	200.7	
550-132142-4	CH-CCR-M61-102219	Total/NA	Water	200.7	
550-132142-5	CH-CCR-FD01-102319	Total/NA	Water	200.7	
MB 550-193615/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-193615/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-193615/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-132142-1 MS	CH-CCR-M54-102219	Total/NA	Water	200.7	
550-132142-1 MSD	CH-CCR-M54-102219	Total/NA	Water	200.7	

### Analysis Batch: 193957

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132142-1	CH-CCR-M54-102219	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-2	CH-CCR-M59-102319	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-3	CH-CCR-M60-102219	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-4	CH-CCR-M61-102219	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-5	CH-CCR-FD01-102319	Total/NA	Water	200.7 Rev 4.4	193615
MB 550-193615/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	193615
LCS 550-193615/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	193615
LCSD 550-193615/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-1 MS	CH-CCR-M54-102219	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-1 MSD	CH-CCR-M54-102219	Total/NA	Water	200.7 Rev 4.4	193615

## General Chemistry

### Analysis Batch: 193702

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132142-1	CH-CCR-M54-102219	Total/NA	Water	SM 2540C	
550-132142-2	CH-CCR-M59-102319	Total/NA	Water	SM 2540C	

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## General Chemistry (Continued)

### Analysis Batch: 193702 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132142-3	CH-CCR-M60-102219	Total/NA	Water	SM 2540C	
550-132142-4	CH-CCR-M61-102219	Total/NA	Water	SM 2540C	
550-132142-5	CH-CCR-FD01-102319	Total/NA	Water	SM 2540C	
MB 550-193702/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-193702/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-193702/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-132142-1 DU	CH-CCR-M54-102219	Total/NA	Water	SM 2540C	

### Analysis Batch: 194181

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132142-1	CH-CCR-M54-102219	Total/NA	Water	SM 4500 H+ B	
550-132142-2	CH-CCR-M59-102319	Total/NA	Water	SM 4500 H+ B	
550-132142-3	CH-CCR-M60-102219	Total/NA	Water	SM 4500 H+ B	
550-132142-4	CH-CCR-M61-102219	Total/NA	Water	SM 4500 H+ B	
550-132142-5	CH-CCR-FD01-102319	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-194181/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-194181/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-132142-1 DU	CH-CCR-M54-102219	Total/NA	Water	SM 4500 H+ B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

**Client Sample ID: CH-CCR-M54-102219**

**Lab Sample ID: 550-132142-1**

**Date Collected: 10/22/19 11:49**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	193979	10/29/19 20:02	NEL	TAL PHX
Total/NA	Analysis	300.0		50	193979	10/29/19 20:57	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 18:30	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-M59-102319**

**Lab Sample ID: 550-132142-2**

**Date Collected: 10/23/19 10:57**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	193979	10/29/19 21:53	NEL	TAL PHX
Total/NA	Analysis	300.0		50	193979	10/29/19 22:11	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 18:34	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-M60-102219**

**Lab Sample ID: 550-132142-3**

**Date Collected: 10/22/19 14:07**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	193979	10/29/19 22:30	NEL	TAL PHX
Total/NA	Analysis	300.0		50	193979	10/29/19 22:48	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 18:38	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-M61-102219**

**Lab Sample ID: 550-132142-4**

**Date Collected: 10/22/19 15:17**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	193979	10/29/19 23:43	NEL	TAL PHX
Total/NA	Analysis	300.0		50	193979	10/30/19 00:02	NEL	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

**Client Sample ID: CH-CCR-M61-102219**

**Lab Sample ID: 550-132142-4**

**Date Collected: 10/22/19 15:17**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 18:41	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	10/28/19 09:32 (Start) 10/29/19 10:55 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-FD01-102319**

**Lab Sample ID: 550-132142-5**

**Date Collected: 10/23/19 10:57**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	193979	10/30/19 00:20	NEL	TAL PHX
Total/NA	Analysis	300.0		50	193979	10/30/19 00:38	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 18:45	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	10/28/19 09:32 (Start) 10/29/19 10:55 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State Program	AZ0728	06-09-20

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14



# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-132142-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**TestAmerica Phoenix**  
 4625 E Cotton Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

**TestAmerica**  
 THE LEADER IN ENVIRONMENTAL TESTING  
**TestAmerica Laboratories, Inc.**

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

COC No: \_\_\_\_\_ of \_\_\_\_\_ COCs

Client Contact: **Jim Edwards** 928-587-0319  
 Date: \_\_\_\_\_ Carrier: \_\_\_\_\_

Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below: \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Sampler: \_\_\_\_\_  
 For Lab Use Only: \_\_\_\_\_  
 Walk-in Client: \_\_\_\_\_  
 Lab Sampling: \_\_\_\_\_  
 Job / SDG No.: \_\_\_\_\_

Sample Identification

Sample ID	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 (B, Ca)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)
14 CH-CR-M54- <del>102219</del> 102219	10/22/19	11:19	G	W	4	N	X	X	X	X	X
2 CH-CR-M59-102319	10/23/19	10:57	G	W	4	N	X	X	X	X	X
3 CH-CR-M60- <del>102219</del> 102219	10/22/19	14:07	G	W	4	N	X	X	X	X	X
4 CH-CR-M61-102219	10/22/19	15:17	G	W	4	N	X	X	X	X	X
5 CH-CR-FD-01- <del>102319</del> 102319	10/23/19	10:57	G	W	4	N	X	X	X	X	X

Sample Specific Notes: low flow



Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other \_\_\_\_\_

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments: Method 200.8 with collision cell

Special Instructions/QC Requirements & Comments: 6.9 orlu

Custody Seals Intact:  Yes  No  
 Relinquished by: Isaac Torres  
 Relinquished by: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_

Company: \_\_\_\_\_  
 Date/Time: 10/23/19 @ 1008  
 Received by: \_\_\_\_\_  
 Received in Laboratory by: \_\_\_\_\_  
 Company: TAPNB  
 Date/Time: 10/23/19 1008

CLD

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-132142-1

**Login Number: 132142**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Maycock, Lisa**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-132146-1

Laboratory Sample Delivery Group: APS Cholla Power Plant  
Client Project/Site: 2019 Semi Annual Sampling Event

**For:**

Arizona Public Service Company  
PO BOX 188, Ste. 4458  
Joseph City, Arizona 86032

Attn: Jim Edwards



Authorized for release by:  
11/25/2019 4:11:57 PM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
SDG: APS Cholla Power Plant

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
B3	Target analyte detected in calibration blank at or above the method reporting limit.
D1	Sample required dilution due to matrix.
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
SDG: APS Cholla Power Plant

**Job ID: 550-132146-1**

**Laboratory: Eurofins TestAmerica, Phoenix**

## Narrative

### Job Narrative 550-132146-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 10/25/2019 10:08 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 3.9° C and 6.8° C.

#### Receipt Exceptions

The following samples were received at the laboratory outside the required temperature criteria: CH-CCR-M52A-102419 (550-132146-1), CH-CCR-M53A-102319 (550-132146-2), CH-CCR-W305-102319 (550-132146-3), CH-CCR-W306-102319 (550-132146-4), CH-CCR-W314-102419 (550-132146-5), CH-CCR-M64A-102419 (550-132146-6), CH-CCR-M64A-102419 (550-132146-6[DUJ]), CH-CCR-M64A-102419 (550-132146-6[MSJ]), CH-CCR-M64A-102419 (550-132146-6[MSD]), CH-CCR-FD01-102319 (550-132146-7), CH-CCR-M55A-102419 (550-132146-8), CH-CCR-W301-102319 (550-132146-9), CH-CCR-W302-102319 (550-132146-10), CH-CCR-W304-102419 (550-132146-11), CH-CCR-W307-102419 (550-132146-12), CH-CCR-W308-102419 (550-132146-13), CH-CCR-W309-102419 (550-132146-14), CH-CCR-W317-102419 (550-132146-15) and CH-CCR-FD02-102419 (550-132146-16). The client was contacted regarding this issue, and the laboratory was instructed to <CHOOSE\_ONE> proceed with/cancel analysis.

Note: 1 of 2 coolers came in over temp when received. The analyst did not immediately mark which samples were received out of temp. When questioned he was able to determine which ones came in which cooler based on his memory and how the samples were grouped. He marked the COC accordingly and that information has been entered into TALS.

#### HPLC/IC

Method 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W305-102319 (550-132146-3), CH-CCR-W314-102419 (550-132146-5) and CH-CCR-M64A-102419 (550-132146-6). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

Method 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-FD01-102319 (550-132146-7), CH-CCR-M55A-102419 (550-132146-8), CH-CCR-W301-102319 (550-132146-9), CH-CCR-W304-102419 (550-132146-11), CH-CCR-W307-102419 (550-132146-12), CH-CCR-W308-102419 (550-132146-13) and CH-CCR-FD02-102419 (550-132146-16). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method 200.8 LL: The continuing calibration blank (CCB) for analytical batch 550-194052 contained thallium above the reporting limit (RL). All reported samples associated with this CCB were either ND for this analyte or contained this analyte at a concentration greater than 10X the value found in the CCB; therefore, re-analysis of samples was not performed.

Method 200.8 LL: The following sample was diluted due to the nature of the sample matrix: CH-CCR-M64A-102419 (550-132146-6). Elevated reporting limits (RLs) are provided.

Method 200.8 LL: The continuing calibration blank (CCB) for analytical batch 550-196232 contained selenium above the reporting limit (RL). All reported samples associated with this CCB were either ND for this analyte or contained this analyte at a concentration greater than 10X the value found in the CCB; therefore, re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### General Chemistry



# Case Narrative

Client: Arizona Public Service Company  
Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
SDG: APS Cholla Power Plant

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## Job ID: 550-132146-1 (Continued)

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### Laboratory: Eurofins TestAmerica, Phoenix (Continued)

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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# Sample Summary

Client: Arizona Public Service Company  
Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
SDG: APS Cholla Power Plant

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
550-132146-1	CH-CCR-M52A-102419	Water	10/24/19 07:47	10/25/19 10:08	
550-132146-2	CH-CCR-M53A-102319	Water	10/23/19 14:45	10/25/19 10:08	
550-132146-3	CH-CCR-W305-102319	Water	10/23/19 15:32	10/25/19 10:08	
550-132146-4	CH-CCR-W306-102319	Water	10/23/19 16:17	10/25/19 10:08	
550-132146-5	CH-CCR-W314-102419	Water	10/24/19 08:53	10/25/19 10:08	
550-132146-6	CH-CCR-M64A-102419	Water	10/24/19 14:53	10/25/19 10:08	
550-132146-7	CH-CCR-FD01-102319	Water	10/23/19 15:32	10/25/19 10:08	
550-132146-8	CH-CCR-M55A-102419	Water	10/24/19 12:18	10/25/19 10:08	
550-132146-9	CH-CCR-W301-102319	Water	10/23/19 14:02	10/25/19 10:08	
550-132146-10	CH-CCR-W302-102319	Water	10/23/19 12:19	10/25/19 10:08	
550-132146-11	CH-CCR-W304-102419	Water	10/24/19 09:20	10/25/19 10:08	
550-132146-12	CH-CCR-W307-102419	Water	10/24/19 10:06	10/25/19 10:08	
550-132146-13	CH-CCR-W308-102419	Water	10/24/19 10:55	10/25/19 10:08	
550-132146-14	CH-CCR-W309-102419	Water	10/24/19 11:38	10/25/19 10:08	
550-132146-15	CH-CCR-W317-102419	Water	10/24/19 13:50	10/25/19 10:08	
550-132146-16	CH-CCR-FD02-102419	Water	10/24/19 09:20	10/25/19 10:08	

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-M52A-102419**

**Lab Sample ID: 550-132146-1**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3400	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.91	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	3.2		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	760		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.22		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0012	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.017	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cadmium	0.0019	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Chromium	0.024	D1	0.0020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.070	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.078	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.0011	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	9300	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.0	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

**Client Sample ID: CH-CCR-M53A-102319**

**Lab Sample ID: 550-132146-2**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2200	D2	400	mg/L	200		300.0	Total/NA
Fluoride	2.2	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	3.3		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	590		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0018	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.0099	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cadmium	0.0015	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.013	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.044	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.0011	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Thallium	0.00022	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	7900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

**Client Sample ID: CH-CCR-W305-102319**

**Lab Sample ID: 550-132146-3**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2400	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.34		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	690		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.20		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0019	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.014	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cadmium	0.00022	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.018	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Lead	0.0026	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.023	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Thallium	0.00024	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	7000	D2	100	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Client Sample ID: CH-CCR-W305-102319 (Continued)

## Lab Sample ID: 550-132146-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W306-102319

## Lab Sample ID: 550-132146-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1900	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	13000	D2	400	mg/L	200		300.0	Total/NA
Boron	1.0		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	380		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.70		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0060	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.013	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cadmium	0.00021	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.0029	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.039	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.0023	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Total Dissolved Solids	19000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W314-102419

## Lab Sample ID: 550-132146-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2700	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2200	D2	400	mg/L	200		300.0	Total/NA
Boron	1.2		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	750		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.30		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0015	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.013	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cadmium	0.00036	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Chromium	0.0081	D1	0.0020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.019	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.011	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	7400	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.3	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M64A-102419

## Lab Sample ID: 550-132146-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	8400	D2	400	mg/L	200		300.0	Total/NA
Sulfate	8600	D2	400	mg/L	200		300.0	Total/NA
Boron	1.2		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	460	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.26		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0018	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.013	D1 M1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.0059	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	13000	D2	200	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Client Sample ID: CH-CCR-M64A-102419 (Continued)

## Lab Sample ID: 550-132146-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD01-102319

## Lab Sample ID: 550-132146-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2300	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2400	D2	400	mg/L	200		300.0	Total/NA
Boron	0.34		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	680		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.20		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0015	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.013	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cadmium	0.00021	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.018	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Lead	0.0025	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.022	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	7100	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.3	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M55A-102419

## Lab Sample ID: 550-132146-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4300	D2	400	mg/L	200		300.0	Total/NA
Sulfate	3400	D2	400	mg/L	200		300.0	Total/NA
Boron	0.40		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	670		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.38		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0023	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.016	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Chromium	0.0044	D1	0.0020	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.0051	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.078	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Total Dissolved Solids	12000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	7.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W301-102319

## Lab Sample ID: 550-132146-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6300	D2	400	mg/L	200		300.0	Total/NA
Sulfate	3600	D2	400	mg/L	200		300.0	Total/NA
Boron	0.65		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	760		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.52		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0030	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.0092	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cobalt	0.016	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.0069	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.0056	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Total Dissolved Solids	14000	D2	200	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
SDG: APS Cholla Power Plant

## Client Sample ID: CH-CCR-W301-102319 (Continued)

## Lab Sample ID: 550-132146-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.3	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W302-102319

## Lab Sample ID: 550-132146-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2700	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.80	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.59		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	570		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.32		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0015	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.014	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Chromium	0.019	D1	0.0020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.0055	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.015	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	8000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W304-102419

## Lab Sample ID: 550-132146-11

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3300	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	0.52		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	610		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.45		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0014	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.014	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cobalt	0.0028	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.0042	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.0012	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	9100	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W307-102419

## Lab Sample ID: 550-132146-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2800	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2700	D2	400	mg/L	200		300.0	Total/NA
Boron	2.3		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	750		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.23		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.013	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Cadmium	0.00049	D1	0.00020	mg/L	2		200.8 LL	Total/NA
Chromium	0.016	D1	0.0020	mg/L	2		200.8 LL	Total/NA
Cobalt	0.082	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Lead	0.0011	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.011	D1	0.0010	mg/L	2		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Client Sample ID: CH-CCR-W307-102419 (Continued)

## Lab Sample ID: 550-132146-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	8100	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU		1	SM 4500 H+ B	Total/NA
Temperature	8.1	H5	0.1	Degrees C		1	SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W308-102419

## Lab Sample ID: 550-132146-13

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3100	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2800	D2	400	mg/L	200		300.0	Total/NA
Boron	0.45		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	780		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.37		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.0078	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Chromium	0.010	D1	0.0020	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.0025	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.022	B3 D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	8900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU		1	SM 4500 H+ B	Total/NA
Temperature	8.5	H5	0.1	Degrees C		1	SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W309-102419

## Lab Sample ID: 550-132146-14

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.1	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.45		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	430		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.31		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0066	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Barium	0.0079	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Chromium	0.0020	D1	0.0020	mg/L	2		200.8 LL	Total/NA
Molybdenum	0.011	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Selenium	0.18	D1	0.0010	mg/L	2		200.8 LL	Total/NA
Total Dissolved Solids	7100	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU		1	SM 4500 H+ B	Total/NA
Temperature	9.3	H5	0.1	Degrees C		1	SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W317-102419

## Lab Sample ID: 550-132146-15

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	400	mg/L	200		300.0	Total/NA
Sulfate	680	D2	400	mg/L	200		300.0	Total/NA
Boron	0.21		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	340		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0043		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.036		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0012		0.0010	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0046		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	3400	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU		1	SM 4500 H+ B	Total/NA
Temperature	9.5	H5	0.1	Degrees C		1	SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix



# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-FD02-102419**

**Lab Sample ID: 550-132146-16**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3400	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	0.52		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	610		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.45		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.00093		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.015		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0016		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0029		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0036		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	9200	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	8.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-M52A-102419**

**Lab Sample ID: 550-132146-1**

Date Collected: 10/24/19 07:47

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3400	D2	400	mg/L			10/30/19 01:15	200
Fluoride	0.91	D1	0.80	mg/L			10/30/19 00:57	2
Sulfate	2900	D2	400	mg/L			10/30/19 01:15	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 20:10	1
Boron	3.2		0.050	mg/L		10/26/19 10:43	10/29/19 20:10	1
Calcium	760		2.0	mg/L		10/26/19 10:43	10/29/19 20:10	1
Lithium	0.22		0.20	mg/L		10/26/19 10:43	10/29/19 20:10	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 15:59	2
Arsenic	0.0012	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:59	2
Barium	0.017	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:59	2
Cadmium	0.0019	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 15:59	2
Chromium	0.024	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 15:59	2
Cobalt	0.070	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:59	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:59	2
Molybdenum	0.078	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:59	2
Selenium	0.0011	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:59	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 15:59	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:21	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	9300	D2	100	mg/L			10/28/19 09:32	1
pH	7.0	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.1	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-M53A-102319**

**Lab Sample ID: 550-132146-2**

Date Collected: 10/23/19 14:45

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2200	D2	400	mg/L			10/30/19 01:52	200
Fluoride	2.2	D1	0.80	mg/L			10/30/19 01:34	2
Sulfate	2900	D2	400	mg/L			10/30/19 01:52	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:17	1
Boron	3.3		0.050	mg/L		10/26/19 10:38	10/29/19 19:17	1
Calcium	590		2.0	mg/L		10/26/19 10:38	10/29/19 19:17	1
Lithium	ND		0.20	mg/L		10/26/19 10:38	10/29/19 19:17	1

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-M53A-102319**

**Lab Sample ID: 550-132146-2**

Date Collected: 10/23/19 14:45

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:01	2
<b>Arsenic</b>	<b>0.0018</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:01	2
<b>Barium</b>	<b>0.0099</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:01	2
<b>Cadmium</b>	<b>0.0015</b>	<b>D1</b>	0.00020	mg/L		10/28/19 08:40	11/18/19 16:01	2
Chromium	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:01	2
<b>Cobalt</b>	<b>0.013</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:01	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:01	2
<b>Molybdenum</b>	<b>0.044</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:01	2
<b>Selenium</b>	<b>0.0011</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:01	2
<b>Thallium</b>	<b>0.00022</b>	<b>D1</b>	0.00020	mg/L		10/28/19 08:40	11/18/19 16:01	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:22	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Dissolved Solids</b>	<b>7900</b>	<b>D2</b>	100	mg/L			10/28/19 09:32	1
<b>pH</b>	<b>7.5</b>	<b>H5</b>	1.7	SU			10/31/19 14:07	1
<b>Temperature</b>	<b>7.9</b>	<b>H5</b>	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-W305-102319**

**Lab Sample ID: 550-132146-3**

Date Collected: 10/23/19 15:32

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Chloride</b>	<b>2400</b>	<b>D2</b>	400	mg/L			10/30/19 02:29	200
Fluoride	ND	D1 D5	0.80	mg/L			10/30/19 02:10	2
<b>Sulfate</b>	<b>2300</b>	<b>D2</b>	400	mg/L			10/30/19 02:29	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:21	1
<b>Boron</b>	<b>0.34</b>		0.050	mg/L		10/26/19 10:38	10/29/19 19:21	1
<b>Calcium</b>	<b>690</b>		2.0	mg/L		10/26/19 10:38	10/29/19 19:21	1
<b>Lithium</b>	<b>0.20</b>		0.20	mg/L		10/26/19 10:38	10/29/19 19:21	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:03	2
<b>Arsenic</b>	<b>0.0019</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:03	2
<b>Barium</b>	<b>0.014</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:03	2
<b>Cadmium</b>	<b>0.00022</b>	<b>D1</b>	0.00020	mg/L		10/28/19 08:40	11/18/19 16:03	2
Chromium	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:03	2
<b>Cobalt</b>	<b>0.018</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:03	2
<b>Lead</b>	<b>0.0026</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:03	2
<b>Molybdenum</b>	<b>0.023</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:03	2
Selenium	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:03	2
<b>Thallium</b>	<b>0.00024</b>	<b>D1</b>	0.00020	mg/L		10/28/19 08:40	11/18/19 16:03	2

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Client Sample ID: CH-CCR-W305-102319

## Lab Sample ID: 550-132146-3

Date Collected: 10/23/19 15:32

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:24	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7000	D2	100	mg/L			10/28/19 09:32	1
pH	7.3	H5	1.7	SU			10/31/19 14:07	1
Temperature	7.9	H5	0.1	Degrees C			10/31/19 14:07	1

## Client Sample ID: CH-CCR-W306-102319

## Lab Sample ID: 550-132146-4

Date Collected: 10/23/19 16:17

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1900	D2	400	mg/L			10/30/19 03:42	200
Fluoride	1.0	D1	0.80	mg/L			10/30/19 03:24	2
Sulfate	13000	D2	400	mg/L			10/30/19 03:42	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:24	1
Boron	1.0		0.050	mg/L		10/26/19 10:38	10/29/19 19:24	1
Calcium	380		2.0	mg/L		10/26/19 10:38	10/29/19 19:24	1
Lithium	0.70		0.20	mg/L		10/26/19 10:38	10/29/19 19:24	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:09	2
Arsenic	0.0060	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:42	4
Barium	0.013	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:09	2
Cadmium	0.00021	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:09	2
Chromium	ND	D1	0.0040	mg/L		10/28/19 08:40	11/18/19 16:42	4
Cobalt	0.0029	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:42	4
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:09	2
Molybdenum	0.039	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:09	2
Selenium	0.0023	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:42	4
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:09	2

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:25	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	19000	D2	200	mg/L			10/28/19 09:32	1
pH	7.9	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.9	H5	0.1	Degrees C			10/31/19 14:07	1

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W314-102419**

**Lab Sample ID: 550-132146-5**

Date Collected: 10/24/19 08:53

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2700	D2	400	mg/L			10/30/19 04:19	200
Fluoride	ND	D1 D5	0.80	mg/L			10/30/19 04:01	2
Sulfate	2200	D2	400	mg/L			10/30/19 04:19	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 20:06	1
Boron	1.2		0.050	mg/L		10/26/19 10:43	10/29/19 20:06	1
Calcium	750		2.0	mg/L		10/26/19 10:43	10/29/19 20:06	1
Lithium	0.30		0.20	mg/L		10/26/19 10:43	10/29/19 20:06	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:11	2
Arsenic	0.0015	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:11	2
Barium	0.013	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:11	2
Cadmium	0.00036	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:11	2
Chromium	0.0081	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:11	2
Cobalt	0.019	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:11	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:11	2
Molybdenum	0.011	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:11	2
Selenium	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:11	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:11	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:27	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7400	D2	100	mg/L			10/28/19 09:32	1
pH	7.4	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.3	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-M64A-102419**

**Lab Sample ID: 550-132146-6**

Date Collected: 10/24/19 14:53

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	8400	D2	400	mg/L			10/30/19 05:33	200
Fluoride	ND	D1 D5	0.80	mg/L			10/30/19 04:38	2
Sulfate	8600	D2	400	mg/L			10/30/19 05:33	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 20:03	1
Boron	1.2		0.050	mg/L		10/26/19 10:43	10/29/19 20:03	1
Calcium	460	M3	2.0	mg/L		10/26/19 10:43	10/29/19 20:03	1
Lithium	0.26		0.20	mg/L		10/26/19 10:43	10/29/19 20:03	1

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-M64A-102419**

**Lab Sample ID: 550-132146-6**

Date Collected: 10/24/19 14:53

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 15:53	2
<b>Arsenic</b>	<b>0.0018</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 15:53	2
<b>Barium</b>	<b>0.013</b>	<b>D1 M1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 15:53	2
Cadmium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 15:53	2
Chromium	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 15:53	2
Cobalt	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:53	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:53	2
<b>Molybdenum</b>	<b>0.0059</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 15:53	2
Selenium	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 15:53	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 15:53	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:19	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Dissolved Solids</b>	<b>13000</b>	<b>D2</b>	200	mg/L			10/28/19 09:32	1
<b>pH</b>	<b>7.5</b>	<b>H5</b>	1.7	SU			10/31/19 14:07	1
<b>Temperature</b>	<b>7.6</b>	<b>H5</b>	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-FD01-102319**

**Lab Sample ID: 550-132146-7**

Date Collected: 10/23/19 15:32

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Chloride</b>	<b>2300</b>	<b>D2</b>	400	mg/L			10/30/19 21:20	200
Fluoride	ND	D1 D5	0.80	mg/L			10/30/19 21:02	2
<b>Sulfate</b>	<b>2400</b>	<b>D2</b>	400	mg/L			10/30/19 21:20	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:28	1
<b>Boron</b>	<b>0.34</b>		0.050	mg/L		10/26/19 10:38	10/29/19 19:28	1
<b>Calcium</b>	<b>680</b>		2.0	mg/L		10/26/19 10:38	10/29/19 19:28	1
<b>Lithium</b>	<b>0.20</b>		0.20	mg/L		10/26/19 10:38	10/29/19 19:28	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:14	2
<b>Arsenic</b>	<b>0.0015</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:14	2
<b>Barium</b>	<b>0.013</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:14	2
<b>Cadmium</b>	<b>0.00021</b>	<b>D1</b>	0.00020	mg/L		10/28/19 08:40	11/18/19 16:14	2
Chromium	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:14	2
<b>Cobalt</b>	<b>0.018</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:14	2
<b>Lead</b>	<b>0.0025</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:14	2
<b>Molybdenum</b>	<b>0.022</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:14	2
Selenium	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:14	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:14	2

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-FD01-102319**

**Lab Sample ID: 550-132146-7**

Date Collected: 10/23/19 15:32

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:28	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7100	D2	100	mg/L			10/28/19 09:32	1
pH	7.5	H5	1.7	SU			10/31/19 14:07	1
Temperature	7.3	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-M55A-102419**

**Lab Sample ID: 550-132146-8**

Date Collected: 10/24/19 12:18

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4300	D2	400	mg/L			10/30/19 21:57	200
Fluoride	ND	D1 D5	0.80	mg/L			10/30/19 21:39	2
Sulfate	3400	D2	400	mg/L			10/30/19 21:57	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:31	1
Boron	0.40		0.050	mg/L		10/26/19 10:38	10/29/19 19:31	1
Calcium	670		2.0	mg/L		10/26/19 10:38	10/29/19 19:31	1
Lithium	0.38		0.20	mg/L		10/26/19 10:38	10/29/19 19:31	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:16	2
Arsenic	0.0023	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:16	2
Barium	0.016	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:16	2
Cadmium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:16	2
Chromium	0.0044	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:16	2
Cobalt	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:16	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:16	2
Molybdenum	0.0051	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:16	2
Selenium	0.078	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:44	4
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:16	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:30	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	100	mg/L			10/28/19 09:32	1
pH	7.4	H5	1.7	SU			10/31/19 14:07	1
Temperature	7.6	H5	0.1	Degrees C			10/31/19 14:07	1



# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W301-102319**

**Lab Sample ID: 550-132146-9**

Date Collected: 10/23/19 14:02

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6300	D2	400	mg/L			10/30/19 22:34	200
Fluoride	ND	D1 D5	0.80	mg/L			10/30/19 22:16	2
Sulfate	3600	D2	400	mg/L			10/30/19 22:34	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:10	1
Boron	0.65		0.050	mg/L		10/26/19 10:38	10/29/19 19:10	1
Calcium	760		2.0	mg/L		10/26/19 10:38	10/29/19 19:10	1
Lithium	0.52		0.20	mg/L		10/26/19 10:38	10/29/19 19:10	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:18	2
Arsenic	0.0030	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:46	4
Barium	0.0092	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:18	2
Cadmium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:18	2
Chromium	ND	D1	0.0040	mg/L		10/28/19 08:40	11/18/19 16:46	4
Cobalt	0.016	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:46	4
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:18	2
Molybdenum	0.0069	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:18	2
Selenium	0.0056	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:46	4
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:18	2

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:31	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	14000	D2	200	mg/L			10/28/19 09:32	1
pH	7.3	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.3	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-W302-102319**

**Lab Sample ID: 550-132146-10**

Date Collected: 10/23/19 12:19

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2700	D2	400	mg/L			10/30/19 23:48	200
Fluoride	0.80	D1	0.80	mg/L			10/30/19 23:29	2
Sulfate	2300	D2	400	mg/L			10/30/19 23:48	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:14	1
Boron	0.59		0.050	mg/L		10/26/19 10:38	10/29/19 19:14	1
Calcium	570		2.0	mg/L		10/26/19 10:38	10/29/19 19:14	1
Lithium	0.32		0.20	mg/L		10/26/19 10:38	10/29/19 19:14	1

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# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W302-102319**

**Lab Sample ID: 550-132146-10**

Date Collected: 10/23/19 12:19

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:20	2
<b>Arsenic</b>	<b>0.0015</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:20	2
<b>Barium</b>	<b>0.014</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:20	2
Cadmium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:20	2
<b>Chromium</b>	<b>0.019</b>	<b>D1</b>	0.0020	mg/L		10/28/19 08:40	11/18/19 16:20	2
<b>Cobalt</b>	<b>0.0055</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:20	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:20	2
<b>Molybdenum</b>	<b>0.015</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:20	2
Selenium	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:20	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:20	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:36	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Dissolved Solids</b>	<b>8000</b>	<b>D2</b>	100	mg/L			10/28/19 09:32	1
<b>pH</b>	<b>7.4</b>	<b>H5</b>	1.7	SU			10/31/19 14:07	1
<b>Temperature</b>	<b>8.6</b>	<b>H5</b>	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-W304-102419**

**Lab Sample ID: 550-132146-11**

Date Collected: 10/24/19 09:20

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Chloride</b>	<b>3300</b>	<b>D2</b>	400	mg/L			10/31/19 00:24	200
Fluoride	ND	D1 D5	0.80	mg/L			10/31/19 00:06	2
<b>Sulfate</b>	<b>2900</b>	<b>D2</b>	400	mg/L			10/31/19 00:24	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:35	1
<b>Boron</b>	<b>0.52</b>		0.050	mg/L		10/26/19 10:38	10/29/19 19:35	1
<b>Calcium</b>	<b>610</b>		2.0	mg/L		10/26/19 10:38	10/29/19 19:35	1
<b>Lithium</b>	<b>0.45</b>		0.20	mg/L		10/26/19 10:38	10/29/19 19:35	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:22	2
<b>Arsenic</b>	<b>0.0014</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:22	2
<b>Barium</b>	<b>0.014</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:22	2
Cadmium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:22	2
Chromium	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:22	2
<b>Cobalt</b>	<b>0.0028</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:22	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:22	2
<b>Molybdenum</b>	<b>0.0042</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:22	2
<b>Selenium</b>	<b>0.0012</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:22	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:22	2

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# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Client Sample ID: CH-CCR-W304-102419

## Lab Sample ID: 550-132146-11

Date Collected: 10/24/19 09:20

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:37	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	9100	D2	100	mg/L			10/28/19 09:32	1
pH	7.4	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.5	H5	0.1	Degrees C			10/31/19 14:07	1

## Client Sample ID: CH-CCR-W307-102419

## Lab Sample ID: 550-132146-12

Date Collected: 10/24/19 10:06

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2800	D2	400	mg/L			10/31/19 01:01	200
Fluoride	ND	D1 D5	0.80	mg/L			10/31/19 00:43	2
Sulfate	2700	D2	400	mg/L			10/31/19 01:01	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 19:38	1
Boron	2.3		0.050	mg/L		10/26/19 10:38	10/29/19 19:38	1
Calcium	750		2.0	mg/L		10/26/19 10:38	10/29/19 19:38	1
Lithium	0.23		0.20	mg/L		10/26/19 10:38	10/29/19 19:38	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:24	2
Arsenic	ND	D1	0.0020	mg/L		10/28/19 08:40	11/14/19 01:04	4
Barium	0.013	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:24	2
Cadmium	0.00049	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:24	2
Chromium	0.016	D1	0.0020	mg/L		10/28/19 08:40	11/22/19 18:23	2
Cobalt	0.082	D1	0.0020	mg/L		10/28/19 08:40	11/14/19 01:04	4
Lead	0.0011	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:24	2
Molybdenum	0.011	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:24	2
Selenium	ND	B3 D1	0.0010	mg/L		10/28/19 08:40	11/22/19 05:29	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:24	2

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:39	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	8100	D2	100	mg/L			10/28/19 09:35	1
pH	7.4	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.1	H5	0.1	Degrees C			10/31/19 14:07	1

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W308-102419**

**Lab Sample ID: 550-132146-13**

Date Collected: 10/24/19 10:55

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3100	D2	400	mg/L			10/31/19 01:38	200
Fluoride	ND	D1 D5	0.80	mg/L			10/31/19 01:20	2
Sulfate	2800	D2	400	mg/L			10/31/19 01:38	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 20:16	1
Boron	0.45		0.050	mg/L		10/26/19 10:43	10/29/19 20:16	1
Calcium	780		2.0	mg/L		10/26/19 10:43	10/29/19 20:16	1
Lithium	0.37		0.20	mg/L		10/26/19 10:43	10/29/19 20:16	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:26	2
Arsenic	ND	D1	0.0020	mg/L		10/28/19 08:40	11/14/19 01:06	4
Barium	0.0078	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:26	2
Cadmium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:26	2
Chromium	0.010	D1	0.0020	mg/L		10/28/19 08:40	11/22/19 18:25	2
Cobalt	ND	D1	0.0020	mg/L		10/28/19 08:40	11/14/19 01:06	4
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:26	2
Molybdenum	0.0025	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:26	2
Selenium	0.022	B3 D1	0.0010	mg/L		10/28/19 08:40	11/22/19 05:33	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:26	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:40	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	8900	D2	100	mg/L			10/28/19 09:35	1
pH	7.3	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.5	H5	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-W309-102419**

**Lab Sample ID: 550-132146-14**

Date Collected: 10/24/19 11:38

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1600	D2	400	mg/L			10/31/19 02:15	200
Fluoride	1.1	D1	0.80	mg/L			10/31/19 01:57	2
Sulfate	3300	D2	400	mg/L			10/31/19 02:15	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 20:20	1
Boron	0.45		0.050	mg/L		10/26/19 10:43	10/29/19 20:20	1
Calcium	430		2.0	mg/L		10/26/19 10:43	10/29/19 20:20	1
Lithium	0.31		0.20	mg/L		10/26/19 10:43	10/29/19 20:20	1

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W309-102419**

**Lab Sample ID: 550-132146-14**

Date Collected: 10/24/19 11:38

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0020	mg/L		10/28/19 08:40	11/18/19 16:28	2
<b>Arsenic</b>	<b>0.0066</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:28	2
<b>Barium</b>	<b>0.0079</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:28	2
Cadmium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:28	2
<b>Chromium</b>	<b>0.0020</b>	<b>D1</b>	0.0020	mg/L		10/28/19 08:40	11/18/19 16:28	2
Cobalt	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:28	2
Lead	ND	D1	0.0010	mg/L		10/28/19 08:40	11/18/19 16:28	2
<b>Molybdenum</b>	<b>0.011</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:28	2
<b>Selenium</b>	<b>0.18</b>	<b>D1</b>	0.0010	mg/L		10/28/19 08:40	11/18/19 16:28	2
Thallium	ND	D1	0.00020	mg/L		10/28/19 08:40	11/18/19 16:28	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:42	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Dissolved Solids</b>	<b>7100</b>	<b>D2</b>	100	mg/L			10/28/19 09:35	1
<b>pH</b>	<b>7.5</b>	<b>H5</b>	1.7	SU			10/31/19 14:07	1
<b>Temperature</b>	<b>9.3</b>	<b>H5</b>	0.1	Degrees C			10/31/19 14:07	1

**Client Sample ID: CH-CCR-W317-102419**

**Lab Sample ID: 550-132146-15**

Date Collected: 10/24/19 13:50

Matrix: Water

Date Received: 10/25/19 10:08

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Chloride</b>	<b>1400</b>	<b>D2</b>	400	mg/L			10/31/19 03:29	200
Fluoride	ND		0.40	mg/L			10/31/19 12:08	1
<b>Sulfate</b>	<b>680</b>	<b>D2</b>	400	mg/L			10/31/19 03:29	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 20:23	1
<b>Boron</b>	<b>0.21</b>		0.050	mg/L		10/26/19 10:43	10/29/19 20:23	1
<b>Calcium</b>	<b>340</b>		2.0	mg/L		10/26/19 10:43	10/29/19 20:23	1
Lithium	ND		0.20	mg/L		10/26/19 10:43	10/29/19 20:23	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		10/28/19 08:40	11/18/19 15:55	1
<b>Arsenic</b>	<b>0.0043</b>		0.00050	mg/L		10/28/19 08:40	11/18/19 15:55	1
<b>Barium</b>	<b>0.036</b>		0.00050	mg/L		10/28/19 08:40	11/18/19 15:55	1
Cadmium	ND		0.00010	mg/L		10/28/19 08:40	11/18/19 15:55	1
<b>Chromium</b>	<b>0.0012</b>		0.0010	mg/L		10/28/19 08:40	11/18/19 15:55	1
Cobalt	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:55	1
Lead	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:55	1
<b>Molybdenum</b>	<b>0.0046</b>		0.00050	mg/L		10/28/19 08:40	11/18/19 15:55	1
Selenium	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:55	1
Thallium	ND		0.00010	mg/L		10/28/19 08:40	11/18/19 15:55	1

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# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Client Sample ID: CH-CCR-W317-102419

## Lab Sample ID: 550-132146-15

Date Collected: 10/24/19 13:50

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:44	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	3400	D2	100	mg/L			10/28/19 09:35	1
pH	7.5	H5	1.7	SU			10/31/19 14:07	1
Temperature	9.5	H5	0.1	Degrees C			10/31/19 14:07	1

## Client Sample ID: CH-CCR-FD02-102419

## Lab Sample ID: 550-132146-16

Date Collected: 10/24/19 09:20

Matrix: Water

Date Received: 10/25/19 10:08

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3400	D2	400	mg/L			10/31/19 04:05	200
Fluoride	ND	D1 D5	0.80	mg/L			10/31/19 03:47	2
Sulfate	2900	D2	400	mg/L			10/31/19 04:05	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 20:27	1
Boron	0.52		0.050	mg/L		10/26/19 10:43	10/29/19 20:27	1
Calcium	610		2.0	mg/L		10/26/19 10:43	10/29/19 20:27	1
Lithium	0.45		0.20	mg/L		10/26/19 10:43	10/29/19 20:27	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		10/28/19 08:40	11/18/19 15:57	1
Arsenic	0.00093		0.00050	mg/L		10/28/19 08:40	11/14/19 00:37	1
Barium	0.015		0.00050	mg/L		10/28/19 08:40	11/18/19 15:57	1
Cadmium	ND		0.00010	mg/L		10/28/19 08:40	11/18/19 15:57	1
Chromium	0.0016		0.0010	mg/L		10/28/19 08:40	11/22/19 18:21	1
Cobalt	0.0029		0.00050	mg/L		10/28/19 08:40	11/14/19 00:37	1
Lead	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:57	1
Molybdenum	0.0036		0.00050	mg/L		10/28/19 08:40	11/18/19 15:57	1
Selenium	ND	B3	0.00050	mg/L		10/28/19 08:40	11/22/19 05:25	1
Thallium	ND		0.00010	mg/L		10/28/19 08:40	11/18/19 15:57	1

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:45	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	9200	D2	100	mg/L			10/28/19 09:35	1
pH	7.4	H5	1.7	SU			10/31/19 14:07	1
Temperature	8.2	H5	0.1	Degrees C			10/31/19 14:07	1

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-193979/2**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			10/29/19 18:30	1
Fluoride	ND		0.40	mg/L			10/29/19 18:30	1
Sulfate	ND		2.0	mg/L			10/29/19 18:30	1

**Lab Sample ID: LCS 550-193979/5**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.0		mg/L		105	90 - 110
Fluoride	4.00	4.11		mg/L		103	90 - 110
Sulfate	20.0	20.5		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-193979/6**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.1		mg/L		105	90 - 110	0	20
Fluoride	4.00	4.13		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.6		mg/L		103	90 - 110	0	20

**Lab Sample ID: 550-132146-6 MS**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND	D1 D5	8.00	7.85	D1	mg/L		95	80 - 120

**Lab Sample ID: 550-132146-6 MS**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	8400	D2	4000	12400	D2	mg/L		102	80 - 120
Sulfate	8600	D2	4000	12700	D2	mg/L		103	80 - 120

**Lab Sample ID: 550-132146-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND	D1 D5	8.00	7.84	D1	mg/L		95	80 - 120	0	20

**Lab Sample ID: 550-132146-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	8400	D2	4000	12400	D2	mg/L		101	80 - 120	0	20

Eurofins TestAmerica, Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-132146-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 193979**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	8600	D2	4000	12700	D2	mg/L		102	80 - 120	0	20

**Lab Sample ID: MB 550-194105/2**  
**Matrix: Water**  
**Analysis Batch: 194105**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			10/30/19 18:16	1
Fluoride	ND		0.40	mg/L			10/30/19 18:16	1
Sulfate	ND		2.0	mg/L			10/30/19 18:16	1

**Lab Sample ID: LCS 550-194105/5**  
**Matrix: Water**  
**Analysis Batch: 194105**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.0		mg/L		105	90 - 110
Fluoride	4.00	4.15		mg/L		104	90 - 110
Sulfate	20.0	20.7		mg/L		103	90 - 110

**Lab Sample ID: LCSD 550-194105/6**  
**Matrix: Water**  
**Analysis Batch: 194105**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.1		mg/L		105	90 - 110	0	20
Fluoride	4.00	4.15		mg/L		104	90 - 110	0	20
Sulfate	20.0	20.7		mg/L		104	90 - 110	0	20

**Lab Sample ID: 550-132167-A-2 MS**  
**Matrix: Water**  
**Analysis Batch: 194105**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	8.0		20.0	29.7		mg/L		109	80 - 120
Fluoride	1.2		4.00	5.34		mg/L		103	80 - 120
Sulfate	ND		20.0	21.0		mg/L		105	80 - 120

**Lab Sample ID: 550-132167-A-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 194105**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	8.0		20.0	30.0		mg/L		110	80 - 120	1	20
Fluoride	1.2		4.00	5.38		mg/L		104	80 - 120	1	20
Sulfate	ND		20.0	21.2		mg/L		106	80 - 120	1	20

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-193615/1-A**  
**Matrix: Water**  
**Analysis Batch: 193957**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 193615**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		10/26/19 10:38	10/29/19 18:15	1
Calcium	ND		2.0	mg/L		10/26/19 10:38	10/29/19 18:15	1
Beryllium	ND		0.0010	mg/L		10/26/19 10:38	10/29/19 18:15	1
Lithium	ND		0.20	mg/L		10/26/19 10:38	10/29/19 18:15	1

**Lab Sample ID: LCS 550-193615/2-A**  
**Matrix: Water**  
**Analysis Batch: 193957**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 193615**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Boron	1.00	0.938		mg/L		94	85 - 115
Calcium	21.0	20.4		mg/L		97	85 - 115
Beryllium	1.00	0.963		mg/L		96	85 - 115
Lithium	1.00	0.965		mg/L		97	85 - 115

**Lab Sample ID: LCSD 550-193615/3-A**  
**Matrix: Water**  
**Analysis Batch: 193957**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 193615**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	0.948		mg/L		95	85 - 115	1	20
Calcium	21.0	20.6		mg/L		98	85 - 115	1	20
Beryllium	1.00	0.975		mg/L		98	85 - 115	1	20
Lithium	1.00	0.978		mg/L		98	85 - 115	1	20

**Lab Sample ID: 550-132142-C-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 193957**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 193615**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Boron	0.49		1.00	1.47		mg/L		98	70 - 130
Calcium	95		21.0	113	M3	mg/L		85	70 - 130
Beryllium	ND		1.00	0.979		mg/L		98	70 - 130
Lithium	ND		1.00	1.03		mg/L		98	70 - 130

**Lab Sample ID: 550-132142-C-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 193957**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 193615**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	0.49		1.00	1.45		mg/L		96	70 - 130	1	20
Calcium	95		21.0	110	M3	mg/L		73	70 - 130	2	20
Beryllium	ND		1.00	0.968		mg/L		97	70 - 130	1	20
Lithium	ND		1.00	1.02		mg/L		97	70 - 130	1	20

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: MB 550-193616/1-A**  
**Matrix: Water**  
**Analysis Batch: 193958**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 193616**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		10/26/19 10:43	10/29/19 19:47	1
Calcium	ND		2.0	mg/L		10/26/19 10:43	10/29/19 19:47	1
Beryllium	ND		0.0010	mg/L		10/26/19 10:43	10/29/19 19:47	1
Lithium	ND		0.20	mg/L		10/26/19 10:43	10/29/19 19:47	1

**Lab Sample ID: LCS 550-193616/2-A**  
**Matrix: Water**  
**Analysis Batch: 193958**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 193616**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Boron	1.00	0.924		mg/L		92	85 - 115
Calcium	21.0	20.3		mg/L		97	85 - 115
Beryllium	1.00	0.966		mg/L		97	85 - 115
Lithium	1.00	0.938		mg/L		94	85 - 115

**Lab Sample ID: LCSD 550-193616/3-A**  
**Matrix: Water**  
**Analysis Batch: 193958**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 193616**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	0.924		mg/L		92	85 - 115	0	20
Calcium	21.0	20.2		mg/L		96	85 - 115	0	20
Beryllium	1.00	0.970		mg/L		97	85 - 115	0	20
Lithium	1.00	0.942		mg/L		94	85 - 115	0	20

**Lab Sample ID: 550-132146-6 MS**  
**Matrix: Water**  
**Analysis Batch: 193958**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**  
**Prep Batch: 193616**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Boron	1.2		1.00	2.20		mg/L		95	70 - 130
Calcium	460	M3	21.0	461	M3	mg/L		-12	70 - 130
Beryllium	ND		1.00	0.932		mg/L		93	70 - 130
Lithium	0.26		1.00	1.22		mg/L		96	70 - 130

**Lab Sample ID: 550-132146-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 193958**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**  
**Prep Batch: 193616**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.2		1.00	2.23		mg/L		99	70 - 130	1	20
Calcium	460	M3	21.0	470	M3	mg/L		33	70 - 130	2	20
Beryllium	ND		1.00	0.939		mg/L		94	70 - 130	1	20
Lithium	0.26		1.00	1.23		mg/L		97	70 - 130	1	20

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-193697/1-A**  
**Matrix: Water**  
**Analysis Batch: 195863**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 193697**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		10/28/19 08:40	11/18/19 15:42	1
Arsenic	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:42	1
Barium	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:42	1
Cadmium	ND		0.00010	mg/L		10/28/19 08:40	11/18/19 15:42	1
Chromium	ND		0.0010	mg/L		10/28/19 08:40	11/18/19 15:42	1
Cobalt	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:42	1
Lead	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:42	1
Molybdenum	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:42	1
Selenium	ND		0.00050	mg/L		10/28/19 08:40	11/18/19 15:42	1
Thallium	ND		0.00010	mg/L		10/28/19 08:40	11/18/19 15:42	1

**Lab Sample ID: LCS 550-193697/2-A**  
**Matrix: Water**  
**Analysis Batch: 195863**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 193697**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.103		mg/L		103	85 - 115
Arsenic	0.100	0.0957		mg/L		96	85 - 115
Barium	0.100	0.102		mg/L		102	85 - 115
Cadmium	0.100	0.105		mg/L		105	85 - 115
Chromium	0.100	0.0940		mg/L		94	85 - 115
Cobalt	0.100	0.0942		mg/L		94	85 - 115
Lead	0.100	0.0988		mg/L		99	85 - 115
Molybdenum	0.100	0.102		mg/L		102	85 - 115
Selenium	0.100	0.0915		mg/L		92	85 - 115
Thallium	0.100	0.105		mg/L		105	85 - 115

**Lab Sample ID: LCSD 550-193697/3-A**  
**Matrix: Water**  
**Analysis Batch: 195863**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 193697**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.103		mg/L		103	85 - 115	0	20
Arsenic	0.100	0.101		mg/L		101	85 - 115	5	20
Barium	0.100	0.104		mg/L		104	85 - 115	2	20
Cadmium	0.100	0.104		mg/L		104	85 - 115	1	20
Chromium	0.100	0.0980		mg/L		98	85 - 115	4	20
Cobalt	0.100	0.0982		mg/L		98	85 - 115	4	20
Lead	0.100	0.100		mg/L		100	85 - 115	2	20
Molybdenum	0.100	0.102		mg/L		102	85 - 115	1	20
Selenium	0.100	0.0999		mg/L		100	85 - 115	9	20
Thallium	0.100	0.105		mg/L		105	85 - 115	0	20

**Lab Sample ID: 550-132146-6 MS**  
**Matrix: Water**  
**Analysis Batch: 195863**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**  
**Prep Batch: 193697**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Antimony	ND	D1	0.100	0.108		mg/L		108	70 - 130

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# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-132146-6 MS**  
**Matrix: Water**  
**Analysis Batch: 195863**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**  
**Prep Batch: 193697**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.0018	D1	0.100	0.109		mg/L		108	70 - 130
Barium	0.013	D1 M1	0.100	0.135		mg/L		123	70 - 130
Cadmium	ND	D1	0.100	0.0994		mg/L		99	70 - 130
Chromium	ND	D1	0.100	0.0980		mg/L		98	70 - 130
Cobalt	ND	D1	0.100	0.0952		mg/L		95	70 - 130
Lead	ND	D1	0.100	0.0959		mg/L		96	70 - 130
Molybdenum	0.0059	D1	0.100	0.117		mg/L		111	70 - 130
Selenium	ND	D1	0.100	0.111		mg/L		111	70 - 130
Thallium	ND	D1	0.100	0.100		mg/L		100	70 - 130

**Lab Sample ID: 550-132146-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 195863**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**  
**Prep Batch: 193697**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	ND	D1	0.100	0.108		mg/L		108	70 - 130	1	20
Arsenic	0.0018	D1	0.100	0.105		mg/L		103	70 - 130	4	20
Barium	0.013	D1 M1	0.100	0.161	M1	mg/L		148	70 - 130	17	20
Cadmium	ND	D1	0.100	0.101		mg/L		101	70 - 130	1	20
Chromium	ND	D1	0.100	0.0954		mg/L		95	70 - 130	3	20
Cobalt	ND	D1	0.100	0.0924		mg/L		92	70 - 130	3	20
Lead	ND	D1	0.100	0.0979		mg/L		98	70 - 130	2	20
Molybdenum	0.0059	D1	0.100	0.117		mg/L		112	70 - 130	1	20
Selenium	ND	D1	0.100	0.101		mg/L		101	70 - 130	10	20
Thallium	ND	D1	0.100	0.0982		mg/L		98	70 - 130	2	20

## Method: 245.1 - Mercury (CVAA)

**Lab Sample ID: MB 550-193915/1-A**  
**Matrix: Water**  
**Analysis Batch: 193981**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 193915**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		10/29/19 16:04	10/30/19 10:12	1

**Lab Sample ID: LCS 550-193915/2-A**  
**Matrix: Water**  
**Analysis Batch: 193981**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 193915**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hg	0.00500	0.00477		mg/L		95	85 - 115

**Lab Sample ID: LCSD 550-193915/3-A**  
**Matrix: Water**  
**Analysis Batch: 193981**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 193915**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hg	0.00500	0.00444		mg/L		89	85 - 115	7	20

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: 245.1 - Mercury (CVAA) (Continued)

**Lab Sample ID: 550-132146-6 MS**  
**Matrix: Water**  
**Analysis Batch: 193981**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**  
**Prep Batch: 193915**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Hg	ND		0.00500	0.00410		mg/L		82	70 - 130

**Lab Sample ID: 550-132146-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 193981**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**  
**Prep Batch: 193915**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.00500	0.00407		mg/L		81	70 - 130	1	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-193702/1**  
**Matrix: Water**  
**Analysis Batch: 193702**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			10/28/19 09:32	1

**Lab Sample ID: LCS 550-193702/2**  
**Matrix: Water**  
**Analysis Batch: 193702**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	996		mg/L		100	90 - 110

**Lab Sample ID: LCSD 550-193702/3**  
**Matrix: Water**  
**Analysis Batch: 193702**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Total Dissolved Solids	1000	978		mg/L		98	90 - 110	2	10

**Lab Sample ID: 550-132146-6 DU**  
**Matrix: Water**  
**Analysis Batch: 193702**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Total Dissolved Solids	13000	D2	12300	D2	mg/L		2	10

**Lab Sample ID: MB 550-193704/1**  
**Matrix: Water**  
**Analysis Batch: 193704**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			10/28/19 09:35	1

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

**Lab Sample ID: LCS 550-193704/2**  
**Matrix: Water**  
**Analysis Batch: 193704**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	984		mg/L		98	90 - 110

**Lab Sample ID: LCSD 550-193704/3**  
**Matrix: Water**  
**Analysis Batch: 193704**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	988		mg/L		99	90 - 110	0	10

**Lab Sample ID: 550-132146-12 DU**  
**Matrix: Water**  
**Analysis Batch: 193704**

**Client Sample ID: CH-CCR-W307-102419**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	8100	D2	7900	D2	mg/L		2	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-194181/1**  
**Matrix: Water**  
**Analysis Batch: 194181**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.6	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-194181/12**  
**Matrix: Water**  
**Analysis Batch: 194181**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.7	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-194181/24**  
**Matrix: Water**  
**Analysis Batch: 194181**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.4	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-194181/36**  
**Matrix: Water**  
**Analysis Batch: 194181**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.4	98.5 - 101.5



# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: 550-132142-B-1 DU**  
**Matrix: Water**  
**Analysis Batch: 194181**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
pH	7.4	H5	7.4	H5	SU		0.3		5
Temperature	7.5	H5	7.6	H5	Degrees C		1		

**Lab Sample ID: 550-132146-6 DU**  
**Matrix: Water**  
**Analysis Batch: 194181**

**Client Sample ID: CH-CCR-M64A-102419**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
pH	7.5	H5	7.5	H5	SU		0.1		5
Temperature	7.6	H5	7.7	H5	Degrees C		1		

**Lab Sample ID: 550-132146-13 DU**  
**Matrix: Water**  
**Analysis Batch: 194181**

**Client Sample ID: CH-CCR-W308-102419**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
pH	7.3	H5	7.4	H5	SU		0.7		5
Temperature	8.5	H5	8.6	H5	Degrees C		1		

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## HPLC/IC

### Analysis Batch: 193979

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	300.0	
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	300.0	
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	300.0	
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	300.0	
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	300.0	
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	300.0	
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	300.0	
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	300.0	
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	300.0	
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	300.0	
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	300.0	
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	300.0	
MB 550-193979/2	Method Blank	Total/NA	Water	300.0	
LCS 550-193979/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-193979/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	300.0	
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	300.0	
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	300.0	
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	300.0	

### Analysis Batch: 194105

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	300.0	
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	300.0	
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	300.0	
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	300.0	
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	300.0	
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	300.0	
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	300.0	
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	300.0	
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	300.0	
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	300.0	
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	300.0	
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	300.0	
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	300.0	
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	300.0	
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	300.0	
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	300.0	
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	300.0	
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	300.0	
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	300.0	
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	300.0	
MB 550-194105/2	Method Blank	Total/NA	Water	300.0	
LCS 550-194105/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-194105/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-132167-A-2 MS	Matrix Spike	Total/NA	Water	300.0	
550-132167-A-2 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Metals

### Prep Batch: 193615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	200.7	
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	200.7	
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	200.7	
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	200.7	
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	200.7	
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	200.7	
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	200.7	
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	200.7	
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	200.7	
MB 550-193615/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-193615/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-193615/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-132142-C-1-A MS	Matrix Spike	Total/NA	Water	200.7	
550-132142-C-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Prep Batch: 193616

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	200.7	
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	200.7	
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	200.7	
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	200.7	
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	200.7	
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	200.7	
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	200.7	
MB 550-193616/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-193616/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-193616/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	200.7	
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	200.7	

### Prep Batch: 193697

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	200.8	
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	200.8	
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	200.8	
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	200.8	
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	200.8	
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	200.8	
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	200.8	
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	200.8	
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	200.8	
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	200.8	
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	200.8	
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	200.8	
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	200.8	
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	200.8	
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	200.8	
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	200.8	
MB 550-193697/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-193697/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-193697/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Metals (Continued)

### Prep Batch: 193697 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	200.8	
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	200.8	

### Prep Batch: 193915

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	245.1	
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	245.1	
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	245.1	
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	245.1	
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	245.1	
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	245.1	
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	245.1	
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	245.1	
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	245.1	
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	245.1	
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	245.1	
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	245.1	
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	245.1	
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	245.1	
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	245.1	
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	245.1	
MB 550-193915/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-193915/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-193915/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	245.1	
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	245.1	

### Analysis Batch: 193957

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	200.7 Rev 4.4	193615
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	200.7 Rev 4.4	193615
MB 550-193615/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	193615
LCS 550-193615/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	193615
LCSD 550-193615/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-C-1-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	193615
550-132142-C-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	193615

### Analysis Batch: 193958

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	200.7 Rev 4.4	193616
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	200.7 Rev 4.4	193616
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	200.7 Rev 4.4	193616
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	200.7 Rev 4.4	193616
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	200.7 Rev 4.4	193616

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Metals (Continued)

### Analysis Batch: 193958 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	200.7 Rev 4.4	193616
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	200.7 Rev 4.4	193616
MB 550-193616/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	193616
LCS 550-193616/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	193616
LCSD 550-193616/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	193616
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	200.7 Rev 4.4	193616
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	200.7 Rev 4.4	193616

### Analysis Batch: 193981

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	245.1	193915
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	245.1	193915
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	245.1	193915
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	245.1	193915
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	245.1	193915
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	245.1	193915
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	245.1	193915
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	245.1	193915
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	245.1	193915
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	245.1	193915
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	245.1	193915
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	245.1	193915
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	245.1	193915
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	245.1	193915
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	245.1	193915
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	245.1	193915
MB 550-193915/1-A	Method Blank	Total/NA	Water	245.1	193915
LCS 550-193915/2-A	Lab Control Sample	Total/NA	Water	245.1	193915
LCSD 550-193915/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	193915
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	245.1	193915
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	245.1	193915

### Analysis Batch: 195467

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	200.8 LL	193697
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	200.8 LL	193697
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	200.8 LL	193697

### Analysis Batch: 195863

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	200.8 LL	193697
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	200.8 LL	193697
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	200.8 LL	193697
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	200.8 LL	193697
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	200.8 LL	193697
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	200.8 LL	193697
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	200.8 LL	193697
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	200.8 LL	193697
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	200.8 LL	193697
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	200.8 LL	193697
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	200.8 LL	193697

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## Metals (Continued)

### Analysis Batch: 195863 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	200.8 LL	193697
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	200.8 LL	193697
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	200.8 LL	193697
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	200.8 LL	193697
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	200.8 LL	193697
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	200.8 LL	193697
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	200.8 LL	193697
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	200.8 LL	193697
MB 550-193697/1-A	Method Blank	Total/NA	Water	200.8 LL	193697
LCS 550-193697/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	193697
LCSD 550-193697/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	193697
550-132146-6 MS	CH-CCR-M64A-102419	Total/NA	Water	200.8 LL	193697
550-132146-6 MSD	CH-CCR-M64A-102419	Total/NA	Water	200.8 LL	193697

### Analysis Batch: 196232

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	200.8 LL	193697
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	200.8 LL	193697
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	200.8 LL	193697

### Analysis Batch: 196384

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	200.8 LL	193697
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	200.8 LL	193697
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	200.8 LL	193697

## General Chemistry

### Analysis Batch: 193702

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	SM 2540C	
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	SM 2540C	
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	SM 2540C	
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	SM 2540C	
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	SM 2540C	
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	SM 2540C	
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	SM 2540C	
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	SM 2540C	
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	SM 2540C	
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	SM 2540C	
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	SM 2540C	
MB 550-193702/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-193702/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-193702/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-132146-6 DU	CH-CCR-M64A-102419	Total/NA	Water	SM 2540C	

### Analysis Batch: 193704

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	SM 2540C	
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	SM 2540C	
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	SM 2540C	



# QC Association Summary

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

## General Chemistry (Continued)

### Analysis Batch: 193704 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	SM 2540C	
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	SM 2540C	
MB 550-193704/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-193704/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-193704/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-132146-12 DU	CH-CCR-W307-102419	Total/NA	Water	SM 2540C	

### Analysis Batch: 194181

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-132146-1	CH-CCR-M52A-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-2	CH-CCR-M53A-102319	Total/NA	Water	SM 4500 H+ B	
550-132146-3	CH-CCR-W305-102319	Total/NA	Water	SM 4500 H+ B	
550-132146-4	CH-CCR-W306-102319	Total/NA	Water	SM 4500 H+ B	
550-132146-5	CH-CCR-W314-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-6	CH-CCR-M64A-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-7	CH-CCR-FD01-102319	Total/NA	Water	SM 4500 H+ B	
550-132146-8	CH-CCR-M55A-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-9	CH-CCR-W301-102319	Total/NA	Water	SM 4500 H+ B	
550-132146-10	CH-CCR-W302-102319	Total/NA	Water	SM 4500 H+ B	
550-132146-11	CH-CCR-W304-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-12	CH-CCR-W307-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-13	CH-CCR-W308-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-14	CH-CCR-W309-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-15	CH-CCR-W317-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-16	CH-CCR-FD02-102419	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-194181/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-194181/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-194181/24	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-194181/36	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-132142-B-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	
550-132146-6 DU	CH-CCR-M64A-102419	Total/NA	Water	SM 4500 H+ B	
550-132146-13 DU	CH-CCR-W308-102419	Total/NA	Water	SM 4500 H+ B	



# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-M52A-102419**

**Lab Sample ID: 550-132146-1**

**Date Collected: 10/24/19 07:47**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	193979	10/30/19 00:57	NEL	TAL PHX
Total/NA	Analysis	300.0		200	193979	10/30/19 01:15	NEL	TAL PHX
Total/NA	Prep	200.7			193616	10/26/19 10:43	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193958	10/29/19 20:10	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 15:59	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:21	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702		YET	TAL PHX
					(Start)	10/28/19 09:32		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-M53A-102319**

**Lab Sample ID: 550-132146-2**

**Date Collected: 10/23/19 14:45**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	193979	10/30/19 01:34	NEL	TAL PHX
Total/NA	Analysis	300.0		200	193979	10/30/19 01:52	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:17	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:01	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:22	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702		YET	TAL PHX
					(Start)	10/28/19 09:32		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W305-102319**

**Lab Sample ID: 550-132146-3**

**Date Collected: 10/23/19 15:32**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	193979	10/30/19 02:10	NEL	TAL PHX
Total/NA	Analysis	300.0		200	193979	10/30/19 02:29	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:21	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:03	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:24	BCV	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W305-102319**

**Lab Sample ID: 550-132146-3**

Date Collected: 10/23/19 15:32

Matrix: Water

Date Received: 10/25/19 10:08

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	193702		YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W306-102319**

**Lab Sample ID: 550-132146-4**

Date Collected: 10/23/19 16:17

Matrix: Water

Date Received: 10/25/19 10:08

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	193979	10/30/19 03:24	NEL	TAL PHX
Total/NA	Analysis	300.0		200	193979	10/30/19 03:42	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:24	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:09	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	195863	11/18/19 16:42	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:25	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W314-102419**

**Lab Sample ID: 550-132146-5**

Date Collected: 10/24/19 08:53

Matrix: Water

Date Received: 10/25/19 10:08

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	193979	10/30/19 04:01	NEL	TAL PHX
Total/NA	Analysis	300.0		200	193979	10/30/19 04:19	NEL	TAL PHX
Total/NA	Prep	200.7			193616	10/26/19 10:43	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193958	10/29/19 20:06	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:11	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:27	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-M64A-102419**

**Lab Sample ID: 550-132146-6**

**Date Collected: 10/24/19 14:53**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	193979	10/30/19 04:38	NEL	TAL PHX
Total/NA	Analysis	300.0		200	193979	10/30/19 05:33	NEL	TAL PHX
Total/NA	Prep	200.7			193616	10/26/19 10:43	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193958	10/29/19 20:03	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 15:53	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:19	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702		YET	TAL PHX
					(Start)	10/28/19 09:32		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-FD01-102319**

**Lab Sample ID: 550-132146-7**

**Date Collected: 10/23/19 15:32**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/30/19 21:02	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/30/19 21:20	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:28	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:14	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:28	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702		YET	TAL PHX
					(Start)	10/28/19 09:32		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-M55A-102419**

**Lab Sample ID: 550-132146-8**

**Date Collected: 10/24/19 12:18**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/30/19 21:39	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/30/19 21:57	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:31	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:16	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	195863	11/18/19 16:44	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-M55A-102419**

**Lab Sample ID: 550-132146-8**

**Date Collected: 10/24/19 12:18**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:30	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W301-102319**

**Lab Sample ID: 550-132146-9**

**Date Collected: 10/23/19 14:02**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/30/19 22:16	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/30/19 22:34	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:10	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:18	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	195863	11/18/19 16:46	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:31	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W302-102319**

**Lab Sample ID: 550-132146-10**

**Date Collected: 10/23/19 12:19**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/30/19 23:29	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/30/19 23:48	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:14	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:20	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:36	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702	(Start) 10/28/19 09:32 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W304-102419**

**Lab Sample ID: 550-132146-11**

**Date Collected: 10/24/19 09:20**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/31/19 00:06	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/31/19 00:24	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:35	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:22	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:37	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193702		YET	TAL PHX
					(Start)	10/28/19 09:32		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W307-102419**

**Lab Sample ID: 550-132146-12**

**Date Collected: 10/24/19 10:06**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/31/19 00:43	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/31/19 01:01	NEL	TAL PHX
Total/NA	Prep	200.7			193615	10/26/19 10:38	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193957	10/29/19 19:38	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	195467	11/14/19 01:04	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:24	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	196232	11/22/19 05:29	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	196384	11/22/19 18:23	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:39	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193704		YET	TAL PHX
					(Start)	10/28/19 09:35		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W308-102419**

**Lab Sample ID: 550-132146-13**

**Date Collected: 10/24/19 10:55**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/31/19 01:20	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/31/19 01:38	NEL	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W308-102419**

**Lab Sample ID: 550-132146-13**

**Date Collected: 10/24/19 10:55**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			193616	10/26/19 10:43	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193958	10/29/19 20:16	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	195467	11/14/19 01:06	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:26	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	196232	11/22/19 05:33	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	196384	11/22/19 18:25	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:40	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193704		YET	TAL PHX
					(Start)	10/28/19 09:35		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W309-102419**

**Lab Sample ID: 550-132146-14**

**Date Collected: 10/24/19 11:38**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/31/19 01:57	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/31/19 02:15	NEL	TAL PHX
Total/NA	Prep	200.7			193616	10/26/19 10:43	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193958	10/29/19 20:20	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		2	195863	11/18/19 16:28	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:42	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193704		YET	TAL PHX
					(Start)	10/28/19 09:35		
					(End)	10/29/19 10:55		
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-W317-102419**

**Lab Sample ID: 550-132146-15**

**Date Collected: 10/24/19 13:50**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	194105	10/31/19 03:29	NEL	TAL PHX
Total/NA	Analysis	300.0		1	194105	10/31/19 12:08	NEL	TAL PHX
Total/NA	Prep	200.7			193616	10/26/19 10:43	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193958	10/29/19 20:23	SRA	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
 SDG: APS Cholla Power Plant

**Client Sample ID: CH-CCR-W317-102419**

**Lab Sample ID: 550-132146-15**

**Date Collected: 10/24/19 13:50**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	195863	11/18/19 15:55	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:44	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193704	(Start) 10/28/19 09:35 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Client Sample ID: CH-CCR-FD02-102419**

**Lab Sample ID: 550-132146-16**

**Date Collected: 10/24/19 09:20**

**Matrix: Water**

**Date Received: 10/25/19 10:08**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	194105	10/31/19 03:47	NEL	TAL PHX
Total/NA	Analysis	300.0		200	194105	10/31/19 04:05	NEL	TAL PHX
Total/NA	Prep	200.7			193616	10/26/19 10:43	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	193958	10/29/19 20:27	SRA	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	195467	11/14/19 00:37	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	195863	11/18/19 15:57	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	196232	11/22/19 05:25	ARE	TAL PHX
Total/NA	Prep	200.8			193697	10/28/19 08:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	196384	11/22/19 18:21	ARE	TAL PHX
Total/NA	Prep	245.1			193915	10/29/19 16:04	MGM	TAL PHX
Total/NA	Analysis	245.1		1	193981	10/30/19 10:45	BCV	TAL PHX
Total/NA	Analysis	SM 2540C		1	193704	(Start) 10/28/19 09:35 (End) 10/29/19 10:55	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	194181	10/31/19 14:07	MDS	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
SDG: APS Cholla Power Plant

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State Program	AZ0728	06-09-20

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: 2019 Semi Annual Sampling Event

Job ID: 550-132146-1  
SDG: APS Cholla Power Plant

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
245.1	Mercury (CVAA)	EPA	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX
245.1	Preparation, Mercury	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

**Chain of Custody Record**

**TestAmerica**  
 THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact: **Jim Edwards** 928-386-0302  
 Regulatory Program:  DW  NPDES  RCRA  Other:  CCR

Lab Contact: **Jim Edwards**  
 Date: \_\_\_\_\_ Carrier: \_\_\_\_\_  
 COC No: \_\_\_\_\_ of \_\_\_\_\_ COCs

Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
 TAT If different from Below: \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Project Name: **2019 Semi-Annual Sampling Event**  
 Site: **APS Cholla Power Plant**  
 P O # \_\_\_\_\_



Sample Identification	Sample Date	Sample Time	Sample Type (G-Comp, G-Grav)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 (B, Be, Ca, Li)	EPA 300.0 (Cl, F, SO4)	SM 2450C (TDS)	SM 4500HB (pH)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 245.1 (Hg)	Sample Specific Notes:
1. CH-CCR-M52A-102419	10/24/19	07:47	G	W	4	N	X	X	X	X	X	X	X	low flow 3.9
2. CH-CCR-M53A-102319	10/23/19	14:45	G	W	64	N	X	X	X	X	X	X	X	6.8
3. CH-CCR-W305-102319	10/23/19	15:32	G	W	64	N	X	X	X	X	X	X	X	3.9
4. CH-CCR-W306-102319	10/23/19	16:05	G	W	64	N	X	X	X	X	X	X	X	3.9
5. CH-CCR-W314-102419	10/24/19	08:53	G	W	4	N	X	X	X	X	X	X	X	6.8
6. CH-CCR-M64A-102419	10/24/19	14:53	G	W	4	N	X	X	X	X	X	X	X	3.9
7. CH-CCR-FD01-102319	10/23/19	15:32	G	W	64	N	X	X	X	X	X	X	X	3.9
8. CH-CCR-M55A-102419	10/24/19	12:18	G	W	4	N	X	X	X	X	X	X	X	3.9
9. CH-CCR-W301-102319	10/23/19	14:02	G	W	64	N	X	X	X	X	X	X	X	6.8
10. CH-CCR-W302-102319	10/23/19	12:19	G	W	64	N	X	X	X	X	X	X	X	6.8
11. CH-CCR-W304-102419	10/24/19	09:20	G	W	4	N	X	X	X	X	X	X	X	3.9
12. CH-CCR-W307-102419	10/24/19	10:06	G	W	4	N	X	X	X	X	X	X	X	3.9

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other \_\_\_\_\_  
 Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:  
 Method 200.8 with collision cell  
 Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

3.9, 6.8 or 1008

Custody Seals Intact:  Yes  No  
 Relinquished by: **Sarah Carls** Company: **Wood** Date/Time: **10/24/19 10:08**  
 Relinquished by: **[Signature]** Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013  
 CDV



TestAmerica Phoenix  
4625 E Cotton Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

TestAmerica Laboratories, Inc.

Client Contact: Jim Edwards 928-386-0302  
Analysis Turnaround Time:  CALENDAR DAYS  WORKING DAYS  
Date: \_\_\_\_\_ Carrier: \_\_\_\_\_  
COC No: 2 of 2 COCs

APL Cholla 4801 Cholla Lake Rd  
Joseph City, AZ 86032  
928/386-0302 Phone  
(xxx) xxx-xxxx FAX  
Project Name:  
Site:  
P O #  
TAT if different from Below:  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 (B, Be, Ca, Li)	EPA 300.0 (Cl, F, SO4)	SM 2450C (TDS)	SM 4500HB (pH)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 245.1 (Hg)	Sample Specific Notes:
13. CH-CGR-W308-102419	10/24/19	10:55	G	W	4	N	X	X	X	X	X	X	X	6.8
14. CH-CGR-W309-102419	10/24/19	11:38	G	W	4	N	X	X	X	X	X	X	X	6.8
15. CH-CGR-W317-102419	10/24/19	13:50	G	W	4	N	X	X	X	X	X	X	X	6.9
16. CH-CGR-FD02-102419	10/24/19	08:00	G	W	4	N	X	X	X	X	X	X	X	6.8

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other \_\_\_\_\_  
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  
Special Instructions/QC Requirements & Comments: \_\_\_\_\_  
Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Method 200.8 with collision cell  
Custody Seals Intact:  Yes  No  
Custody Seal No.: \_\_\_\_\_  
Cooler Temp. (°C): Obs'd: \_\_\_\_\_  
Therm ID No.: \_\_\_\_\_

Relinquished by: *Sac Loren* *W*  
Company: *Good*  
Date/Time: *10/25/19 08*  
Received by: \_\_\_\_\_  
Company: \_\_\_\_\_  
Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_  
Company: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Received in Laboratory by: \_\_\_\_\_  
Company: *TAPK*  
Date/Time: *10/25/19 1008*

CDO

3.9, 6.8 CRICE

132146

## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-132146-1  
SDG Number: APS Cholla Power Plant

**Login Number: 132146**

**List Number: 1**

**Creator: Maycock, Lisa**

**List Source: Eurofins TestAmerica, Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-133983-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
PO BOX 188, Ste. 4458  
Joseph City, Arizona 86032

Attn: Jim Edwards



Authorized for release by:  
1/14/2020 7:31:17 AM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
B1	Target analyte detected in method blank at or above the method reporting limit.
B7	Target analyte detected in method blank at or above method reporting limit. Concentration found in the sample was 10 times above the concentration found in the blank.
D1	Sample required dilution due to matrix.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Job ID: 550-133983-1**

**Laboratory: Eurofins TestAmerica, Phoenix**

## Narrative

### Job Narrative 550-133983-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 11/27/2019 9:56 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 0.6° C and 0.8° C.

#### Receipt Exceptions

Several of the sample sites are not set up in TALs for the sample site enforcement.

CH-CCR-M50A-112519 (550-133983-1), CH-CCR-M51A-112519 (550-133983-2), CH-CCR-W123-112519 (550-133983-3), CH-CCR-W123-112519 (550-133983-3[DU]), CH-CCR-W123-112519 (550-133983-3[MS]), CH-CCR-W123-112519 (550-133983-3[MSD]), CH-CCR-FD01-112619 (550-133983-4), CH-CCR-M65A-112619 (550-133983-5), CH-CCR-M66A-112619 (550-133983-6), CH-CCR-M67A-112619 (550-133983-7), CH-CCR-W126-112619 (550-133983-8) and CH-CCR-M46A-112619 (550-133983-9)

#### HPLC/IC

Method 300.0: The following samples were diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-CCR-M67A-112619 (550-133983-7) and CH-CCR-M46A-112619 (550-133983-9). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method 200.8 LL: The method blank for preparation batch 550-196865 contained chromium above the reporting limit (RL). None of the samples associated with this method blank contained the target compound; therefore, re-extraction and/or re-analysis of samples were not performed.

Method 200.8 LL: The method blank for preparation batch 550-196865 and analytical batch 550-198037 contained barium above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

Method 200.8 LL: The following samples were diluted due to the nature of the sample matrix (internal standard failures): CH-CCR-M50A-112519 (550-133983-1), CH-CCR-M51A-112519 (550-133983-2), CH-CCR-W123-112519 (550-133983-3), CH-CCR-FD01-112619 (550-133983-4), CH-CCR-M65A-112619 (550-133983-5), CH-CCR-M66A-112619 (550-133983-6), CH-CCR-M67A-112619 (550-133983-7), CH-CCR-W126-112619 (550-133983-8) and CH-CCR-M46A-112619 (550-133983-9). Elevated reporting limits (RLs) are provided.

Method 200.8 LL: The continuing calibration blank (CCB) for analytical batch 550-199475 contained copper above the reporting limit (RL). All reported samples associated with this CCB were ND for this analyte; therefore, re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
550-133983-1	CH-CCR-M50A-112519	Water	11/25/19 15:17	11/27/19 09:56	
550-133983-2	CH-CCR-M51A-112519	Water	11/25/19 16:08	11/27/19 09:56	
550-133983-3	CH-CCR-W123-112519	Water	11/25/19 14:43	11/27/19 09:56	
550-133983-4	CH-CCR-FD01-112619	Water	11/26/19 08:39	11/27/19 09:56	
550-133983-5	CH-CCR-M65A-112619	Water	11/26/19 09:30	11/27/19 09:56	
550-133983-6	CH-CCR-M66A-112619	Water	11/26/19 08:39	11/27/19 09:56	
550-133983-7	CH-CCR-M67A-112619	Water	11/26/19 10:17	11/27/19 09:56	
550-133983-8	CH-CCR-W126-112619	Water	11/26/19 08:07	11/27/19 09:56	
550-133983-9	CH-CCR-M46A-112619	Water	11/26/19 12:38	11/27/19 09:56	

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Client Sample ID: CH-CCR-M50A-112519

## Lab Sample ID: 550-133983-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2100	D2	400	mg/L	200		300.0	Total/NA
Fluoride	2.1	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3000	D2	400	mg/L	200		300.0	Total/NA
Boron	3.1		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	610		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.43		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0027		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.010	B7	0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0071		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00053		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0083		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0022		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	7800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M51A-112519

## Lab Sample ID: 550-133983-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5300	D2	400	mg/L	200		300.0	Total/NA
Fluoride	4.8	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	30		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	820		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.45		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.018		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.0086	B7	0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00076		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.11		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W123-112519

## Lab Sample ID: 550-133983-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	3.6	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3700	D2	400	mg/L	200		300.0	Total/NA
Boron	35	M3	0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	780	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.66		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0023	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.0097		0.0010	mg/L	2		200.8 LL	Total/NA
Chromium	0.14	B1 B7 D1	0.0040	mg/L	4		200.8 LL	Total/NA
Cobalt	0.0026	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.41		0.0050	mg/L	10		200.8 LL	Total/NA
Selenium	0.0052	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Total Dissolved Solids	15000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.6	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	14.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Client Sample ID: CH-CCR-FD01-112619

## Lab Sample ID: 550-133983-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.1	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3100	D2	400	mg/L	200		300.0	Total/NA
Boron	1.5		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	780		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.48		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.016	B7	0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00028		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0026		0.0010	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.015		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.026	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M65A-112619

## Lab Sample ID: 550-133983-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3500	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.7	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	12		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	760		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.52		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.017	B7	0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00014		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.015		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0032	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.080		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	9300	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M66A-112619

## Lab Sample ID: 550-133983-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.1	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3100	D2	400	mg/L	200		300.0	Total/NA
Boron	1.5		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	780		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.48		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0039	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.022	B7	0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00038		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.016	B7	0.0010	mg/L	1		200.8 LL	Total/NA
Lead	0.00061		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.016		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.060	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Client Sample ID: CH-CCR-M67A-112619

## Lab Sample ID: 550-133983-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5000	D2	400	mg/L	200		300.0	Total/NA
Sulfate	1500	D2	400	mg/L	200		300.0	Total/NA
Boron	0.38		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	1500		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.015	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.026	B7	0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0042	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.0052		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	6.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.4	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W126-112619

## Lab Sample ID: 550-133983-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	7000	D2	400	mg/L	200		300.0	Total/NA
Fluoride	3.6	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	4200	D2	400	mg/L	200		300.0	Total/NA
Boron	48		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	720		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.70		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0023	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.010		0.0010	mg/L	2		200.8 LL	Total/NA
Chromium	0.019	B7	0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0040	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.21	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Total Dissolved Solids	15000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M46A-112619

## Lab Sample ID: 550-133983-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6400	D2	400	mg/L	200		300.0	Total/NA
Sulfate	1900	D2	400	mg/L	200		300.0	Total/NA
Boron	0.64		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	1300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	0.23		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0042	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.037	B7	0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.00052		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.026		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	13000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.0	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-M50A-112519**

**Lab Sample ID: 550-133983-1**

Date Collected: 11/25/19 15:17

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2100	D2	400	mg/L			12/03/19 17:07	200
Fluoride	2.1	D1	0.80	mg/L			12/03/19 16:49	2
Sulfate	3000	D2	400	mg/L			12/03/19 17:07	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.1		0.050	mg/L		11/29/19 14:06	12/02/19 19:47	1
Calcium	610		2.0	mg/L		11/29/19 14:06	12/02/19 19:47	1
Lithium	0.43		0.20	mg/L		11/29/19 14:06	12/02/19 19:47	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0027		0.00050	mg/L		11/29/19 14:16	12/24/19 15:29	1
Barium	0.010	B7	0.00050	mg/L		11/29/19 14:16	12/15/19 10:24	1
Cadmium	ND		0.00010	mg/L		11/29/19 14:16	12/15/19 10:24	1
Chromium	0.0071		0.0010	mg/L		01/07/20 07:30	01/09/20 20:30	1
Cobalt	0.00053		0.00050	mg/L		11/29/19 14:16	12/24/19 15:29	1
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:24	1
Molybdenum	0.0083		0.00050	mg/L		11/29/19 14:16	12/15/19 10:24	1
Selenium	0.0022		0.00050	mg/L		11/29/19 14:16	12/24/19 15:29	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	7800	D2	100	mg/L			12/02/19 09:59	1
pH	7.1	H5	1.7	SU			12/02/19 17:21	1
Temperature	15.2	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-M51A-112519**

**Lab Sample ID: 550-133983-2**

Date Collected: 11/25/19 16:08

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5300	D2	400	mg/L			12/03/19 17:44	200
Fluoride	4.8	D1	0.80	mg/L			12/03/19 17:26	2
Sulfate	2900	D2	400	mg/L			12/03/19 17:44	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	30		0.050	mg/L		11/29/19 14:06	12/02/19 19:51	1
Calcium	820		2.0	mg/L		11/29/19 14:06	12/02/19 19:51	1
Lithium	0.45		0.20	mg/L		11/29/19 14:06	12/02/19 19:51	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.018		0.00050	mg/L		11/29/19 14:16	12/24/19 15:35	1
Barium	0.0086	B7	0.00050	mg/L		11/29/19 14:16	12/15/19 10:26	1
Cadmium	ND		0.00010	mg/L		11/29/19 14:16	12/15/19 10:26	1
Chromium	ND		0.0010	mg/L		11/29/19 14:16	12/24/19 15:35	1
Cobalt	0.00076		0.00050	mg/L		11/29/19 14:16	12/24/19 15:35	1
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:26	1

Euofins TestAmerica, Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-M51A-112519**

**Lab Sample ID: 550-133983-2**

Date Collected: 11/25/19 16:08

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	0.11		0.00050	mg/L		11/29/19 14:16	12/15/19 10:26	1
Selenium	ND		0.00050	mg/L		11/29/19 14:16	12/24/19 15:35	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	200	mg/L			12/02/19 09:59	1
pH	7.2	H5	1.7	SU			12/02/19 17:21	1
Temperature	15.6	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-W123-112519**

**Lab Sample ID: 550-133983-3**

Date Collected: 11/25/19 14:43

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6600	D2	400	mg/L			12/03/19 18:58	200
Fluoride	3.6	D1	0.80	mg/L			12/03/19 18:03	2
Sulfate	3700	D2	400	mg/L			12/03/19 18:58	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	35	M3	0.050	mg/L		11/29/19 14:06	12/02/19 19:44	1
Calcium	780	M3	2.0	mg/L		11/29/19 14:06	12/02/19 19:44	1
Lithium	0.66		0.20	mg/L		11/29/19 14:06	12/02/19 19:44	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0023	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:19	4
Barium	0.0097		0.0010	mg/L		11/29/19 14:16	12/26/19 13:31	2
Cadmium	ND		0.0010	mg/L		11/29/19 14:16	12/24/19 15:17	10
Chromium	0.14	B1 B7 D1	0.0040	mg/L		11/29/19 14:16	12/24/19 15:19	4
Cobalt	0.0026	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:19	4
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:22	1
Molybdenum	0.41		0.0050	mg/L		11/29/19 14:16	12/24/19 15:17	10
Selenium	0.0052	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:19	4

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	15000	D2	200	mg/L			12/02/19 09:59	1
pH	7.6	H5	1.7	SU			12/02/19 17:21	1
Temperature	14.9	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-FD01-112619**

**Lab Sample ID: 550-133983-4**

Date Collected: 11/26/19 08:39

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4600	D2	400	mg/L			12/03/19 20:48	200
Fluoride	1.1	D1	0.80	mg/L			12/03/19 20:30	2
Sulfate	3100	D2	400	mg/L			12/03/19 20:48	200

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-FD01-112619**

**Lab Sample ID: 550-133983-4**

Date Collected: 11/26/19 08:39

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.5		0.050	mg/L		11/29/19 14:06	12/02/19 19:55	1
Calcium	780		2.0	mg/L		11/29/19 14:06	12/02/19 19:55	1
Lithium	0.48		0.20	mg/L		11/29/19 14:06	12/02/19 19:55	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:39	4
Barium	0.016	B7	0.00050	mg/L		11/29/19 14:16	12/15/19 10:28	1
Cadmium	0.00028		0.00010	mg/L		11/29/19 14:16	12/15/19 10:28	1
Chromium	0.0026		0.0010	mg/L		01/07/20 07:30	01/09/20 20:32	1
Cobalt	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:39	4
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:28	1
Molybdenum	0.015		0.00050	mg/L		11/29/19 14:16	12/15/19 10:28	1
Selenium	0.026	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:39	4

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	100	mg/L			12/02/19 10:03	1
pH	7.2	H5	1.7	SU			12/02/19 17:21	1
Temperature	15.6	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-M65A-112619**

**Lab Sample ID: 550-133983-5**

Date Collected: 11/26/19 09:30

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3500	D2	400	mg/L			12/03/19 21:25	200
Fluoride	1.7	D1	0.80	mg/L			12/03/19 21:07	2
Sulfate	2900	D2	400	mg/L			12/03/19 21:25	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	12		0.050	mg/L		11/29/19 14:06	12/02/19 19:58	1
Calcium	760		2.0	mg/L		11/29/19 14:06	12/02/19 19:58	1
Lithium	0.52		0.20	mg/L		11/29/19 14:06	12/02/19 19:58	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:50	4
Barium	0.017	B7	0.00050	mg/L		11/29/19 14:16	12/15/19 10:30	1
Cadmium	0.00014		0.00010	mg/L		11/29/19 14:16	12/15/19 10:30	1
Chromium	0.015		0.0010	mg/L		12/26/19 15:42	12/31/19 21:25	1
Cobalt	0.0032	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:50	4
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:30	1
Molybdenum	0.080		0.00050	mg/L		11/29/19 14:16	12/15/19 10:30	1
Selenium	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:50	4

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	9300	D2	100	mg/L			12/02/19 10:03	1

Euromins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-M65A-112619**

**Lab Sample ID: 550-133983-5**

Date Collected: 11/26/19 09:30

Matrix: Water

Date Received: 11/27/19 09:56

### General Chemistry (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.1	H5	1.7	SU			12/02/19 17:21	1
Temperature	15.8	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-M66A-112619**

**Lab Sample ID: 550-133983-6**

Date Collected: 11/26/19 08:39

Matrix: Water

Date Received: 11/27/19 09:56

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4600	D2	400	mg/L			12/03/19 22:02	200
Fluoride	1.1	D1	0.80	mg/L			12/03/19 21:43	2
Sulfate	3100	D2	400	mg/L			12/03/19 22:02	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.5		0.050	mg/L		11/29/19 14:06	12/02/19 20:02	1
Calcium	780		2.0	mg/L		11/29/19 14:06	12/02/19 20:02	1
Lithium	0.48		0.20	mg/L		11/29/19 14:06	12/02/19 20:02	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0039	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:54	4
Barium	0.022	B7	0.00050	mg/L		11/29/19 14:16	12/15/19 10:32	1
Cadmium	0.00038		0.00010	mg/L		11/29/19 14:16	12/15/19 10:32	1
Chromium	0.016	B7	0.0010	mg/L		11/29/19 14:16	12/26/19 13:54	1
Cobalt	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:54	4
Lead	0.00061		0.00050	mg/L		11/29/19 14:16	12/15/19 10:32	1
Molybdenum	0.016		0.00050	mg/L		11/29/19 14:16	12/15/19 10:32	1
Selenium	0.060	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:54	4

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	100	mg/L			12/02/19 10:03	1
pH	7.2	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.2	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-M67A-112619**

**Lab Sample ID: 550-133983-7**

Date Collected: 11/26/19 10:17

Matrix: Water

Date Received: 11/27/19 09:56

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5000	D2	400	mg/L			12/03/19 22:39	200
Fluoride	ND	D1 D5	0.80	mg/L			12/03/19 22:20	2
Sulfate	1500	D2	400	mg/L			12/03/19 22:39	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.38		0.050	mg/L		11/29/19 14:06	12/02/19 20:06	1
Calcium	1500		2.0	mg/L		11/29/19 14:06	12/02/19 20:06	1
Lithium	ND		0.20	mg/L		11/29/19 14:06	12/02/19 20:06	1

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-M67A-112619**

**Lab Sample ID: 550-133983-7**

Date Collected: 11/26/19 10:17

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.015	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:58	4
Barium	0.026	B7	0.00050	mg/L		11/29/19 14:16	12/15/19 10:39	1
Cadmium	ND		0.00010	mg/L		11/29/19 14:16	12/15/19 10:39	1
Chromium	ND	D1	0.0040	mg/L		11/29/19 14:16	12/24/19 15:58	4
Cobalt	0.0042	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:58	4
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:39	1
Molybdenum	0.0052		0.00050	mg/L		11/29/19 14:16	12/15/19 10:39	1
Selenium	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 15:58	4

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	100	mg/L			12/02/19 10:03	1
pH	6.8	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.4	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-W126-112619**

**Lab Sample ID: 550-133983-8**

Date Collected: 11/26/19 08:07

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	7000	D2	400	mg/L			12/03/19 23:15	200
Fluoride	3.6	D1	0.80	mg/L			12/03/19 22:57	2
Sulfate	4200	D2	400	mg/L			12/03/19 23:15	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	48		0.050	mg/L		11/29/19 14:06	12/02/19 20:09	1
Calcium	720		2.0	mg/L		11/29/19 14:06	12/02/19 20:09	1
Lithium	0.70		0.20	mg/L		11/29/19 14:06	12/02/19 20:09	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0023	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 16:02	4
Barium	0.010		0.0010	mg/L		11/29/19 14:16	12/26/19 13:37	2
Cadmium	ND	D1	0.00040	mg/L		11/29/19 14:16	12/24/19 16:02	4
Chromium	0.019	B7	0.0010	mg/L		11/29/19 14:16	12/26/19 13:56	1
Cobalt	0.0040	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 16:02	4
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/24/19 16:04	1
Molybdenum	0.21	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 16:02	4
Selenium	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 16:02	4

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	15000	D2	200	mg/L			12/02/19 10:03	1
pH	7.3	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.5	H5	0.1	Degrees C			12/02/19 17:21	1

Eurolins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-M46A-112619**

**Lab Sample ID: 550-133983-9**

Date Collected: 11/26/19 12:38

Matrix: Water

Date Received: 11/27/19 09:56

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6400	D2	400	mg/L			12/04/19 00:29	200
Fluoride	ND	D1 D5	0.80	mg/L			12/04/19 00:11	2
Sulfate	1900	D2	400	mg/L			12/04/19 00:29	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.64		0.050	mg/L		11/29/19 14:06	12/02/19 20:13	1
Calcium	1300		2.0	mg/L		11/29/19 14:06	12/02/19 20:13	1
Lithium	0.23		0.20	mg/L		11/29/19 14:06	12/02/19 20:13	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0042	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 16:11	4
Barium	0.037	B7	0.00050	mg/L		11/29/19 14:16	12/15/19 10:43	1
Cadmium	ND		0.00010	mg/L		11/29/19 14:16	12/15/19 10:43	1
Chromium	ND	D1	0.0040	mg/L		11/29/19 14:16	12/24/19 16:11	4
Cobalt	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 16:11	4
Lead	0.00052		0.00050	mg/L		11/29/19 14:16	12/15/19 10:43	1
Molybdenum	0.026		0.00050	mg/L		11/29/19 14:16	12/15/19 10:43	1
Selenium	ND	D1	0.0020	mg/L		11/29/19 14:16	12/24/19 16:11	4

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	13000	D2	200	mg/L			12/02/19 10:03	1
pH	7.0	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.6	H5	0.1	Degrees C			12/02/19 17:21	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-197196/2**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/03/19 14:09	1
Fluoride	ND		0.40	mg/L			12/03/19 14:09	1
Sulfate	ND		2.0	mg/L			12/03/19 14:09	1

**Lab Sample ID: LCS 550-197196/5**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.0		mg/L		105	90 - 110
Fluoride	4.00	4.02		mg/L		100	90 - 110
Sulfate	20.0	20.3		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-197196/6**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.0		mg/L		105	90 - 110	0	20
Fluoride	4.00	4.01		mg/L		100	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-133983-3 MS**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	3.6	D1	8.00	11.3	D1	mg/L		96	80 - 120

**Lab Sample ID: 550-133983-3 MS**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	6600	D2	4000	10600	D2	mg/L		102	80 - 120
Sulfate	3700	D2	4000	7890	D2	mg/L		105	80 - 120

**Lab Sample ID: 550-133983-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	3.6	D1	8.00	11.3	D1	mg/L		96	80 - 120	0	20

**Lab Sample ID: 550-133983-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	6600	D2	4000	10700	D2	mg/L		102	80 - 120	0	20

Eurofins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-133983-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	3700	D2	4000	7910	D2	mg/L		105	80 - 120	0	20

**Lab Sample ID: 550-133984-B-4 MS ^200**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2800	D2	4000	7120	D2	mg/L		108	80 - 120		
Sulfate	590	D2	4000	4670	D2	mg/L		102	80 - 120		

**Lab Sample ID: 550-133984-B-4 MSD ^200**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2800	D2	4000	7140	D2	mg/L		109	80 - 120	0	20
Sulfate	590	D2	4000	4690	D2	mg/L		103	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-196858/1-A**  
**Matrix: Water**  
**Analysis Batch: 197081**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 196858**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		11/29/19 14:06	12/02/19 19:28	1
Calcium	ND		2.0	mg/L		11/29/19 14:06	12/02/19 19:28	1
Lithium	ND		0.20	mg/L		11/29/19 14:06	12/02/19 19:28	1

**Lab Sample ID: LCS 550-196858/2-A**  
**Matrix: Water**  
**Analysis Batch: 197081**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 196858**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.969		mg/L		97	85 - 115		
Calcium	21.0	21.2		mg/L		101	85 - 115		
Lithium	1.00	0.973		mg/L		97	85 - 115		

**Lab Sample ID: LCSD 550-196858/3-A**  
**Matrix: Water**  
**Analysis Batch: 197081**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 196858**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.970		mg/L		97	85 - 115	0	20
Calcium	21.0	21.1		mg/L		101	85 - 115	1	20
Lithium	1.00	0.965		mg/L		96	85 - 115	1	20



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-133983-3 MS**  
**Matrix: Water**  
**Analysis Batch: 197081**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196858**

Analyte	Sample	Sample	Spike	MS		Unit	D	%Rec	Limits
	Result	Qualifier		Result	Qualifier				
Boron	35	M3	1.00	34.8	M3	mg/L		-37	70 - 130
Calcium	780	M3	21.0	773	M3	mg/L		-31	70 - 130
Lithium	0.66		1.00	1.65		mg/L		99	70 - 130

**Lab Sample ID: 550-133983-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 197081**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196858**

Analyte	Sample	Sample	Spike	MSD		Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Boron	35	M3	1.00	35.4	M3	mg/L		29	70 - 130	2	20
Calcium	780	M3	21.0	791	M3	mg/L		57	70 - 130	2	20
Lithium	0.66		1.00	1.67		mg/L		101	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-196865/1-A**  
**Matrix: Water**  
**Analysis Batch: 198037**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Cadmium	ND		0.00010	mg/L		11/29/19 14:16	12/15/19 10:12	1
Lead	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:12	1
Molybdenum	ND		0.00050	mg/L		11/29/19 14:16	12/15/19 10:12	1

**Lab Sample ID: MB 550-196865/1-A**  
**Matrix: Water**  
**Analysis Batch: 198929**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Arsenic	ND		0.00050	mg/L		11/29/19 14:16	12/24/19 15:02	1
Chromium	0.00155	B1	0.0010	mg/L		11/29/19 14:16	12/24/19 15:02	1
Cobalt	ND		0.00050	mg/L		11/29/19 14:16	12/24/19 15:02	1
Selenium	ND		0.00050	mg/L		11/29/19 14:16	12/24/19 15:02	1

**Lab Sample ID: MB 550-196865/1-A**  
**Matrix: Water**  
**Analysis Batch: 199009**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Barium	ND		0.00050	mg/L		11/29/19 14:16	12/26/19 13:21	1

**Lab Sample ID: LCS 550-196865/2-A**  
**Matrix: Water**  
**Analysis Batch: 198037**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	Spike	LCS		Unit	D	%Rec	Limits
		Result	Qualifier				
Barium	0.100	0.113		mg/L		113	85 - 115
Cadmium	0.100	0.108		mg/L		108	85 - 115
Lead	0.100	0.106		mg/L		106	85 - 115
Molybdenum	0.100	0.105		mg/L		105	85 - 115

Eurolins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: LCS 550-196865/2-A**  
**Matrix: Water**  
**Analysis Batch: 198929**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.100	0.0919		mg/L		92	85 - 115
Chromium	0.100	0.0875		mg/L		87	85 - 115
Cobalt	0.100	0.0907		mg/L		91	85 - 115
Selenium	0.100	0.0901		mg/L		90	85 - 115

**Lab Sample ID: LCS 550-196865/2-A**  
**Matrix: Water**  
**Analysis Batch: 199009**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Barium	0.100	0.0948		mg/L		95	85 - 115

**Lab Sample ID: LCSD 550-196865/3-A**  
**Matrix: Water**  
**Analysis Batch: 198037**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Barium	0.100	0.115		mg/L		115	85 - 115	2	20
Cadmium	0.100	0.107		mg/L		107	85 - 115	1	20
Lead	0.100	0.107		mg/L		107	85 - 115	1	20
Molybdenum	0.100	0.104		mg/L		104	85 - 115	0	20

**Lab Sample ID: LCSD 550-196865/3-A**  
**Matrix: Water**  
**Analysis Batch: 198929**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.100	0.0945		mg/L		95	85 - 115	3	20
Chromium	0.100	0.0901		mg/L		90	85 - 115	3	20
Cobalt	0.100	0.0932		mg/L		93	85 - 115	3	20
Selenium	0.100	0.0934		mg/L		93	85 - 115	4	20

**Lab Sample ID: LCSD 550-196865/3-A**  
**Matrix: Water**  
**Analysis Batch: 199009**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**  
**%Rec.**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Barium	0.100	0.0979		mg/L		98	85 - 115	3	20

**Lab Sample ID: 550-133983-3 MS**  
**Matrix: Water**  
**Analysis Batch: 198037**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Lead	ND		0.100	0.0951		mg/L		95	70 - 130

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-133983-3 MS**  
**Matrix: Water**  
**Analysis Batch: 198929**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	Limits	%
	Result	Qualifier	Added	Result	Qualifier					
Arsenic	0.0023	D1	0.100	0.107		mg/L		105	70 - 130	
Cadmium	ND	D1	0.100	0.0905		mg/L		90	70 - 130	
Chromium	0.14	D1 B7 B1	0.100	0.233	B1	mg/L		98	70 - 130	
Cobalt	0.0026	D1	0.100	0.0944		mg/L		92	70 - 130	
Molybdenum	0.42	D1	0.100	0.512	M3	mg/L		94	70 - 130	
Selenium	0.0052	D1	0.100	0.109		mg/L		104	70 - 130	

**Lab Sample ID: 550-133983-3 MS**  
**Matrix: Water**  
**Analysis Batch: 199009**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	Limits	%
	Result	Qualifier	Added	Result	Qualifier					
Barium	0.0097		0.100	0.109		mg/L		99	70 - 130	

**Lab Sample ID: 550-133983-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 198037**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
Lead	ND		0.100	0.0947		mg/L		95	70 - 130	0	20

**Lab Sample ID: 550-133983-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 198929**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
Arsenic	0.0023	D1	0.100	0.108		mg/L		106	70 - 130	1	20
Cadmium	ND	D1	0.100	0.0928		mg/L		93	70 - 130	3	20
Chromium	0.14	D1 B7 B1	0.100	0.245	B1	mg/L		110	70 - 130	5	20
Cobalt	0.0026	D1	0.100	0.0976		mg/L		95	70 - 130	3	20
Molybdenum	0.42	D1	0.100	0.524	M3	mg/L		106	70 - 130	2	20
Selenium	0.0052	D1	0.100	0.113		mg/L		108	70 - 130	4	20

**Lab Sample ID: 550-133983-3 MSD**  
**Matrix: Water**  
**Analysis Batch: 199009**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196865**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
Barium	0.0097		0.100	0.107		mg/L		97	70 - 130	2	20

**Lab Sample ID: MB 550-199026/1-A**  
**Matrix: Water**  
**Analysis Batch: 199411**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 199026**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Chromium	ND		0.0010	mg/L		12/26/19 15:42	12/31/19 21:08	1

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-199026/2-A**  
**Matrix: Water**  
**Analysis Batch: 199411**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 199026**  
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Chromium	0.100	0.0958		mg/L		96	85 - 115

**Lab Sample ID: LCSD 550-199026/3-A**  
**Matrix: Water**  
**Analysis Batch: 199411**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 199026**  
 %Rec. RPD

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chromium	0.100	0.0982		mg/L		98	85 - 115	2	20

**Lab Sample ID: 550-133981-H-7-D MS**  
**Matrix: Water**  
**Analysis Batch: 199411**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 199026**  
 %Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Chromium	ND		0.100	0.0985		mg/L		98	70 - 130

**Lab Sample ID: 550-133981-H-7-E MSD**  
**Matrix: Water**  
**Analysis Batch: 199411**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 199026**  
 %Rec. RPD

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chromium	ND		0.100	0.0972		mg/L		97	70 - 130	1	20

**Lab Sample ID: MB 550-199500/1-A**  
**Matrix: Water**  
**Analysis Batch: 199847**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 199500**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		01/07/20 07:30	01/09/20 20:17	1

**Lab Sample ID: LCS 550-199500/2-A**  
**Matrix: Water**  
**Analysis Batch: 199847**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 199500**  
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Chromium	0.100	0.0899		mg/L		90	85 - 115

**Lab Sample ID: LCSD 550-199500/3-A**  
**Matrix: Water**  
**Analysis Batch: 199847**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 199500**  
 %Rec. RPD

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chromium	0.100	0.0901		mg/L		90	85 - 115	0	20

**Lab Sample ID: 550-135590-A-3-A MS**  
**Matrix: Water**  
**Analysis Batch: 199847**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 199500**  
 %Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Chromium	0.0033		0.100	0.0891		mg/L		86	70 - 130

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# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: 550-135590-A-3-B MSD**  
**Matrix: Water**  
**Analysis Batch: 199847**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 199500**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	0.0033		0.100	0.0895		mg/L		86	70 - 130	0	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-196964/1**  
**Matrix: Water**  
**Analysis Batch: 196964**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			12/02/19 09:59	1

**Lab Sample ID: LCS 550-196964/2**  
**Matrix: Water**  
**Analysis Batch: 196964**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	980		mg/L		98	90 - 110

**Lab Sample ID: LCSD 550-196964/3**  
**Matrix: Water**  
**Analysis Batch: 196964**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	982		mg/L		98	90 - 110	0	10

**Lab Sample ID: 550-133983-3 DU**  
**Matrix: Water**  
**Analysis Batch: 196964**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	15000	D2	14100	D2	mg/L		7	10

**Lab Sample ID: MB 550-196965/1**  
**Matrix: Water**  
**Analysis Batch: 196965**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			12/02/19 10:03	1

**Lab Sample ID: LCS 550-196965/2**  
**Matrix: Water**  
**Analysis Batch: 196965**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	980		mg/L		98	90 - 110

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

**Lab Sample ID: LCSD 550-196965/3**  
**Matrix: Water**  
**Analysis Batch: 196965**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	964		mg/L		96	90 - 110	2	10

**Lab Sample ID: 550-133972-A-4 DU**  
**Matrix: Water**  
**Analysis Batch: 196965**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	2400	D2	2430	D2	mg/L		2	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-197022/1**  
**Matrix: Water**  
**Analysis Batch: 197022**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	6.9		SU		98.9	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-197022/12**  
**Matrix: Water**  
**Analysis Batch: 197022**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.7	98.5 - 101.5

**Lab Sample ID: 550-133983-3 DU**  
**Matrix: Water**  
**Analysis Batch: 197022**

**Client Sample ID: CH-CCR-W123-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.6	H5	7.6	H5	SU		0	5
Temperature	14.9	H5	14.6	H5	Degrees C		2	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## HPLC/IC

### Analysis Batch: 197196

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	300.0	
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	300.0	
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	300.0	
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	300.0	
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	300.0	
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	300.0	
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	300.0	
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	300.0	
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	300.0	
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	300.0	
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	300.0	
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	300.0	
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	300.0	
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	300.0	
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	300.0	
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	300.0	
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	300.0	
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	300.0	
MB 550-197196/2	Method Blank	Total/NA	Water	300.0	
LCS 550-197196/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-197196/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	300.0	
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	300.0	
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	300.0	
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	300.0	
550-133984-B-4 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-133984-B-4 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 196858

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	200.7	
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	200.7	
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	200.7	
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	200.7	
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	200.7	
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	200.7	
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	200.7	
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	200.7	
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	200.7	
MB 550-196858/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-196858/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-196858/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	200.7	
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	200.7	

### Prep Batch: 196865

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	200.8	
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	200.8	

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# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Metals (Continued)

### Prep Batch: 196865 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	200.8	
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	200.8	
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	200.8	
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	200.8	
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	200.8	
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	200.8	
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	200.8	
MB 550-196865/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-196865/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-196865/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	200.8	
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	200.8	

### Analysis Batch: 197081

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	200.7 Rev 4.4	196858
MB 550-196858/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	196858
LCS 550-196858/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	196858
LCSD 550-196858/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	200.7 Rev 4.4	196858
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	200.7 Rev 4.4	196858

### Analysis Batch: 198037

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	200.8 LL	196865
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	200.8 LL	196865
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	200.8 LL	196865
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	200.8 LL	196865
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	200.8 LL	196865
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	200.8 LL	196865
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	200.8 LL	196865
MB 550-196865/1-A	Method Blank	Total/NA	Water	200.8 LL	196865
LCS 550-196865/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	196865
LCSD 550-196865/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	196865
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865

### Analysis Batch: 198929

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	200.8 LL	196865
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	200.8 LL	196865
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865

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# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Metals (Continued)

### Analysis Batch: 198929 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	200.8 LL	196865
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	200.8 LL	196865
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	200.8 LL	196865
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	200.8 LL	196865
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	200.8 LL	196865
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	200.8 LL	196865
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	200.8 LL	196865
MB 550-196865/1-A	Method Blank	Total/NA	Water	200.8 LL	196865
LCS 550-196865/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	196865
LCSD 550-196865/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	196865
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865

### Analysis Batch: 199009

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	200.8 LL	196865
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	200.8 LL	196865
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	200.8 LL	196865
MB 550-196865/1-A	Method Blank	Total/NA	Water	200.8 LL	196865
LCS 550-196865/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	196865
LCSD 550-196865/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	196865
550-133983-3 MS	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865
550-133983-3 MSD	CH-CCR-W123-112519	Total/NA	Water	200.8 LL	196865

### Prep Batch: 199026

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	200.8	
MB 550-199026/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-199026/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-199026/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-133981-H-7-D MS	Matrix Spike	Total/NA	Water	200.8	
550-133981-H-7-E MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Analysis Batch: 199411

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	200.8 LL	199026
MB 550-199026/1-A	Method Blank	Total/NA	Water	200.8 LL	199026
LCS 550-199026/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	199026
LCSD 550-199026/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	199026
550-133981-H-7-D MS	Matrix Spike	Total/NA	Water	200.8 LL	199026
550-133981-H-7-E MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	199026

### Prep Batch: 199500

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	200.8	
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	200.8	
MB 550-199500/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-199500/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-199500/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	

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# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Metals (Continued)

### Prep Batch: 199500 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-135590-A-3-A MS	Matrix Spike	Total/NA	Water	200.8	
550-135590-A-3-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Analysis Batch: 199847

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	200.8 LL	199500
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	200.8 LL	199500
MB 550-199500/1-A	Method Blank	Total/NA	Water	200.8 LL	199500
LCS 550-199500/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	199500
LCSD 550-199500/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	199500
550-135590-A-3-A MS	Matrix Spike	Total/NA	Water	200.8 LL	199500
550-135590-A-3-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	199500

## General Chemistry

### Analysis Batch: 196964

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	SM 2540C	
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	SM 2540C	
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	SM 2540C	
MB 550-196964/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-196964/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-196964/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-133983-3 DU	CH-CCR-W123-112519	Total/NA	Water	SM 2540C	

### Analysis Batch: 196965

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	SM 2540C	
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	SM 2540C	
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	SM 2540C	
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	SM 2540C	
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	SM 2540C	
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	SM 2540C	
MB 550-196965/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-196965/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-196965/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-133972-A-4 DU	Duplicate	Total/NA	Water	SM 2540C	

### Analysis Batch: 197022

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-1	CH-CCR-M50A-112519	Total/NA	Water	SM 4500 H+ B	
550-133983-2	CH-CCR-M51A-112519	Total/NA	Water	SM 4500 H+ B	
550-133983-3	CH-CCR-W123-112519	Total/NA	Water	SM 4500 H+ B	
550-133983-4	CH-CCR-FD01-112619	Total/NA	Water	SM 4500 H+ B	
550-133983-5	CH-CCR-M65A-112619	Total/NA	Water	SM 4500 H+ B	
550-133983-6	CH-CCR-M66A-112619	Total/NA	Water	SM 4500 H+ B	
550-133983-7	CH-CCR-M67A-112619	Total/NA	Water	SM 4500 H+ B	
550-133983-8	CH-CCR-W126-112619	Total/NA	Water	SM 4500 H+ B	
550-133983-9	CH-CCR-M46A-112619	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-197022/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-197022/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## General Chemistry (Continued)

### Analysis Batch: 197022 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133983-3 DU	CH-CCR-W123-112519	Total/NA	Water	SM 4500 H+ B	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-M50A-112519**

**Lab Sample ID: 550-133983-1**

**Date Collected: 11/25/19 15:17**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 16:49	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 17:07	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 19:47	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:24	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198929	12/24/19 15:29	ARE	TAL PHX
Total/NA	Prep	200.8			199500	01/07/20 07:30	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	199847	01/09/20 20:30	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196964		YET	TAL PHX
					(Start)	12/02/19 09:59		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-M51A-112519**

**Lab Sample ID: 550-133983-2**

**Date Collected: 11/25/19 16:08**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 17:26	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 17:44	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 19:51	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:26	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198929	12/24/19 15:35	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196964		YET	TAL PHX
					(Start)	12/02/19 09:59		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-W123-112519**

**Lab Sample ID: 550-133983-3**

**Date Collected: 11/25/19 14:43**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 18:03	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 18:58	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 19:44	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:22	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-W123-112519**

**Lab Sample ID: 550-133983-3**

**Date Collected: 11/25/19 14:43**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		10	198929	12/24/19 15:17	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		4	198929	12/24/19 15:19	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		2	199009	12/26/19 13:31	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196964		YET	TAL PHX
					(Start)	12/02/19 09:59		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD01-112619**

**Lab Sample ID: 550-133983-4**

**Date Collected: 11/26/19 08:39**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 20:30	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 20:48	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 19:55	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:28	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		4	198929	12/24/19 15:39	ARE	TAL PHX
Total/NA	Prep	200.8			199500	01/07/20 07:30	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	199847	01/09/20 20:32	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965		YET	TAL PHX
					(Start)	12/02/19 10:03		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-M65A-112619**

**Lab Sample ID: 550-133983-5**

**Date Collected: 11/26/19 09:30**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 21:07	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 21:25	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 19:58	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:30	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		4	198929	12/24/19 15:50	ARE	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-M65A-112619**

**Lab Sample ID: 550-133983-5**

**Date Collected: 11/26/19 09:30**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			199026	12/26/19 15:42	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	199411	12/31/19 21:25	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965	(Start) 12/02/19 10:03 (End) 12/03/19 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-M66A-112619**

**Lab Sample ID: 550-133983-6**

**Date Collected: 11/26/19 08:39**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 21:43	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 22:02	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 20:02	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:32	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		4	198929	12/24/19 15:54	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	199009	12/26/19 13:54	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965	(Start) 12/02/19 10:03 (End) 12/03/19 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-M67A-112619**

**Lab Sample ID: 550-133983-7**

**Date Collected: 11/26/19 10:17**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 22:20	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 22:39	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 20:06	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:39	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		4	198929	12/24/19 15:58	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965	(Start) 12/02/19 10:03 (End) 12/03/19 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

**Client Sample ID: CH-CCR-W126-112619**

**Lab Sample ID: 550-133983-8**

**Date Collected: 11/26/19 08:07**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/03/19 22:57	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/03/19 23:15	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 20:09	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		4	198929	12/24/19 16:02	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198929	12/24/19 16:04	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		2	199009	12/26/19 13:37	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	199009	12/26/19 13:56	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965		YET	TAL PHX
					(Start)	12/02/19 10:03		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-M46A-112619**

**Lab Sample ID: 550-133983-9**

**Date Collected: 11/26/19 12:38**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	197196	12/04/19 00:11	NEL	TAL PHX
Total/NA	Analysis	300.0		200	197196	12/04/19 00:29	NEL	TAL PHX
Total/NA	Prep	200.7			196858	11/29/19 14:06	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197081	12/02/19 20:13	SRA	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198037	12/15/19 10:43	ARE	TAL PHX
Total/NA	Prep	200.8			196865	11/29/19 14:16	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		4	198929	12/24/19 16:11	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965		YET	TAL PHX
					(Start)	12/02/19 10:03		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State Program	AZ0728	06-09-20

- 1
- 2
- 3
- 4
- 5
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- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133983-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# TestAmerica Phoenix

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

# Chain of Custody Record

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING  
TestAmerica Laboratories, Inc.

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

133983

COC No. of COCs  
Sampler: SE-3127  
For Lab Use Only:

Client Contact  
Jim Edwards  
928-386-0302

Lab Contact:  
Jim Edwards

Date:  
Carrier:

COCS No. of COCs  
Sampler: SE-3127  
For Lab Use Only:

APS Cholla  
4801 Cholla Lake Rd  
Joseph City, AZ 86032

Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS

Carrier:

Date:

COCS No. of COCs  
Sampler: SE-3127  
For Lab Use Only:

928/386-0302 Phone  
(xxx) xxx-xxxx FAX

TAT if different from Below  
 2 weeks  
 1 week  
 2 days  
 1 day

Carrier:

Date:

COCS No. of COCs  
Sampler: SE-3127  
For Lab Use Only:

Project Name:  
Site:

Carrier:

Date:

COCS No. of COCs  
Sampler: SE-3127  
For Lab Use Only:

P O #

Carrier:

Date:

COCS No. of COCs  
Sampler: SE-3127  
For Lab Use Only:

Sample Identification

Sample Date Sample Time Sample Type (C=Comp, G=Grab) Matrix # of Cont.

Filtered Sample ( Y / N )  
Perform MS / MSD ( Y / N )  
EPA 200.7 (B, Ca, Li)  
200.8 (As, Ba, Cd, Cr, Co, Pb, Mo, Se)  
EPA 300.0 (Cl, F, SO4)  
SM 2450C (TDS)  
SM 4500HB (pH)

Carrier:

COCS No. of COCs  
Sampler: SE-3127  
For Lab Use Only:



Sample Specific Notes:  
low flow -01  
-02  
-03  
-04  
-05  
-06  
-07  
-08  
low flow -09

Sample ID	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 (B, Ca, Li)	200.8 (As, Ba, Cd, Cr, Co, Pb, Mo, Se)	EPA 300.0 (Cl, F, SO4)	SM 2450C (TDS)	SM 4500HB (pH)	Carrier	Date	COCS No.	of	COCS	Sampler	For Lab Use Only	
CH-CGR-M-50A - 112519	11/25/19	15:17	G	W	N	X	X	X	X	X	X	X								
CH-CGR-M-51A - 112519	11/25/19	16:08	G	W	N	X	X	X	X	X	X	X								
CH-CGR-W-123 - 112519	11/25/19	14:43	G	W	N	X	X	X	X	X	X	X								
CH-CGR-FD-01 - 112619	11/26/19	08:39	G	W	N	X	X	X	X	X	X	X								
CH-CGR-M-65A - 112619	11/26/19	09:30	G	W	N	X	X	X	X	X	X	X								
CH-CGR-M-66A - 112619	11/26/19	08:39	G	W	N	X	X	X	X	X	X	X								
CH-CGR-M-67A - 112619	11/26/19	10:17	G	W	N	X	X	X	X	X	X	X								
CH-CGR-W-126 - 112619	11/26/19	08:07	G	W	N	X	X	X	X	X	X	X								
CH-CGR-M-64A			G	W	N	X	X	X	X	X	X	X								
CH-CGR-M-49A			G	W	N	X	X	X	X	X	X	X								
CH-CGR-M-46A - 112619	11/26/19	12:38	G	W	N	X	X	X	X	X	X	X								

Preservation Used: 1=Ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Possible Hazard Identification:  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Special Instructions/QC Requirements & Comments:  
Method 200.8 with collision cell

0.6%, 0.8% nb

Custody Seals Intact:  Yes  No

Custody Seal No.:

Cooler Temp. (°C): Obs'd:

Corrd:

Therm ID No.:

Relinquished by: Sac Carrick

Company: pod

Date/Time: 11/24/19 09:56

Received by:

Company:

Date/Time:

Relinquished by: [Signature]

Company:

Date/Time:

Received by:

Company:

Date/Time:

Relinquished by:

Company:

Date/Time:

Received by:

Company:

Date/Time:

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-133983-1

**Login Number: 133983**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.





## ANALYTICAL REPORT

Eurofins TestAmerica, Phoenix  
4625 East Cotton Ctr Blvd  
Suite 189  
Phoenix, AZ 85040  
Tel: (602)437-3340

Laboratory Job ID: 550-133984-1  
Client Project/Site: APS - Cholla CCR

For:  
Arizona Public Service Company  
PO BOX 188, Ste. 4458  
Joseph City, Arizona 86032

Attn: Jim Edwards



Authorized for release by:  
12/17/2019 3:49:44 PM

Ken Baker, Project Manager II  
(602)659-7624  
[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.

### Metals

Qualifier	Qualifier Description
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

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**Job ID: 550-133984-1**

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**Laboratory: Eurofins TestAmerica, Phoenix**

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**Narrative**

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**Job Narrative**  
**550-133984-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 11/27/2019 9:56 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.8° C.

**HPLC/IC**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**Metals**

Method 200.8 LL: The following sample was diluted to bring the concentration of Manganese within the calibration range: CH-CCR-M62A-112519 (550-133984-4). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**General Chemistry**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
550-133984-1	CH-CCR-M56A-112519	Water	11/25/19 11:19	11/27/19 09:56	
550-133984-2	CH-CCR-M57A-112519	Water	11/25/19 10:41	11/27/19 09:56	
550-133984-3	CH-CCR-M58A-112519	Water	11/25/19 09:07	11/27/19 09:56	
550-133984-4	CH-CCR-M62A-112519	Water	11/25/19 12:47	11/27/19 09:56	
550-133984-5	CH-CCR-FD-01-112519	Water	11/25/19 10:41	11/27/19 09:56	

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Client Sample ID: CH-CCR-M56A-112519

## Lab Sample ID: 550-133984-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1700	D2	400	mg/L	200		300.0	Total/NA
Sulfate	880	D2	400	mg/L	200		300.0	Total/NA
Boron	0.32		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0088		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.063		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0086		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00064		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0087		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	4500	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M57A-112519

## Lab Sample ID: 550-133984-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1900	D2	400	mg/L	200		300.0	Total/NA
Sulfate	1400	D2	400	mg/L	200		300.0	Total/NA
Boron	0.54		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	440		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.021		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.047		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0038		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0044		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	4900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.0	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M58A-112519

## Lab Sample ID: 550-133984-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2000	D2	400	mg/L	200		300.0	Total/NA
Sulfate	530	D2	400	mg/L	200		300.0	Total/NA
Boron	0.22		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0046		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.079		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0018		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	4000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M62A-112519

## Lab Sample ID: 550-133984-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2800	D2	400	mg/L	200		300.0	Total/NA
Sulfate	590	D2	400	mg/L	200		300.0	Total/NA
Boron	0.22		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	450	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0048		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.15	M1	0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Detection Summary

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Client Sample ID: CH-CCR-M62A-112519 (Continued)

## Lab Sample ID: 550-133984-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chromium	0.0044		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0012		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0091		0.00050	mg/L	1		200.8 LL	Total/NA
Thallium	0.00016		0.00010	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	5900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD-01-112519

## Lab Sample ID: 550-133984-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1800	D2	400	mg/L	200		300.0	Total/NA
Sulfate	1400	D2	400	mg/L	200		300.0	Total/NA
Boron	0.58		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	480		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.021		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.047		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0035		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0046		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.012		0.00050	mg/L	1		200.8 LL	Total/NA
Total Dissolved Solids	4800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.0	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

**Client Sample ID: CH-CCR-M56A-112519**

**Lab Sample ID: 550-133984-1**

Date Collected: 11/25/19 11:19

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1700	D2	400	mg/L			12/04/19 01:06	200
Fluoride	ND		0.40	mg/L			12/05/19 06:46	1
Sulfate	880	D2	400	mg/L			12/04/19 01:06	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.32		0.050	mg/L		11/29/19 14:09	12/02/19 20:41	1
Calcium	300		2.0	mg/L		11/29/19 14:09	12/02/19 20:41	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0088		0.00050	mg/L		11/29/19 14:20	12/15/19 05:40	1
Barium	0.063		0.00050	mg/L		11/29/19 14:20	12/15/19 05:40	1
Chromium	0.0086		0.0010	mg/L		11/29/19 14:20	12/15/19 05:40	1
Cobalt	0.00064		0.00050	mg/L		11/29/19 14:20	12/15/19 05:40	1
Molybdenum	0.0087		0.00050	mg/L		11/29/19 14:20	12/15/19 05:40	1
Thallium	ND		0.00010	mg/L		11/29/19 14:20	12/15/19 05:40	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4500	D2	100	mg/L			12/02/19 09:59	1
pH	7.3	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.2	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-M57A-112519**

**Lab Sample ID: 550-133984-2**

Date Collected: 11/25/19 10:41

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1900	D2	400	mg/L			12/04/19 01:43	200
Fluoride	ND		0.40	mg/L			12/05/19 07:05	1
Sulfate	1400	D2	400	mg/L			12/04/19 01:43	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.54		0.050	mg/L		11/29/19 14:09	12/02/19 20:45	1
Calcium	440		2.0	mg/L		11/29/19 14:09	12/02/19 20:45	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.021		0.00050	mg/L		11/29/19 14:20	12/15/19 05:42	1
Barium	0.047		0.00050	mg/L		11/29/19 14:20	12/15/19 05:42	1
Chromium	0.0038		0.0010	mg/L		11/29/19 14:20	12/15/19 05:42	1
Cobalt	0.0044		0.00050	mg/L		11/29/19 14:20	12/15/19 05:42	1
Molybdenum	0.012		0.00050	mg/L		11/29/19 14:20	12/15/19 05:42	1
Thallium	ND		0.00010	mg/L		11/29/19 14:20	12/15/19 05:42	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4900	D2	100	mg/L			12/02/19 10:03	1

Eurolins TestAmerica, Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

**Client Sample ID: CH-CCR-M57A-112519**

**Lab Sample ID: 550-133984-2**

Date Collected: 11/25/19 10:41

Matrix: Water

Date Received: 11/27/19 09:56

### General Chemistry (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.0	H5	1.7	SU			12/02/19 17:21	1
Temperature	15.8	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-M58A-112519**

**Lab Sample ID: 550-133984-3**

Date Collected: 11/25/19 09:07

Matrix: Water

Date Received: 11/27/19 09:56

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2000	D2	400	mg/L			12/04/19 02:20	200
Fluoride	ND		0.40	mg/L			12/05/19 07:23	1
Sulfate	530	D2	400	mg/L			12/04/19 02:20	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.22		0.050	mg/L		11/29/19 14:09	12/02/19 20:48	1
Calcium	300		2.0	mg/L		11/29/19 14:09	12/02/19 20:48	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0046		0.00050	mg/L		11/29/19 14:20	12/15/19 05:45	1
Barium	0.079		0.00050	mg/L		11/29/19 14:20	12/15/19 05:45	1
Chromium	ND		0.0010	mg/L		11/29/19 14:20	12/15/19 05:45	1
Cobalt	ND		0.00050	mg/L		11/29/19 14:20	12/15/19 05:45	1
Molybdenum	0.0018		0.00050	mg/L		11/29/19 14:20	12/15/19 05:45	1
Thallium	ND		0.00010	mg/L		11/29/19 14:20	12/15/19 05:45	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4000	D2	100	mg/L			12/02/19 10:03	1
pH	7.4	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.1	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-M62A-112519**

**Lab Sample ID: 550-133984-4**

Date Collected: 11/25/19 12:47

Matrix: Water

Date Received: 11/27/19 09:56

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2800	D2	400	mg/L			12/04/19 04:47	200
Fluoride	ND		0.40	mg/L			12/05/19 07:42	1
Sulfate	590	D2	400	mg/L			12/04/19 04:47	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.22		0.050	mg/L		11/29/19 14:09	12/02/19 20:38	1
Calcium	450	M3	2.0	mg/L		11/29/19 14:09	12/02/19 20:38	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0048		0.00050	mg/L		11/29/19 14:20	12/15/19 05:38	1
Barium	0.15	M1	0.00050	mg/L		11/29/19 14:20	12/15/19 05:38	1

Eurofins TestAmerica, Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

**Client Sample ID: CH-CCR-M62A-112519**

**Lab Sample ID: 550-133984-4**

Date Collected: 11/25/19 12:47

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	0.0044		0.0010	mg/L		11/29/19 14:20	12/15/19 05:38	1
Cobalt	0.0012		0.00050	mg/L		11/29/19 14:20	12/15/19 05:38	1
Molybdenum	0.0091		0.00050	mg/L		11/29/19 14:20	12/15/19 05:38	1
Thallium	0.00016		0.00010	mg/L		11/29/19 14:20	12/15/19 05:38	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5900	D2	100	mg/L			12/02/19 10:03	1
pH	7.3	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.6	H5	0.1	Degrees C			12/02/19 17:21	1

**Client Sample ID: CH-CCR-FD-01-112519**

**Lab Sample ID: 550-133984-5**

Date Collected: 11/25/19 10:41

Matrix: Water

Date Received: 11/27/19 09:56

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1800	D2	400	mg/L			12/04/19 02:56	200
Fluoride	ND		0.40	mg/L			12/05/19 08:37	1
Sulfate	1400	D2	400	mg/L			12/04/19 02:56	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.58		0.050	mg/L		11/29/19 14:09	12/02/19 20:52	1
Calcium	480		2.0	mg/L		11/29/19 14:09	12/02/19 20:52	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.021		0.00050	mg/L		11/29/19 14:20	12/15/19 05:47	1
Barium	0.047		0.00050	mg/L		11/29/19 14:20	12/15/19 05:47	1
Chromium	0.0035		0.0010	mg/L		11/29/19 14:20	12/15/19 05:47	1
Cobalt	0.0046		0.00050	mg/L		11/29/19 14:20	12/15/19 05:47	1
Molybdenum	0.012		0.00050	mg/L		11/29/19 14:20	12/15/19 05:47	1
Thallium	ND		0.00010	mg/L		11/29/19 14:20	12/15/19 05:47	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4800	D2	100	mg/L			12/02/19 10:03	1
pH	7.0	H5	1.7	SU			12/02/19 17:21	1
Temperature	16.0	H5	0.1	Degrees C			12/02/19 17:21	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-197196/2**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/03/19 14:09	1
Fluoride	ND		0.40	mg/L			12/03/19 14:09	1
Sulfate	ND		2.0	mg/L			12/03/19 14:09	1

**Lab Sample ID: LCS 550-197196/5**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.0		mg/L		105	90 - 110
Fluoride	4.00	4.02		mg/L		100	90 - 110
Sulfate	20.0	20.3		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-197196/6**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.0		mg/L		105	90 - 110	0	20
Fluoride	4.00	4.01		mg/L		100	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-133983-B-3 MS ^2**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	3.6	D1	8.00	11.3	D1	mg/L		96	80 - 120

**Lab Sample ID: 550-133983-B-3 MS ^200**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	6600	D2	4000	10600	D2	mg/L		102	80 - 120
Sulfate	3700	D2	4000	7890	D2	mg/L		105	80 - 120

**Lab Sample ID: 550-133983-B-3 MSD ^2**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	3.6	D1	8.00	11.3	D1	mg/L		96	80 - 120	0	20

**Lab Sample ID: 550-133983-B-3 MSD ^200**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	6600	D2	4000	10700	D2	mg/L		102	80 - 120	0	20

Eurofins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-133983-B-3 MSD ^200**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	3700	D2	4000	7910	D2	mg/L		105	80 - 120	0	20

**Lab Sample ID: 550-133984-4 MS**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2800	D2	4000	7120	D2	mg/L		108	80 - 120		
Sulfate	590	D2	4000	4670	D2	mg/L		102	80 - 120		

**Lab Sample ID: 550-133984-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 197196**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	2800	D2	4000	7140	D2	mg/L		109	80 - 120	0	20
Sulfate	590	D2	4000	4690	D2	mg/L		103	80 - 120	0	20

**Lab Sample ID: MB 550-197316/1030**  
**Matrix: Water**  
**Analysis Batch: 197316**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/05/19 03:42	1
Fluoride	ND		0.40	mg/L			12/05/19 03:42	1
Sulfate	ND		2.0	mg/L			12/05/19 03:42	1

**Lab Sample ID: LCS 550-197316/31**  
**Matrix: Water**  
**Analysis Batch: 197316**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.4		mg/L		107	90 - 110		
Fluoride	4.00	4.14		mg/L		104	90 - 110		
Sulfate	20.0	20.7		mg/L		103	90 - 110		

**Lab Sample ID: LCSD 550-197316/32**  
**Matrix: Water**  
**Analysis Batch: 197316**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.4		mg/L		107	90 - 110	0	20
Fluoride	4.00	4.14		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.7		mg/L		103	90 - 110	0	20

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-133984-4 MS**  
**Matrix: Water**  
**Analysis Batch: 197316**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND		4.00	3.90		mg/L		92	80 - 120

**Lab Sample ID: 550-133984-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 197316**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND		4.00	4.11		mg/L		97	80 - 120	5	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-196859/1-A**  
**Matrix: Water**  
**Analysis Batch: 197082**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 196859**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		11/29/19 14:09	12/02/19 20:22	1
Calcium	ND		2.0	mg/L		11/29/19 14:09	12/02/19 20:22	1

**Lab Sample ID: LCS 550-196859/2-A**  
**Matrix: Water**  
**Analysis Batch: 197082**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 196859**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.982		mg/L		98	85 - 115
Calcium	21.0	21.4		mg/L		102	85 - 115

**Lab Sample ID: LCSD 550-196859/3-A**  
**Matrix: Water**  
**Analysis Batch: 197082**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 196859**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.977		mg/L		98	85 - 115	1	20
Calcium	21.0	21.0		mg/L		100	85 - 115	2	20

**Lab Sample ID: 550-133984-4 MS**  
**Matrix: Water**  
**Analysis Batch: 197082**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196859**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.22		1.00	1.21		mg/L		99	70 - 130
Calcium	450	M3	21.0	452	M3	mg/L		20	70 - 130

**Lab Sample ID: 550-133984-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 197082**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196859**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.22		1.00	1.26		mg/L		104	70 - 130	3	20
Calcium	450	M3	21.0	467	M3	mg/L		90	70 - 130	3	20

Eurolins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-196873/1-A**  
**Matrix: Water**  
**Analysis Batch: 198025**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 196873**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		11/29/19 14:20	12/15/19 05:28	1
Barium	ND		0.00050	mg/L		11/29/19 14:20	12/15/19 05:28	1
Chromium	ND		0.0010	mg/L		11/29/19 14:20	12/15/19 05:28	1
Cobalt	ND		0.00050	mg/L		11/29/19 14:20	12/15/19 05:28	1
Molybdenum	ND		0.00050	mg/L		11/29/19 14:20	12/15/19 05:28	1
Thallium	ND		0.00010	mg/L		11/29/19 14:20	12/15/19 05:28	1

**Lab Sample ID: LCS 550-196873/2-A**  
**Matrix: Water**  
**Analysis Batch: 198025**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 196873**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.100	0.103		mg/L		103	85 - 115
Barium	0.100	0.108		mg/L		108	85 - 115
Chromium	0.100	0.101		mg/L		101	85 - 115
Cobalt	0.100	0.105		mg/L		105	85 - 115
Molybdenum	0.100	0.103		mg/L		103	85 - 115
Thallium	0.100	0.109		mg/L		109	85 - 115

**Lab Sample ID: LCSD 550-196873/3-A**  
**Matrix: Water**  
**Analysis Batch: 198025**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 196873**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.100	0.0997		mg/L		100	85 - 115	3	20
Barium	0.100	0.104		mg/L		104	85 - 115	4	20
Chromium	0.100	0.0969		mg/L		97	85 - 115	4	20
Cobalt	0.100	0.102		mg/L		102	85 - 115	3	20
Molybdenum	0.100	0.0996		mg/L		100	85 - 115	3	20
Thallium	0.100	0.110		mg/L		110	85 - 115	1	20

**Lab Sample ID: 550-133984-4 MS**  
**Matrix: Water**  
**Analysis Batch: 198025**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196873**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.0048		0.100	0.109		mg/L		104	70 - 130
Barium	0.15	M1	0.100	0.281	M1	mg/L		133	70 - 130
Chromium	0.0044		0.100	0.0998		mg/L		95	70 - 130
Cobalt	0.0012		0.100	0.0939		mg/L		93	70 - 130
Molybdenum	0.0091		0.100	0.117		mg/L		108	70 - 130
Thallium	0.00016		0.100	0.101		mg/L		101	70 - 130

**Lab Sample ID: 550-133984-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 198025**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**  
**Prep Batch: 196873**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.0048		0.100	0.117		mg/L		112	70 - 130	7	20

Eurolins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

Lab Sample ID: 550-133984-4 MSD  
Matrix: Water  
Analysis Batch: 198025

Client Sample ID: CH-CCR-M62A-112519  
Prep Type: Total/NA  
Prep Batch: 196873

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	0.15	M1	0.100	0.268		mg/L		120	70 - 130	5	20
Chromium	0.0044		0.100	0.103		mg/L		98	70 - 130	3	20
Cobalt	0.0012		0.100	0.0990		mg/L		98	70 - 130	5	20
Molybdenum	0.0091		0.100	0.117		mg/L		108	70 - 130	0	20
Thallium	0.00016		0.100	0.102		mg/L		102	70 - 130	2	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-196964/1  
Matrix: Water  
Analysis Batch: 196964

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			12/02/19 09:59	1

Lab Sample ID: LCS 550-196964/2  
Matrix: Water  
Analysis Batch: 196964

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	980		mg/L		98	90 - 110

Lab Sample ID: LCSD 550-196964/3  
Matrix: Water  
Analysis Batch: 196964

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	982		mg/L		98	90 - 110	0	10

Lab Sample ID: 550-133983-A-3 DU  
Matrix: Water  
Analysis Batch: 196964

Client Sample ID: Duplicate  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	15000	D2	14100	D2	mg/L		7	10

Lab Sample ID: MB 550-196965/1  
Matrix: Water  
Analysis Batch: 196965

Client Sample ID: Method Blank  
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			12/02/19 10:03	1

Lab Sample ID: LCS 550-196965/2  
Matrix: Water  
Analysis Batch: 196965

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	980		mg/L		98	90 - 110

Eurolins TestAmerica, Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

**Lab Sample ID: LCSD 550-196965/3**  
**Matrix: Water**  
**Analysis Batch: 196965**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	964		mg/L		96	90 - 110	2	10

**Lab Sample ID: 550-133984-4 DU**  
**Matrix: Water**  
**Analysis Batch: 196965**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	5900	D2	5680	D2	mg/L		3	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-197022/12**  
**Matrix: Water**  
**Analysis Batch: 197022**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.7	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-197022/22**  
**Matrix: Water**  
**Analysis Batch: 197022**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		101.1	98.5 - 101.5

**Lab Sample ID: 550-133984-4 DU**  
**Matrix: Water**  
**Analysis Batch: 197022**

**Client Sample ID: CH-CCR-M62A-112519**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.3	H5	7.3	H5	SU		0	5
Temperature	16.6	H5	16.1	H5	Degrees C		3	



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## HPLC/IC

### Analysis Batch: 197196

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	300.0	
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	300.0	
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	300.0	
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	300.0	
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	300.0	
MB 550-197196/2	Method Blank	Total/NA	Water	300.0	
LCS 550-197196/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-197196/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-133983-B-3 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-133983-B-3 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-133983-B-3 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-133983-B-3 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-133984-4 MS	CH-CCR-M62A-112519	Total/NA	Water	300.0	
550-133984-4 MSD	CH-CCR-M62A-112519	Total/NA	Water	300.0	

### Analysis Batch: 197316

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	300.0	
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	300.0	
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	300.0	
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	300.0	
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	300.0	
MB 550-197316/1030	Method Blank	Total/NA	Water	300.0	
LCS 550-197316/31	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-197316/32	Lab Control Sample Dup	Total/NA	Water	300.0	
550-133984-4 MS	CH-CCR-M62A-112519	Total/NA	Water	300.0	
550-133984-4 MSD	CH-CCR-M62A-112519	Total/NA	Water	300.0	

## Metals

### Prep Batch: 196859

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	200.7	
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	200.7	
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	200.7	
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	200.7	
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	200.7	
MB 550-196859/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-196859/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-196859/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-133984-4 MS	CH-CCR-M62A-112519	Total/NA	Water	200.7	
550-133984-4 MSD	CH-CCR-M62A-112519	Total/NA	Water	200.7	

### Prep Batch: 196873

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	200.8	
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	200.8	
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	200.8	
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	200.8	
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	200.8	
MB 550-196873/1-A	Method Blank	Total/NA	Water	200.8	

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Metals (Continued)

### Prep Batch: 196873 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 550-196873/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-196873/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-133984-4 MS	CH-CCR-M62A-112519	Total/NA	Water	200.8	
550-133984-4 MSD	CH-CCR-M62A-112519	Total/NA	Water	200.8	

### Analysis Batch: 197082

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	200.7 Rev 4.4	196859
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	200.7 Rev 4.4	196859
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	200.7 Rev 4.4	196859
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	200.7 Rev 4.4	196859
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	200.7 Rev 4.4	196859
MB 550-196859/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	196859
LCS 550-196859/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	196859
LCSD 550-196859/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	196859
550-133984-4 MS	CH-CCR-M62A-112519	Total/NA	Water	200.7 Rev 4.4	196859
550-133984-4 MSD	CH-CCR-M62A-112519	Total/NA	Water	200.7 Rev 4.4	196859

### Analysis Batch: 198025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	200.8 LL	196873
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	200.8 LL	196873
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	200.8 LL	196873
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	200.8 LL	196873
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	200.8 LL	196873
MB 550-196873/1-A	Method Blank	Total/NA	Water	200.8 LL	196873
LCS 550-196873/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	196873
LCSD 550-196873/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	196873
550-133984-4 MS	CH-CCR-M62A-112519	Total/NA	Water	200.8 LL	196873
550-133984-4 MSD	CH-CCR-M62A-112519	Total/NA	Water	200.8 LL	196873

## General Chemistry

### Analysis Batch: 196964

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	SM 2540C	
MB 550-196964/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-196964/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-196964/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-133983-A-3 DU	Duplicate	Total/NA	Water	SM 2540C	

### Analysis Batch: 196965

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	SM 2540C	
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	SM 2540C	
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	SM 2540C	
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	SM 2540C	
MB 550-196965/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-196965/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-196965/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-133984-4 DU	CH-CCR-M62A-112519	Total/NA	Water	SM 2540C	

Eurofins TestAmerica, Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## General Chemistry

### Analysis Batch: 197022

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-133984-1	CH-CCR-M56A-112519	Total/NA	Water	SM 4500 H+ B	
550-133984-2	CH-CCR-M57A-112519	Total/NA	Water	SM 4500 H+ B	
550-133984-3	CH-CCR-M58A-112519	Total/NA	Water	SM 4500 H+ B	
550-133984-4	CH-CCR-M62A-112519	Total/NA	Water	SM 4500 H+ B	
550-133984-5	CH-CCR-FD-01-112519	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-197022/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-197022/22	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-133984-4 DU	CH-CCR-M62A-112519	Total/NA	Water	SM 4500 H+ B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

**Client Sample ID: CH-CCR-M56A-112519**

**Lab Sample ID: 550-133984-1**

**Date Collected: 11/25/19 11:19**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	197196	12/04/19 01:06	NEL	TAL PHX
Total/NA	Analysis	300.0		1	197316	12/05/19 06:46	NEL	TAL PHX
Total/NA	Prep	200.7			196859	11/29/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197082	12/02/19 20:41	SRA	TAL PHX
Total/NA	Prep	200.8			196873	11/29/19 14:20	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198025	12/15/19 05:40	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	196964		YET	TAL PHX
					(Start)	12/02/19 09:59		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-M57A-112519**

**Lab Sample ID: 550-133984-2**

**Date Collected: 11/25/19 10:41**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	197196	12/04/19 01:43	NEL	TAL PHX
Total/NA	Analysis	300.0		1	197316	12/05/19 07:05	NEL	TAL PHX
Total/NA	Prep	200.7			196859	11/29/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197082	12/02/19 20:45	SRA	TAL PHX
Total/NA	Prep	200.8			196873	11/29/19 14:20	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198025	12/15/19 05:42	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965		YET	TAL PHX
					(Start)	12/02/19 10:03		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-M58A-112519**

**Lab Sample ID: 550-133984-3**

**Date Collected: 11/25/19 09:07**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	197196	12/04/19 02:20	NEL	TAL PHX
Total/NA	Analysis	300.0		1	197316	12/05/19 07:23	NEL	TAL PHX
Total/NA	Prep	200.7			196859	11/29/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197082	12/02/19 20:48	SRA	TAL PHX
Total/NA	Prep	200.8			196873	11/29/19 14:20	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198025	12/15/19 05:45	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965		YET	TAL PHX
					(Start)	12/02/19 10:03		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
 Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

**Client Sample ID: CH-CCR-M62A-112519**

**Lab Sample ID: 550-133984-4**

**Date Collected: 11/25/19 12:47**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	197196	12/04/19 04:47	NEL	TAL PHX
Total/NA	Analysis	300.0		1	197316	12/05/19 07:42	NEL	TAL PHX
Total/NA	Prep	200.7			196859	11/29/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197082	12/02/19 20:38	SRA	TAL PHX
Total/NA	Prep	200.8			196873	11/29/19 14:20	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198025	12/15/19 05:38	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965		YET	TAL PHX
					(Start)	12/02/19 10:03		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD-01-112519**

**Lab Sample ID: 550-133984-5**

**Date Collected: 11/25/19 10:41**

**Matrix: Water**

**Date Received: 11/27/19 09:56**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	197196	12/04/19 02:56	NEL	TAL PHX
Total/NA	Analysis	300.0		1	197316	12/05/19 08:37	NEL	TAL PHX
Total/NA	Prep	200.7			196859	11/29/19 14:09	MGM	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	197082	12/02/19 20:52	SRA	TAL PHX
Total/NA	Prep	200.8			196873	11/29/19 14:20	MGM	TAL PHX
Total/NA	Analysis	200.8 LL		1	198025	12/15/19 05:47	SRA	TAL PHX
Total/NA	Analysis	SM 2540C		1	196965		YET	TAL PHX
					(Start)	12/02/19 10:03		
					(End)	12/03/19 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	197022	12/02/19 17:21	MRR	TAL PHX

**Laboratory References:**

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

## Laboratory: Eurofins TestAmerica, Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State Program	AZ0728	06-09-20

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: APS - Cholla CCR

Job ID: 550-133984-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = Eurofins TestAmerica, Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
Phone 602.437.3340 Fax 602.454.9303

**Chain of Custody Record**

133984

Regulatory Program:  DW  NPDES  RCRA  Other: CCR

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING  
TestAmerica Laboratories, Inc.  
12/17/2019

Client Contact		Jim Edwards		928-587-0319		Lab Contact:		Jim Edwards		Date:		Carrier:		COC No.:	
Analysis Turnaround Time		Analysis Turnaround Time		Analysis Turnaround Time		Analysis Turnaround Time		Analysis Turnaround Time		Analysis Turnaround Time		Analysis Turnaround Time		Analysis Turnaround Time	
APC Cholla		4601 Cholla Lake Rd		Joseph City, AZ 86032		928/386-0302		Phone		FAX		Project Name:		Site:	
PO #		Sample Identification		Sample Date		Sample Time		Sample Type (C=Comp, G=Grav)		Matrix		# of Cont.		Filtered Sample (Y/N)	
CH-CGR-M56A-		112519		11/25/19		11:19		G		W		N		X	
CH-CGR-M57A-		112519		11/25/19		10:41		G		W		N		X	
CH-CGR-M58A-		0112519		11/25/19		09:07		G		W		N		X	
CH-CGR-M62A-		112519		11/25/19		12:47		G		W		N		X	
CH-CGR-FD-01		112519		11/25/19		10:41		G		W		N		X	
Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other		Possible Hazard Identification:		Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.		Special Instructions/QC Requirements & Comments:		Method 200.8 with collision cell		Return to Client		Disposal by Lab		Archive for	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C):		Obs'd:		Cor'd:		Therm ID No.:		0.8°C		cds	
Relinquished by: <i>Spac'ors</i>		Company: <i>Wood</i>		Date/Time: <i>11/25/19 08:15</i>		Received by:		Company:		Date/Time:		Relinquished by:		Company: <i>AW</i>	
Relinquished by:		Company:		Date/Time:		Received in Laboratory by:		Company:		Date/Time:		Date/Time: <i>11-27-19 0956</i>			



# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-133984-1

**Login Number: 133984**

**List Source: Eurofins TestAmerica, Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



**APPENDIX F**  
**2019 DATA VALIDATION REPORT**



## **2019 DATA VALIDATION REPORT**

CCR Rule Compliance Groundwater Monitoring Data  
Arizona Public Service Cholla  
Navajo County, Arizona

Prepared by:

**Wood Environment & Infrastructure Solutions, Inc.**

4600 East Washington Street, Suite 600  
Phoenix, Arizona 85034-1917  
(602) 733-6000

January 31, 2020

Project No. 1420182040

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**APPENDICES**

Appendix A Data Assessment Checklists by Sample Delivery Group

### **ACRONYMS**

%	percent
APS	Arizona Public Service Company
BTV(s)	background threshold value(s)
CCR	coal combustion residuals
CLP	Contract Laboratory Program
COC	chain of custody
EPA	United States Environmental Protection Agency
GWPS(s)	Groundwater Protection Standard(s)
ID	identification
LCS	laboratory control sample
LCS D	laboratory control sample
MCL	maximum contaminant level
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
QC	quality control
RL	reporting limit
RPD	relative percent difference
SAP	sampling and analysis plan
SDG	sample delivery group
SM	Standard Method
TDS	total dissolved solids
Wood	Wood Environment & Infrastructure Solutions, Inc.



# **DATA VALIDATION REPORT**

Arizona Public Service Cholla  
Navajo County, Arizona

## **1.0 INTRODUCTION**

Arizona Public Service (APS) collected groundwater Detection and Assessment Monitoring samples to support Coal Combustion Residuals (CCR) Rule Compliance during the 2019 calendar year (the reporting period) at the APS Cholla Power Plant, located near Joseph City in Navajo County, Arizona. This report presents the standard methods used to validate reporting period data and documents the results of the data validation process in summary tables and checklists generated as the samples were collected throughout the year.

## **2.0 DATA VALIDATION METHODOLOGY**

Wood Environment & Infrastructure Solutions, Inc. (Wood) performed a United States Environmental Protection Agency (EPA) Stage 2A validation on samples collected by APS during the 2019 calendar year. This is equivalent to a Level I data evaluation as defined in the project sampling and analysis plan (SAP). The Stage 2A validation includes review of the quality control (QC) results in laboratory analytical reports and does not include review or validation of the raw analytical data. Data validation activities have been performed in general accordance with:

- EPA, 2004. SW 846 Test Methods for Evaluating Solid Wastes, Update IIIB.
- EPA, 2017. EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Superfund Data Review, EPA 540-R-2017-001.
- Montgomery & Associates, 2015. Groundwater Sampling and Analysis Program, Cholla Power Plant, Joseph City, Arizona. November 30, 2015.

The CLP guidelines were written specifically for the CLP and have been modified for the purposes of data reviews conducted during the reporting period where they differ from method-specific QC requirements.

During each groundwater monitoring round conducted during the reporting period, the laboratory's certified analytical report and supporting documentation were reviewed to assess the following:

- Data package and electronic data deliverable completeness;
- Chain of custody (COC) compliance;
- Holding time compliance;
- Presence or absence of laboratory contamination as demonstrated by laboratory blanks;
- Accuracy and bias as demonstrated by recovery of laboratory control sample (LCS) and matrix spike (MS) samples;

- Analytical precision as relative percent difference (RPD) of analyte concentration between laboratory duplicates, LCS/LCS duplicates (LCSDs), or MSs/MS duplicates (MSDs);
- Insofar as possible, the degree of conformance to method requirements and good laboratory practices.

Appendix A presents data assessment checklists generated for each sample delivery group submitted to the analytical laboratory during the reporting period. The laboratory performing the analyses as well as the methods of analysis are presented in the individual checklists. Table 1 presents a comprehensive listing of reporting period samples and Table 2 summarizes field duplicate detections at concentrations greater than analytical reporting limits.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all QC audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

### **3.0 EXPLANATION OF DATA QUALITY INDICATORS**

Summary explanations of the specific data quality indicators reviewed during data validation are presented below.

#### **3.1 Laboratory Control Sample Recoveries**

LCSs are aliquots of analyte free matrices that are spiked with the analytes of interest for an analytical method, or a representative subset of those analytes. The spiked matrix is then processed through the same analytical procedures as the samples it accompanies. LCS recovery is an indication of a laboratory's ability to successfully perform an analytical method in an interference free matrix.

#### **3.2 Matrix Spike Recoveries**

MSs and MSDs are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are an indication of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related.

#### **3.3 Blank Concentrations**

Blank samples are aliquots of analyte free matrix that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results.

Laboratory blanks are processed by the laboratory using exactly the same procedures as the field samples. Target analytes should not be found in laboratory blanks.

When target analytes are detected in blanks, analyte concentrations in associated samples less than five times the concentration detected in the blank will be U qualified as being not detected.

### **3.4 Laboratory Duplicates**

Laboratory duplicate analysis verifies acceptable method precision by the laboratory at the time of preparation and analysis and/or sampling precision at the time of collection.

## **4.0 DEFINITIONS OF DATA VALIDATION QUALIFIERS**

The following qualifiers may be added to the data during data validation:

- J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R** The sample result is rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- U** The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- UJ** The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

## **5.0 CHAIN OF CUSTODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION**

Unless otherwise noted in the Data Assessment Checklists included in Appendix A, the samples were received at the laboratories under proper COC, intact, properly preserved, and at temperatures less than the SAP-specified maximum of 6 degrees Celsius.

## **6.0 SPECIFIC DATA VALIDATION FINDINGS**

Results for groundwater monitoring samples collected in 2019 may be considered usable with the limitations and exceptions summarized in Table 3. The following sections identify requirements used in data assessment.

### **6.1 Metals By EPA Methods 200.7, 200.8, and 245.1**

#### **6.1.1 Holding Times**

Samples must be analyzed for metals within the SAP-specified holding time of 28 days for mercury and 180 days for additional metals.

#### **6.1.2 Laboratory Blanks**

Target analytes must not be detected in the laboratory blanks associated with the analysis of site samples.

### **6.1.3 Laboratory Control Sample Accuracy and Precision**

LCS and LCSD recoveries must be within the laboratory-specified 85 to 115 percent (%) limits and RPDs between the LCS and LCSD results must be less than the laboratory-specified maximum of 20%.

### **6.1.4 Matrix Spikes/Matrix Spike Duplicates**

Laboratories performed MS and MSD analysis on the project samples specified in the Data Assessment Checklists included in Appendix A. MS/MSD recoveries must be within laboratory-specified limits of 70 to 130% and RPDs between MS and MSD results must be less than the laboratory-specified maximum of 20%.

### **6.1.5 Analytical Sensitivity**

RLs for antimony, arsenic, barium, beryllium, cadmium, chromium, mercury, selenium, and thallium must be sufficiently low to meet the National Primary Drinking Water Regulation Maximum Contamination Limits (MCLs). RLs for cobalt, lead, lithium, and molybdenum must be sufficiently low to meet alternative Groundwater Protection Standards (GWPSs).

Boron and calcium are not EPA-regulated analytes in groundwater and it is not possible to evaluate the RLs for these analytes against the National Primary Drinking Water Regulation MCLs.

## **6.2 Anions by EPA Method 300.0**

### **6.2.1 Holding Times**

Samples must be analyzed for anions within the SAP-specified holding time of 28 days.

### **6.2.2 Laboratory Blanks**

Fluoride, chloride, and sulfate must not be detected in the laboratory blanks associated with the analysis of these samples.

### **6.2.3 Laboratory Control Samples**

LCS and LCSD recoveries must be within the laboratory-specified limits of 90 to 110% and RPDs between the LCS and LCSD results must be less than the laboratory-specified maximum values.

### **6.2.4 Matrix Spikes/Matrix Spike Duplicates**

Laboratories performed MS and MSD analysis on the project samples specified in the Data Assessment Checklists included in Appendix A. Recoveries must be within the laboratory-specified limits of 80 to 120%, and RPDs between MS and MSD results must be less than the laboratory-specified limit of 20%.

### **6.2.5 Laboratory Duplicates**

Laboratories performed duplicate analysis on the project samples specified in the Data Assessment Checklists included in Appendix A. The RPDs between duplicate results must be less than the laboratory-specified 20% limit.

### **6.2.6 Analytical Sensitivity**

Fluoride RLs must be sufficiently low to meet the 4 mg/L MCL. Chloride and sulfate are not EPA-regulated analytes in groundwater and it is not possible to evaluate the RLs for these analytes against the Primary Drinking Water Regulation MCLs.

There are applicable CCR Groundwater Monitoring Program Background Threshold Values (BTVs) for fluoride, chloride, and sulfate for the site. Analytical sensitivity must also be evaluated for these site-specific comparison criteria.

## **6.3 Total Dissolved Solids by SM 2540C**

### **6.3.1 Holding Times**

All samples must be analyzed for TDS within the SAP-specified holding time of 7 days.

### **6.3.2 Laboratory Blanks**

TDS must not be detected in the laboratory blanks at concentrations above the reporting limit.

### **6.3.3 Laboratory Control Sample Accuracy and Precision**

LCS and LCSD recoveries must be within the laboratory-specified limits of 90 to 110% and RPDs between the LCS and LCSD results must be less than the laboratory-specified maximum of 10%.

### **6.3.4 Laboratory Duplicates**

Laboratories performed duplicate analysis for TDS on the project samples specified in the Data Assessment Checklists included in Appendix A. RPDs between primary sample and laboratory duplicate results must be less than the laboratory-specified 10% limit.

## **6.4 pH by SM 4500B**

### **6.4.1 Holding Times**

All samples must be analyzed for pH within 15 minutes of sample collection.

### **6.4.2 Laboratory Control Sample Accuracy**

LCS recoveries must be within the laboratory-specified limits of 98.5 to 101.5%.

### **6.4.3 Laboratory Duplicates**

Laboratories performed duplicate analysis for pH on the project samples specified in the Data Assessment Checklists included in Appendix A. RPDs between primary sample and laboratory duplicate results must be less than the laboratory-specified 5% limit.

## **6.5 Radium by EPA Methods 903.0 and 904.0**

### **6.5.1 Holding Time**

All samples must be analyzed for radium within the EPA-recommended holding time of 6 months.

### **6.5.2     Laboratory Blanks**

Radium must not be detected in the laboratory blanks at concentrations above the reporting limit.

### **6.5.3     Laboratory Control Sample Accuracy**

LCS and LCSD recoveries must be within laboratory-specified limits.

### **6.5.4     Carrier Accuracy**

Carrier recoveries must be within the laboratory-specified 40 to 110% limits.

### **6.5.5     Analytical Sensitivity**

Total radium RLs must be sufficiently low to meet the MCL of 5 picocuries per liter. Pending development of applicable CCR Groundwater Monitoring Program BTVs and/or GPSs for the site, analytical sensitivity must also be evaluated for these site-specific comparison criteria.

## **7.0       FIELD DUPLICATES**

APS collected field duplicate samples of the specified field original samples as specified in Table 1. Target analyte detections are summarized in Table 2. Precision values must be less than the SAP-specified maximum of 20%, or the differences between the detected concentrations must be less than the RLs.

## **8.0       SUMMARY AND CONCLUSIONS**

Data are usable with the addition of qualifiers as presented in Table 3.

## **9.0 REFERENCES**

EPA, 2017. EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Superfund Data Review, EPA 540-R-2017-001.

EPA, 2004. SW 846 Test Methods for Evaluating Solid Wastes, Update IIIB.

Montgomery & Associates, 2015. Groundwater Sampling and Analysis Program, Cholla Power Plant, Joseph City, Arizona. #CH\_GW\_SAP\_021\_11-30-15. November 30, 2015.



## **10.0 LIMITATIONS**

This report was prepared exclusively for Arizona Public Service by Wood Environment & Infrastructure Solutions, Inc. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Wood services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This data validation report is intended to be used by Arizona Public Service for the Cholla Power Plant site only, subject to the terms and conditions of its contract with Wood. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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**TABLES**

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**TABLE 1**  
**FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sampling Program	CCR Unit	Collection Date and Time	Field Sample Identification	Eurofins TestAmerica Phoenix Sample Identification	Radiation Safety Engineering Sample Identification	Notes
Assessment	FAP	2/13/2019 17:09	CH-CCR-M50A-21319	550-118120-1		
Assessment	FAP	2/13/2019 16:20	CH-CCR-M51A-21319	550-118120-2		
Assessment	FAP	2/13/2019 14:47	CH-CCR-M64A-21319	550-118120-3		
Assessment	FAP	2/14/2019 12:12	CH-CCR-M65A-21419	550-118120-4		
Assessment	FAP	2/14/2019 13:33	CH-CCR-M66A-21419	550-118120-5		
Assessment	FAP	2/14/2019 11:18	CH-CCR-M67A-21419	550-118120-6		
Assessment	FAP	2/13/2019 17:44	CH-CCR-W123-21319	550-118120-7		
Assessment	FAP	2/13/2019 14:47	CH-CCR-FD01-21319	550-118120-8		Field duplicate of CH-CCR-M64A-21319
Assessment	BAP	2/15/2019 17:37	CH-CCR-M52A-21519	550-118121-1		
Assessment	BAP	2/15/2019 18:12	CH-CCR-M53A-21519	550-118121-2		
Assessment	BAP	2/15/2019 11:49	CH-CCR-M55A-21519	550-118121-3		
Assessment	BAP	2/15/2019 16:28	CH-CCR-W301-21519	550-118121-4		
Assessment	BAP	2/15/2019 15:16	CH-CCR-W302-21519	550-118121-5		
Assessment	BAP	2/15/2019 15:52	CH-CCR-W304-21519	550-118121-6		
Assessment	BAP	2/15/2019 18:42	CH-CCR-W305-21519	550-118121-7		
Assessment	BAP	2/15/2019 19:21	CH-CCR-W306-21519	550-118121-8		
Assessment	BAP	2/15/2019 14:21	CH-CCR-W307-21519	550-118121-9		
Assessment	BAP	2/15/2019 13:47	CH-CCR-W308-21519	550-118121-10		
Assessment	BAP	2/15/2019 12:52	CH-CCR-W309-21519	550-118121-11		
Assessment	BAP	2/15/2019 17:01	CH-CCR-W314-21519	550-118121-12		
Assessment	BAP	2/15/2019 18:42	CH-CCR-FD01-21519	550-118121-13		Duplicate of CH-CCR-W305-21519
Assessment	SEDI	2/15/2019 22:14	CH-CCR-M56A-21519	550-118122-1		
Assessment	SEDI	2/15/2019 21:41	CH-CCR-M57A-21519	550-118122-2		
Assessment	SEDI	2/15/2019 21:04	CH-CCR-M58A-21519	550-118122-3		
Assessment	SEDI	2/15/2019 20:13	CH-CCR-M62A-21519	550-118122-4		

**TABLE 1**  
**FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sampling Program	CCR Unit	Collection Date and Time	Field Sample Identification	Eurofins TestAmerica Phoenix Sample Identification	Radiation Safety Engineering Sample Identification	Notes
Assessment	SEDI	2/15/2019 20:13	CH-CCR-FD02-21519	550-118122-5		Duplicate of CH-CCR-M62A-21519
Assessment	BAP	3/30/2019 16:01	CH-CCR-W317-33019	550-120430-1		
Assessment	BAP	3/30/2019 14:57	CH-CCR-BAP-33019	550-120430-2		
Assessment	FAP	3/30/2019 13:34	CH-CCR-FAP-33019	550-120430-3		
Assessment	FAP	4/11/2019 11:14	CH-CCR-M50A-41119	550-121047-1	62097	
Assessment	FAP	4/10/2019 8:48	CH-CCR-M51A-41019	550-121047-2	62098	Logged in by Eurofins as CH-CCR-M51A-41119
Assessment	FAP	4/11/2019 11:42	CH-CCR-W123-41119	550-121047-3	62099	
Assessment	FAP	4/11/2019 11:42	CH-CCR-FD02-41119		62100	Field duplicate of CH-CCR-W123-41119
Assessment	FAP	4/11/2019 14:02	CH-CCR-M65A-41119	550-121047-4		
Assessment	FAP	4/11/2019 14:26	CH-CCR-M66A-41119	550-121047-5		
Assessment	FAP	4/11/2019 13:36	CH-CCR-M67A-41119	550-121047-6		
Assessment	FAP	4/11/2019 12:20	CH-CCR-W126-41119	550-121047-7		
Assessment	FAP	4/11/2019 15:26	CH-CCR-M64A-41119	550-121047-8		
Assessment	FAP	4/11/2019 12:20	CH-CCR-FD01-41119	550-121047-9		Duplicate of CH-CCR-W126-41119
Assessment	BAM	4/9/2019 14:27	CH-CCR-M54-40919	550-121053-1		
Assessment	BAM	4/9/2019 10:00	CH-CCR-M59-40919	550-121053-2		
Assessment	BAM	4/9/2019 12:45	CH-CCR-M60-40919	550-121053-3		
Assessment	BAM	4/9/2019 11:41	CH-CCR-M61-40919	550-121053-4		
Assessment	BAP	4/16/2019 16:33	CH-CCR-M52A-41619	550-121460-1	62101	
Assessment	BAP	4/17/2019 13:11	CH-CCR-M53A-41719	550-121460-2	62102	
Assessment	BAP	4/17/2019 12:38	CH-CCR-W305-41719	550-121460-3	62103	
Assessment	BAP	4/16/2019 17:34	CH-CCR-W306-41619	550-121460-4	62104	
Assessment	BAP	4/16/2019 16:00	CH-CCR-W314-41619	550-121460-5	62105	
Assessment	BAP	4/16/2019 9:51	CH-CCR-M64A-41619	550-121460-6	62106	

**TABLE 1**  
**FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sampling Program	CCR Unit	Collection Date and Time	Field Sample Identification	Eurofins TestAmerica Phoenix Sample Identification	Radiation Safety Engineering Sample Identification	Notes
Assessment	BAP	4/16/2019 9:51	CH-CCR-FD01-41619	550-121460-7	62107	Duplicate of CH-CCR-M64A-41619
Assessment	BAP	4/16/2019 11:18	CH-CCR-M55A-41619	550-121460-8		
Assessment	BAP	4/16/2019 15:15	CH-CCR-W301-41619	550-121460-9		
Assessment	BAP	4/17/2019 11:32	CH-CCR-W302-41719	550-121460-10		
Assessment	BAP	4/16/2019 14:22	CH-CCR-W304-41619	550-121460-11		
Assessment	BAP	4/16/2019 13:31	CH-CCR-W307-41619	550-121460-12		
Assessment	(Tanner W	4/16/2019 11:51	CH-CCR-W308-41619	550-121461-1		
Assessment	(Tanner W	4/16/2019 12:51	CH-CCR-W309-41619	550-121461-2		
Assessment	(Tanner W	4/17/2019 14:01	CH-CCR-W317-41719	550-121461-3		
Assessment	(Tanner W	4/17/2019 14:01	CH-CCR-FD03-41719	550-121461-4		Duplicate of CH-CCR-W317-41719
Assessment	SEDI	4/18/2019 9:58	CH-CCR-M56A-41819	550-121462-1	62109	
Assessment	SEDI	4/17/2019 15:28	CH-CCR-M57A-41719	550-121462-2	62110	
Assessment	SEDI	4/17/2019 14:59	CH-CCR-M58A-41719	550-121462-3	62111	
Assessment	SEDI	4/18/2019 9:10	CH-CCR-M62A-41819	550-121462-4	62112	
Assessment	SEDI	4/18/2019 9:10	CH-CCR-FD04-41819	550-121462-5	62113	Duplicate of CH-CCR-M62A-41819
Assessment	FAP	4/29/2019 11:35	CH-APP-FAP-42919	550-121943-1		
Assessment	FAP	4/29/2019 11:35	CH-APP-FAP-42919	550-121943-2		Laboratory filtered
Assessment	BAP	4/29/2019 12:45	CH-APP-BAP-42919	550-121943-3		
Assessment	BAP	4/29/2019 12:45	CH-APP-BAP-42919	550-121943-4		Laboratory filtered
Assessment	BAP	8/1/2019 17:08	CH-CCR-M52A-8119	550-127215-1		
Assessment	BAP	8/1/2019 16:16	CH-CCR-M53A-8119	550-127215-2		
Assessment	BAP	8/1/2019 15:43	CH-CCR-W305-8119	550-127215-3		
Assessment	BAP	8/1/2019 13:37	CH-CCR-W306-8119	550-127215-4		
Assessment	BAP	8/1/2019 17:40	CH-CCR-W314-8119	550-127215-5		
Assessment	BAP	8/1/2019 12:20	CH-CCR-M64A-8119	550-127215-6		

**TABLE 1**  
**FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sampling Program	CCR Unit	Collection Date and Time	Field Sample Identification	Eurofins TestAmerica Phoenix Sample Identification	Radiation Safety Engineering Sample Identification	Notes
Assessment	BAP	8/1/2019 12:20	CH-CCR-FD01-8119	550-127215-7		Field duplicate of CH-CCR-M64A-8119
Assessment	BAP	8/1/2019 18:17	CH-CCR-M55A-8119	550-127215-8		
Assessment	BAP	8/1/2019 16:16	CH-CCR-FD02-8119	550-127215-9		Field duplicate of CH-CCR-M53A-8119
Assessment	SEDI	8/9/2019 15:18	CH-CCR-M56A-8919	550-127722-1	62661	
Assessment	SEDI	8/9/2019 14:12	CH-CCR-M57A-8919	550-127722-2	62662	
Assessment	SEDI	8/9/2019 13:44	CH-CCR-M58A-8919	550-127722-3	62663	
Assessment	SEDI	8/9/2019 15:51	CH-CCR-M62A-8919	550-127722-4	62664	
Assessment	SEDI	8/9/2019 14:12	CH-CCR-FD01-8919	550-127722-5	62665	Field duplicate of CH-CCR-M57A-8919
Assessment	BAP	8/9/2019 11:18	CH-CCR-W301-8919	550-127723-1		
Assessment	BAP	8/9/2019 11:55	CH-CCR-W302-8919	550-127723-2		
Assessment	BAP	8/8/2019 15:02	CH-CCR-W304-8819	550-127723-3		
Assessment	BAP	8/8/2019 14:15	CH-CCR-W307-8819	550-127723-4		
Assessment	BAP	8/8/2019 13:15	CH-CCR-W308-8819	550-127723-5		
Assessment	BAP	8/8/2019 12:05	CH-CCR-W309-8819	550-127723-6		
Assessment	BAP	8/9/2019 12:51	CH-CCR-W317-8919	550-127723-7		
Assessment	BAP	8/8/2019 12:05	CH-CCR-FD01-8819	550-127723-8		Field duplicate of CH-CCR-W309-8819
Assessment	BAM	10/22/2019 11:49	CH-CCR-M54-102219	550-132142-1		
Assessment	BAM	10/23/2019 10:57	CH-CCR-M59-102319	550-132142-2		
Assessment	BAM	10/22/2019 14:07	CH-CCR-M60-102219	550-132142-3		
Assessment	BAM	10/22/2019 15:17	CH-CCR-M61-102219	550-132142-4		
Assessment	BAM	10/23/2019 10:57	CH-CCR-FD01-102319	550-132142-5		Field duplicate of CH-CCR-M59-102319
Assessment	BAP	10/24/2019 7:47	CH-CCR-M52A-102419	550-132146-1		
Assessment	BAP	10/23/2019 14:45	CH-CCR-M53A-102319	550-132146-2		
Assessment	BAP	10/23/2019 15:32	CH-CCR-W305-102319	550-132146-3		
Assessment	BAP	10/23/2019 16:17	CH-CCR-W306-102319	550-132146-4		

**TABLE 1**  
**FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sampling Program	CCR Unit	Collection Date and Time	Field Sample Identification	Eurofins TestAmerica Phoenix Sample Identification	Radiation Safety Engineering Sample Identification	Notes
Assessment	BAP	10/24/2019 8:53	CH-CCR-W314-102419	550-132146-5		
Assessment	BAP	10/24/2019 14:53	CH-CCR-M64A-102419	550-132146-6		
Assessment	BAP	10/23/2019 15:32	CH-CCR-FD01-102319	550-132146-7		Field duplicate of CH-CCR-W305-102319
Assessment	BAP	10/24/2019 12:18	CH-CCR-M55A-102419	550-132146-8		
Assessment	BAP	10/23/2019 14:02	CH-CCR-W301-102319	550-132146-9		
Assessment	BAP	10/23/2019 12:19	CH-CCR-W302-102319	550-132146-10		
Assessment	BAP	10/24/2019 9:20	CH-CCR-W304-102419	550-132146-11		
Assessment	BAP	10/24/2019 10:06	CH-CCR-W307-102419	550-132146-12		
Assessment	BAP	10/24/2019 10:55	CH-CCR-W308-102419	550-132146-13		
Assessment	BAP	10/24/2019 11:38	CH-CCR-W309-102419	550-132146-14		
Assessment	BAP	10/24/2019 13:50	CH-CCR-W317-102419	550-132146-15		
Assessment	BAP	10/24/2019 9:20	CH-CCR-FD02-102419	550-132146-16		Field duplicate of CH-CCR-W304-102419
Assessment	FAP	11/25/2019 15:17	CH-CCR-M50A-112519		63434	
Assessment	FAP	11/25/2019 16:08	CH-CCR-M51A-112519		63435	
Assessment	FAP	11/25/2019 14:43	CH-CCR-W123-112519		63436	
Assessment	FAP	11/26/2019 9:30	CH-CCR-M65A-112619		63437	
Assessment	FAP	11/26/2019 8:39	CH-CCR-M66A-112619		63438	
Assessment	FAP	11/26/2019 10:17	CH-CCR-M67A-112619		63439	
Assessment	FAP	11/26/2019 8:02	CH-CCR-W126-112619		63440	
Assessment	FAP	11/26/2019 8:39	CH-CCR-FD01-112619		63441	Field duplicate of CH-CCR-M66A-112619
Assessment	FAP	11/26/2019 12:38	CH-CCR-M46A-112619		63442	



**TABLE 1**  
**FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

<b>Sampling Program</b>	<b>CCR Unit</b>	<b>Collection Date and Time</b>	<b>Field Sample Identification</b>	<b>Eurofins TestAmerica Phoenix Sample Identification</b>	<b>Radiation Safety Engineering Sample Identification</b>	<b>Notes</b>
Assessment	SEDI	11/25/2019 11:19	CH-CCR-M56A-112519	550-133984-1		
Assessment	SEDI	11/25/2019 10:41	CH-CCR-M57A-112519	550-133984-2		
Assessment	SEDI	11/25/2019 9:07	CH-CCR-M58A-112519	550-133984-3		
Assessment	SEDI	11/25/2019 12:47	CH-CCR-M62A-112519	550-133984-4		
Assessment	SEDI	11/25/2019 10:41	CH-CCR-FD-01-112519	550-133984-5		Field duplicate of CH-CCR-M57A-112519

**TABLE 2**  
**FIELD DUPLICATE DETECTIONS**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-M64A-21319 and CH-CCR-FD01-21319					
Lithium	0.20 mg/L	0.29	0.29	0%	
Arsenic	0.00050 mg/L	0.00089	0.00076	16%	
Barium	0.00050 mg/L	0.012	0.012	0%	
Molybdenum	0.00050 mg/L	0.0049	0.0048	2.1%	
Selenium	0.00050 mg/L	0.00052	0.00050 U	NC	± RL
Samples CH-CCR-W305-21519 and CH-CCR-FD01-21519					
Lithium	0.20 mg/L	0.22	0.22	0%	
Arsenic	0.00050 mg/L	0.00087	0.0018	70%	J-FD
Barium	0.00050 mg/L	0.011	0.016	37%	J-FD
Cadmium	0.00010 mg/L	0.00010 U	0.00012	NC	± RL
Chromium	0.0010 mg/L	0.0017	0.0015	13%	
Cobalt	0.00050 mg/L	0.018	0.022	20%	
Lead	0.00050 mg/L	0.0018	0.0024	29%	J-FD
Molybdenum	0.00050 mg/L	0.02	0.026	26%	J-FD
Selenium	0.00050 mg/L	0.00050 U	0.00070	NC	± RL
Samples CH-CCR-M62A-21519 and CH-CCR-FD02-21519					
Chloride	400 mg/L	2,900	3,000	3.4%	
Sulfate	400 mg/L	560	590	5.2%	
Boron	0.050 mg/L	0.23	0.23	0%	
Calcium	2.0 mg/L	490	490	0%	
Arsenic	0.00050 mg/L	0.0030	0.0032	6.5%	
Barium	0.00050 mg/L	0.068	0.071	4.3%	
Molybdenum	0.00050 mg/L	0.0024	0.0025	4.1%	
pH	1.7 SU	7.3	7.3	0%	
Samples CH-CCR-W126-41119 and CH-CCR-FD01-41119					
Chloride	200 mg/L	6,700	6,700	0%	
Fluoride	0.80 mg/L	3.7	3.7	0%	
Sulfate	200 mg/L	3,900	3,900	0%	
Boron	0.050 mg/L	46	47	2.2%	
Calcium	2.0 mg/L	740	750	1.3%	
Lithium	0.20 mg/L	0.73	0.73	0%	
Arsenic	0.50 mg/L	1.7	1.6	6.1%	
Barium	0.50 mg/L	11	9.4	16%	
Chromium	1.0 mg/L	8.5	6.9	21%	J-FD
Cobalt	0.50 mg/L	4.2	4.1	2.4%	
Molybdenum	0.50 mg/L	220	220	0%	
Selenium	0.50 mg/L	2.0	1.9	5.1%	
Total Dissolved Solids	200 mg/L	16,000	16,000	0%	
pH	1.7 S.U.	7.4	7.4	0%	
Samples CH-CCR-W123-41119 and CH-CCR-FD02-41119					
No detected analytes					

**TABLE 2**  
**FIELD DUPLICATE DETECTIONS**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-M64A-41619 and CH-CCR-FD01-41619					
Lithium	0.20 mg/L	0.25	0.25	0%	
Arsenic	0.00050 mg/L	0.00058	0.00057	1.7%	
Barium	0.00050 mg/L	0.012	0.012	0%	
Molybdenum	0.00050 mg/L	0.0050	0.0051	2.0%	
Selenium	0.00050 mg/L	0.00078	0.00050 U	NC	± RL
Samples CH-CCR-W317-41719 and CH-CCR-FD03-41719					
Arsenic	0.00050 mg/L	0.0035	0.0039	11%	
Barium	0.00050 mg/L	0.032	0.033	3.1%	
Molybdenum	0.00050 mg/L	0.0028	0.0028	0%	
Samples CH-CCR-M62A-41819 and CH-CCR-FD04-41819					
Fluoride	0.40 mg/L	0.47	0.40 U	NC	± RL
Arsenic	0.00050 mg/L	0.0033	0.0031	6.3%	
Barium	0.00050 mg/L	0.068	0.068	0%	
Molybdenum	0.00050 mg/L	0.0026	0.0025	3.9%	
Samples CH-CCR-MW64A-8119 and CH-CCR-FD01-8119					
Chloride	400 mg/L	4,200	4,300	2.4%	
Sulfate	400 mg/L	4,300	4,300	0%	
Boron	0.050 mg/L	1.3	1.3	0%	
Calcium	2.0 mg/L	450	450	0%	
Total Dissolved Solids	100 mg/L	12,000	12,000	0%	
pH	1.7 S.U.	7.4	7.4	0%	
Samples CH-CCR-MW53A-8119 and CH-CCR-FD02-8119					
Chloride	400 mg/L	2,200	2,200	0%	
Fluoride	0.80 mg/L	2.3	2.3	0%	
Sulfate	400 mg/L	2,900	3,000	3.4%	
Boron	0.050 mg/L	3.2	3.2	0%	
Calcium	2.0 mg/L	590	600	1.7%	
Total Dissolved Solids	100 mg/L	7,800	8,500	8.6%	
pH	1.7 S.U.	7.5	7.3	2.7%	
Samples CH-CCR-W309-8819 and CH-CCR-FD01-8819					
Chloride	400 mg/L	1,600	1,600	0%	
Fluoride	0.80 mg/L	1.1	1.0	10%	
Sulfate	400 mg/L	3,200	3,200	0%	
Boron	0.050 mg/L	0.50	0.48	4.1%	
Calcium	2.0 mg/L	470	450	4.3%	
Total Dissolved Solids	100 mg/L	7,300	7,200	1.4%	
pH	1.7 S.U.	7.5	7.5	0%	

**TABLE 2**  
**FIELD DUPLICATE DETECTIONS**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-M57A-8919 and CH-CCR-FD01-8919					
Chloride	300 mg/L	1,900	1,900	0%	
Sulfate	300 mg/L	1,300	1,300	0%	
Boron	0.050 mg/L	0.56	0.55	1.8%	
Calcium	2.0 mg/L	470	450	4.3%	
Arsenic	0.00050 mg/L	0.0019	0.0021	10%	
Barium	0.00050 mg/L	0.039	0.040	2.5%	
Chromium	0.0010 mg/L	0.038	0.043	12%	
Cobalt	0.00050 mg/L	0.0040	0.0039	2.5%	
Molybdenum	0.00050 mg/L	0.0068	0.0071	4.3%	
Total Dissolved Solids	100 mg/L	4,700	5,000	6.2%	
pH	1.7 S.U.	7.0	7.0	0%	
Samples CH-CCR-M59-102319 and CH-CCR-FD01-102319					
Chloride	100 mg/L	1,400	1,400	0%	
Fluoride	0.40 mg/L	1.3	1.3	0%	
Sulfate	100 mg/L	350	350	0%	
Boron	0.050 mg/L	0.48	0.48	0%	
Calcium	2.0 mg/L	84	85	1.2%	
Total Dissolved Solids	100 mg/L	2,800	2,600	7.4%	
pH	1.7 S.U.	7.5	7.8	3.9%	
Samples CH-CCR-W305-102319 and CH-CCR-FD01-102319					
Chloride	400 mg/L	2,400	2,300	4.3%	
Sulfate	400 mg/L	2,300	2,400	4.3%	
Boron	0.050 mg/L	0.34	0.34	0%	
Calcium	2.0 mg/L	690	680	1.5%	
Lithium	0.20 mg/L	0.20	0.20	0%	
Arsenic	0.0010 mg/L	0.0019	0.0015	24%	± RL
Barium	0.0010 mg/L	0.014	0.013	7.4%	
Cadmium	0.00020 mg/L	0.00022	0.00021	4.7%	
Cobalt	0.0010 mg/L	0.018	0.018	0%	
Lead	0.0010 mg/L	0.0026	0.0025	3.9%	
Molybdenum	0.0010 mg/L	0.023	0.022	4.4%	
Thallium	0.00020 mg/L	0.00024	0.00020 U	NC	± RL
Total Dissolved Solids	100 mg/L	7,000	7,100	1.4%	
pH	1.7 S.U.	7.3	7.5	2.7%	

**TABLE 2**  
**FIELD DUPLICATE DETECTIONS**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-W304-102419 and CH-CCR-FD02-102419					
Chloride	400 mg/L	3,300	3,400	3.0%	
Sulfate	400 mg/L	2,900	2,900	0%	
Boron	0.050 mg/L	0.52	0.52	0%	
Calcium	2.0 mg/L	610	610	0%	
Lithium	0.20 mg/L	0.45	0.45	0%	
Arsenic	0.0010 mg/L	0.0014	0.00093	40%	± RL
Barium	0.0010 mg/L	0.014	0.015	6.9%	
Chromium	0.0010 mg/L	0.0010 U	0.0016	NC	± RL
Cobalt	0.0010 mg/L	0.0028	0.0029	4%	
Molybdenum	0.0010 mg/L	0.0042	0.0036	15%	
Selenium	0.0010 mg/L	0.0012	0.0010 U	NC	± RL
Total Dissolved Solids	100 mg/L	9,100	9,200	1.1%	
pH	1.7 S.U.	7.4	7.4	0%	
Samples CH-CCR-M57A-112519 and CH-CCR-FD-01-112519					
Chloride	400 mg/L	1,900	1,800	5.4%	
Sulfate	400 mg/L	1,400	1,400	0%	
Boron	0.050 mg/L	0.54	0.58	7.1%	
Calcium	2.0 mg/L	440	480	8.7%	
Arsenic	0.00050 mg/L	0.021	0.021	0%	
Barium	0.00050 mg/L	0.047	0.047	0%	
Chromium	0.0010 mg/L	0.0038	0.0035	8.2%	
Cobalt	0.00050 mg/L	0.0044	0.0046	4.4%	
Molybdenum	0.00050 mg/L	0.012	0.012	0%	
Total Dissolved Solids	100 mg/L	4,900	4,800	2.1%	
pH	1.7 S.U.	7.0	7.0	0%	

**TABLE 3**  
**QUALIFIERS ADDED DURING DATA VALIDATION**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sample Identification	Sample Delivery Group	Analyte	Result	Qualifier and Reason Code
CH-APP-BAP-42919	550-121943	pH	8.2 S.U.	J HT
CH-APP-FAP-42919	550-121943	Fluoride	69 mg/L	J HM
CH-APP-FAP-42919	550-121943	pH	7.1 S.U.	J HT
CH-CCR-BAP-33019	550-120430	Barium	0.20 mg/L	J HM
CH-CCR-BAP-33019	550-120430	pH	8.3 S.U.	J HT
CH-CCR-FAP-33019	550-120430	Fluoride	68 mg/L	J HT
CH-CCR-FAP-33019	550-120430	Fluoride	5.1 mg/L	R EX
CH-CCR-FAP-33019	550-120430	pH	6.7 S.U.	J HT
CH-CCR-FD01-102319	550-132142	pH	7.8 S.U.	J HT
CH-CCR-FD01-102319	550-132146	pH	7.5 S.U.	J HT
CH-CCR-FD01-21519	550-118121	Arsenic	0.0018 mg/L	J FD
CH-CCR-FD01-21519	550-118121	Barium	0.016 mg/L	J FD
CH-CCR-FD01-21519	550-118121	Lead	0.0024 mg/L	J FD
CH-CCR-FD01-21519	550-118121	Molybdenum	0.026 mg/L	J FD
CH-CCR-FD01-8119	550-127215	pH	7.4 S.U.	J HT
CH-CCR-FD01-8819	550-127723	pH	7.5 S.U.	J HT
CH-CCR-FD01-8919	550-127722	pH	7.0 S.U.	J HT
CH-CCR-FD02-102419	550-132146	Chloride	3,400 mg/L	J RT
CH-CCR-FD02-102419	550-132146	Fluoride	0.80 mg/L	UJ RT
CH-CCR-FD02-102419	550-132146	pH	7.4 S.U.	J RT, HT
CH-CCR-FD02-102419	550-132146	Sulfate	2,900 mg/L	J RT
CH-CCR-FD02-102419	550-132146	Total Dissolved Solids	9,200 mg/L	J RT
CH-CCR-FD02-21519	550-118122	pH	7.3 S.U.	J HT
CH-CCR-FD02-8119	550-127215	pH	7.3 S.U.	J HT
CH-CCR-M52A-102419	550-132146	pH	7.0 S.U.	J HT
CH-CCR-M52A-8119	550-127215	pH	6.9 S.U.	J HT
CH-CCR-M53A-102319	550-132146	Chloride	2,200 mg/L	J RT
CH-CCR-M53A-102319	550-132146	Fluoride	2.2 mg/L	J RT
CH-CCR-M53A-102319	550-132146	pH	7.5 S.U.	J RT, HT
CH-CCR-M53A-102319	550-132146	Sulfate	2,900 mg/L	J RT
CH-CCR-M53A-102319	550-132146	Total Dissolved Solids	7,900 mg/L	J RT
CH-CCR-M53A-8119	550-127215	pH	7.5 S.U.	J HT
CH-CCR-M54-102219	550-132142	pH	7.4 S.U.	J HT
CH-CCR-M55A-102419	550-132146	pH	7.4 S.U.	J HT
CH-CCR-M55A-8119	550-127215	pH	7.3 S.U.	J HT
CH-CCR-M56A-21519	550-118122	pH	7.3 S.U.	J HT
CH-CCR-M56A-8919	550-127722	pH	7.3 S.U.	J HT
CH-CCR-M57A-21519	550-118122	pH	7.1 S.U.	J HT
CH-CCR-M57A-8919	550-127722	pH	7.0 S.U.	J HT
CH-CCR-M58A-21519	550-118122	pH	7.5 S.U.	J HT

**TABLE 3**  
**QUALIFIERS ADDED DURING DATA VALIDATION**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sample Identification	Sample Delivery Group	Analyte	Result	Qualifier and Reason Code
CH-CCR-M58A-8919	550-127722	pH	7.4 S.U.	J HT
CH-CCR-M59-102319	550-132142	pH	7.5 S.U.	J HT
CH-CCR-M59-40919	550-121053	pH	7.9 S.U.	J HT
CH-CCR-M59-40919	550-121053	Total Dissolved Solids	2,700 mg/L	J HT
CH-CCR-M60-102219	550-132142	pH	7.6 S.U.	J HT
CH-CCR-M60-40919	550-121053	pH	7.7 S.U.	J HT
CH-CCR-M61-102219	550-132142	pH	7.8 S.U.	J HT
CH-CCR-M61-40919	550-121053	pH	7.7 S.U.	J HT
CH-CCR-M62A-21519	550-118122	pH	7.3 S.U.	J HT
CH-CCR-M62A-8919	550-127722	pH	7.3 S.U.	J HT
CH-CCR-M64A-102419	550-132146	Barium	0.013 mg/L	J HM
CH-CCR-M64A-102419	550-132146	pH	7.5 S.U.	J HT
CH-CCR-M64A-41119	550-121047	pH	7.3 S.U.	J HT
CH-CCR-M64A-8119	550-127215	pH	7.4 S.U.	J HT
CH-CCR-M65A-41119	550-121047	pH	7.2 S.U.	J HT
CH-CCR-M66A-41119	550-121047	pH	7.2 S.U.	J HT
CH-CCR-M67A-41119	550-121047	pH	6.9 S.U.	J HT
CH-CCR-w123-41119	550-121047	pH	7.6 S.U.	J HT
CH-CCR-W126-41119	550-121047	Chromium	8.5 mg/L	J FD
CH-CCR-W126-41119	550-121047	pH	7.4 S.U.	J HT
CH-CCR-W301-102319	550-132146	Chloride	6,300 mg/L	J RT
CH-CCR-W301-102319	550-132146	Fluoride	0.80 mg/L	UJ RT
CH-CCR-W301-102319	550-132146	pH	7.3 S.U.	J RT, HT
CH-CCR-W301-102319	550-132146	Sulfate	3,600 mg/L	J RT
CH-CCR-W301-102319	550-132146	Total Dissolved Solids	14,000 mg/L	J RT
CH-CCR-W301-21519	550-118121	Fluoride	0.40 mg/L	UJ LM
CH-CCR-W301-8919	550-127723	pH	7.2 S.U.	J HT
CH-CCR-W302-102319	550-132146	Chloride	2,700 mg/L	J RT
CH-CCR-W302-102319	550-132146	Fluoride	0.80 mg/L	J RT
CH-CCR-W302-102319	550-132146	pH	7.4 S.U.	J RT, HT
CH-CCR-W302-102319	550-132146	Sulfate	2,300 mg/L	J RT
CH-CCR-W302-102319	550-132146	Total Dissolved Solids	8,000 mg/L	J RT
CH-CCR-W302-8919	550-127723	pH	7.3 S.U.	J HT
CH-CCR-W304-102419	550-132146	pH	7.4 S.U.	J HT
CH-CCR-W304-8819	550-127723	pH	7.3 S.U.	J HT
CH-CCR-W305-102319	550-132146	pH	7.3 S.U.	J HT
CH-CCR-W305-21519	550-118121	Arsenic	0.00087 mg/L	J FD
CH-CCR-W305-21519	550-118121	Barium	0.011 mg/L	J FD
CH-CCR-W305-21519	550-118121	Lead	0.0018 mg/L	J FD
CH-CCR-W305-21519	550-118121	Molybdenum	0.020 mg/L	J FD



**TABLE 3**  
**QUALIFIERS ADDED DURING DATA VALIDATION**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

Sample Identification	Sample Delivery Group	Analyte	Result	Qualifier and Reason Code
CH-CCR-W305-8119	550-127215	pH	7.3 S.U.	J HT
CH-CCR-W306-102319	550-132146	pH	7.9 S.U.	J HT
CH-CCR-W306-8119	550-127215	pH	7.9 S.U.	J HT
CH-CCR-W307-102419	550-132146	pH	7.4 S.U.	J HT
CH-CCR-W307-8819	550-127723	pH	7.2 S.U.	J HT
CH-CCR-W308-102419	550-132146	Chloride	3,100 mg/L	J RT
CH-CCR-W308-102419	550-132146	Fluoride	0.80 mg/L	UJ RT
CH-CCR-W308-102419	550-132146	pH	7.3 S.U.	J RT, HT
CH-CCR-W308-102419	550-132146	Sulfate	2,800 mg/L	J RT
CH-CCR-W308-102419	550-132146	Total Dissolved Solids	8,900 mg/L	J RT
CH-CCR-W308-41619	550-121460	Selenium	0.053 mg/L	J HM
CH-CCR-W308-8819	550-127723	pH	7.2 S.U.	J HT
CH-CCR-W309-102419	550-132146	Chloride	1,600 mg/L	J RT
CH-CCR-W309-102419	550-132146	Fluoride	1.1 mg/L	J RT
CH-CCR-W309-102419	550-132146	pH	7.5 S.U.	J HT
CH-CCR-W309-102419	550-132146	Sulfate	3300 mg/L	J RT
CH-CCR-W309-102419	550-132146	Total Dissolved Solids	7,100 mg/L	J RT
CH-CCR-W309-41619	550-121460	Selenium	0.22 mg/L	J HM
CH-CCR-W309-8819	550-127723	pH	7.5 S.U.	J HT
CH-CCR-W314-102419	550-132146	Chloride	2,700 mg/L	J RT
CH-CCR-W314-102419	550-132146	Fluoride	0.80 mg/L	UJ RT
CH-CCR-W314-102419	550-132146	pH	7.4 S.U.	J RT, HT
CH-CCR-W314-102419	550-132146	Sulfate	2,200 mg/L	J RT
CH-CCR-W314-102419	550-132146	Total Dissolved Solids	7,400 mg/L	J RT
CH-CCR-W314-8119	550-127215	pH	7.4 S.U.	J HT
CH-CCR-W317-102419	550-132146	Chloride	1,400 mg/L	J RT
CH-CCR-W317-102419	550-132146	Fluoride	0.40 mg/L	UJ RT
CH-CCR-W317-102419	550-132146	pH	7.5 S.U.	J RT, HT
CH-CCR-W317-102419	550-132146	Sulfate	680 mg/L	J RT
CH-CCR-W317-102419	550-132146	Total Dissolved Solids	3,400 mg/L	J RT
CH-CCR-W317-33019	550-120430	pH	7.5 S.U.	J HT
CH-CCR-W317-8919	550-127723	pH	7.4 S.U.	J HT
CH-CCR-M56A-112519	550-133984	pH	7.3 S.U.	J HT
CH-CCR-M57A-112519	550-133984	pH	7.0 S.U.	J HT
CH-CCR-M58A-112519	550-133984	pH	7.4 S.U.	J HT
CH-CCR-M62A-112519	550-133984	pH	7.3 S.U.	J HT
CH-CCR-M62A-112519	550-133984	Barium	0.15 mg/L	J HM
CH-CCR-FD-01-112519	550-133984	pH	7.0 S.U.	J HT

**TABLE 3**  
**QUALIFIERS ADDED DURING DATA VALIDATION**  
**Coal Combustion Residuals Rule**  
**2019 Compliance Monitoring Groundwater Data**

**Notes:**

mg/L = milligrams per liter

S.U. = standard units

**Qualifiers:**

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

R = The result has been rejected.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

**Reason Codes:**

EX = There were multiple datasets available for the same parameter and based on professional judgement this result has been rejected in favor of data from the other dataset.

FD = Imprecision between primary and field duplicate results. Potential sampling and/or analytical imprecision.

HM = High matrix spike recovery. Result may be biased high.

HT = The maximum recommended hold time was exceeded and the result should be considered an estimated value.

LM = Low matrix spike recovery. Result may be biased low.

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**APPENDIX A**

Data Assessment Checklists by Sample Delivery Group

## Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	J118120-1	<b>Review Date:</b>	04/10/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M50A-21319	02/13/19 17:09	550-118120-1	
CH-CCR-M51A-21319	02/13/19 16:20	550-118120-2	
CH-CCR-M64A-21319	02/13/19 14:47	550-118120-3	
CH-CCR-M65A-21419	02/14/19 12:12	550-118120-4	
CH-CCR-M66A-21419	02/14/19 12:12	550-118120-5	
CH-CCR-M67A-21419	02/14/19 11:18	550-118120-6	
CH-CCR-W123-21319	02/13/19 17:44	550-118120-7	
CH-CCR-FD01-21319	02/13/19 14:47	550-118120-8	Duplicate of CH-CCR-M64A-21319

### Analytical Methods:

Analyte	Analyte Group	EPA Method
Beryllium, Lithium	Metals	EPA 200.7
Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Mercury	Metals	EPA 245.1
Fluoride	Anions	EPA 300.0

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes

No

If No, provide details.

TestAmerica did not write the sample receipt date on the COC.

Sample Login Matched COC?

Yes

No

If no, provide details.

### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?  Yes  No

2. Samples analyzed for mercury and fluoride within 28 days of sampling?  
 Yes  No

If No:

Sample ID	Time Between Collection And Analysis	Affected Results

3. Target analytes detected in the blank?  Yes  No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

The laboratory did not report blank results for Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, and Thallium.

**Cholla CCR Data Review**

4. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

Analyte	Recovery	Affected Samples

LCS recoveries were within limits, but the RPD between LCS and LCSD results was high at 27%. Mercury was not detected in the associated samples and data usability is not adversely affected.

5. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M66A-21419	Fluoride, Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Thallium, Selenium, Mercury
CH-CCR-M50A-21319	Beryllium, Lithium

a. Are MS recoveries within laboratory specified limits?

Yes     No

If No:

Analyte	Recovery	Effect on Data Usability



**Cholla CCR Data Review**

6. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M64A-21319	CH-CCR-FD01-21319

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?                      Yes    No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Lithium	0.020 mg/L	0.29	0.29	0%	
Arsenic	0.0050 mg/L	0.0089	0.0076	16%	
Barium	0.0050 mg/L	0.012	0.012	0%	
Molybdenum	0.0050 mg/L	0.0049	0.0048	2.1%	
Selenium	0.0050 mg/L	0.0005	0.0050 U	NC	$\pm$ RL

$\pm$  RL                      The difference between concentrations is less than the reporting limit, demonstrating acceptable sampling and analytical precision.

**Cholla CCR Data Review**

7. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

**Yes**
 **No**

Analyte	Maximum Contaminant Level (mg/L)
Antimony	0.006
Arsenic	0.010
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Fluoride	4.0
Lead	0.015
Mercury	0.002
Selenium	0.05
Thallium	0.002

If No, list affected samples and analytes.

Sample ID	Analyte	Concentration

## Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-118121-1	<b>Review Date:</b>	4/10/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M52A-21519	02/15/19 17:37	550-118121-1	
CH-CCR-M53A-21519	02/15/19 18:12	550-118121-2	
CH-CCR-M55A-21519	02/15/19 11:49	550-118121-3	
CH-CCR-W301-21519	02/15/19 16:28	550-118121-4	
CH-CCR-W302-21519	02/15/19 15:16	550-118121-5	
CH-CCR-W304-21519	02/15/19 15:52	550-118121-6	
CH-CCR-W305-21519	02/15/19 18:42	550-118121-7	
CH-CCR-W306-21519	02/15/19 19:21	550-118121-8	
CH-CCR-W307-21519	02/15/19 14:21	550-118121-9	
CH-CCR-W308-21519	02/15/19 13:47	550-118121-10	
CH-CCR-W309-21519	02/15/19 12:52	550-118121-11	
CH-CCR-W314-21519	02/15/19 17:01	550-118121-12	
CH-CCR-FD01-21519	02/15/19 18:42	550-118121-13	Duplicate of CH-CCR-W305-21519

### Analytical Methods:

Analyte	Analyte Group	EPA Method
Beryllium, Lithium	Metals	EPA 200.7
Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Mercury	Metals	EPA 245.1
Fluoride	Anions	EPA 300.0

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?  
If No, provide details.

Yes

No

Sample Login Matched COC?

Yes

No

If no, provide details.

### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?       Yes       No

2. Samples analyzed for mercury and fluoride within 28 days of sampling?  
 Yes       No

If No:

Sample ID	Time Between Collection And Analysis	Affected Results

3. Target analytes detected in the blank?       Yes       No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

4. LCS recoveries within laboratory-specified limits?

Yes  No

If No:

Analyte	Recovery	Affected Samples

5. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W301-21519	Fluoride, antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Thallium, Selenium
CH-CCR-W304-21519	Mercury
CH-CCR-FD01-21519	Beryllium, Lithium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-W301-21519	Fluoride	76/77 (MS/MSD)	80-120%	UJ-LM

UJ-LM Low matrix spike recovery. Result may be biased low.

**Cholla CCR Data Review**

6. Field duplicate collected?

Yes    **No**

If Yes:

Parent Sample	Field Duplicate
CH-CCR-W305-21519	CH-CCR-FD01-21519

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?      Yes    **No**

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Lithium	0.20 mg/L	0.22	0.22	0%	
Arsenic	0.00050 mg/L	0.00087	0.0018	70%	J-FD
Barium	0.00050 mg/L	0.011	0.016	37%	J-FD
Cadmium	0.00010 mg/L	0.00010 U	0.00012	NC	$\pm$ RL
Chromium	0.0010 mg/L	0.0017	0.0015	13%	
Cobalt	0.00050 mg/L	0.018	0.022	20%	
Lead	0.00050 mg/L	0.0018	0.0024	29%	J-FD
Molybdenum	0.00050 mg/L	0.020	0.026	26%	J-FD
Selenium	0.00050 mg/L	0.00050 U	0.00070	NC	$\pm$ RL

$\pm$  RL      The difference between concentrations is less than the reporting limit, demonstrating acceptable sampling and analytical precision.

J-FD      Imprecision between primary and field duplicate results. Potential sampling and/or analytical imprecision.



### Cholla CCR Data Review

7. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes  No

Analyte	Maximum Contaminant Level (mg/L)
Antimony	0.006
Arsenic	0.010
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Fluoride	4.0
Lead	0.015
Mercury	0.002
Selenium	0.05
Thallium	0.002

If No, list affected samples and analytes.

Sample ID	Analyte	Concentration

### Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-118122-1	<b>Review Date:</b>	4/10/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M56A-21519	02/15/19 22:14	550-118122-1	
CH-CCR-M57A-21519	02/15/19 21:41	550-118122-2	
CH-CCR-M58A-21519	02/15/19 21:04	550-118122-3	
CH-CCR-M62A-21519	02/15/19 20:13	550-118122-4	
CH-CCR-FD02-21519	02/15/19 20:13	550-118122-5	Duplicate of CH-CCR-M62A-21519

**Analytical Methods:**

Analyte	Analyte Group	Method
Boron, Calcium	Metals	EPA 200.7
Arsenic, Barium, Chromium, Cobalt, Molybdenum, Thallium	Metals	EPA 200.8
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
pH	General Chemistry	SM 4500 H+ B

**Qualifier Definitions:**

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

**Cholla CCR Data Review**

**Sample Receipt Condition:**

COC Signed and Complete?  
If No, provide details.

Yes  No

Sample Login Matched COC?

Yes  No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes  No

**Cholla CCR Data Review**

1. Samples analyzed for metals within 180 days of sampling?  Yes  No

2. Samples analyzed for mercury, chloride, fluoride, and sulfate within 28 days of sampling?

Yes  No

3. Samples analyzed for pH within 15 minutes of sampling?  Yes  No  N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M56A-21519 CH-CCR-M57A-21519 CH-CCR-M58A-21519 CH-CCR-M62A-21519 CH-CCR-FD02-21519	pH	3 days	J-HT

J-HT The maximum recommended hold time was exceeded and the result should be considered an estimated value.

4. Target analytes detected in the blank?  Yes  No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

5. LCS recoveries within laboratory-specified limits?

Yes  No

If No:

Analyte	Recovery	Affected Samples

6. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M62A-21519	Chloride, Fluoride, Sulfate, Arsenic, Barium, Chromium, Cobalt, Molybdenum, Thallium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

**Cholla CCR Data Review**

7. Field duplicate collected?

Yes  No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-MW62A-21519	CH-CCR-FD02-21519

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit? Yes  No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Chloride	400 mg/L	2,900	3,000	3.4%	
Sulfate	400 mg/L	560	590	5.2%	
Boron	0.050 mg/L	0.23	0.23	0%	
Calcium	2.0 mg/L	490	490	0%	
Arsenic	0.0030 mg/L	0.0030	0.0032	6.5%	
Barium	0.00050 mg/L	0.068	0.071	4.3%	
Molybdenum	0.00050 mg/L	0.0024	0.0025	4.1%	
pH	1.7 pH Units	7.3	7.3	0%	

8. Did the laboratory perform duplicate analyses on project-specific samples?

Yes  No

If Yes:

Sample ID	Analysis
CH-CCR-M62A-21519	pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes  No

If No:

Sample ID	Analyte	Effect on Data Usability

**Cholla CCR Data Review**

9. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes  No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit



### Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-120430-1	<b>Review Date:</b>	7/23/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-W317-33019	03/30/19 16:01	550-120430-1	
CH-CCR-BAP-33019	03/30/19 14:57	550-120430-2	
CH-CCR-FAP-33019	03/30/19 13:34	550-120430-3	

**Analytical Methods:**

Analyte	Analyte Group	Method
Beryllium, Boron, Calcium, Lithium, Magnesium, Potassium, Sodium	Metals	EPA 200.7
Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Mercury	Metals	EPA 245.1
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Alkalinity, Total Dissolved Solids, pH	General Chemistry	SM 4500 H+ B

**Qualifier Definitions:**

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes

No

If No, provide details.

Sample Login Matched COC?

Yes

No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes

No

### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?      Yes    No
  
2. Samples analyzed for mercury, chloride, fluoride, and sulfate within 28 days of sampling?  
Yes    No
  
3. Samples analyzed for alkalinity within 14 days of sampling?      Yes    No    N/A
  
4. Samples Analyzed for total dissolved solids within 7 days of sampling?  
Yes    No    N/A
  
5. Samples analyzed for pH within 15 minutes of sampling?      Yes    No    N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-W317-33019	pH	5 days, 19 hours, 42 minutes	J-HT
CH-CCR-BAP-33019	pH	5 days, 20 hours, 46 minutes	J-HT
CH-CCR-FAP-33019	pH	5 days, 22 hours, 9 minutes	J-HT
CH-CCR-FAP-33019	Fluoride	33 Days	J-HT

J-HT    The maximum recommended hold time was exceeded and the result should be considered an estimated value.

6. Target analytes detected in the blank?      Yes    No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

7. LCS recoveries within laboratory-specified limits?

Yes No

If No:

Analyte	Recovery	Affected Samples

8. MS performed on a project-specific sample?

Yes No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-BAP-33019	Chloride, Fluoride, Sulfate, Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-BAP-33019	Barium	150% and 142%	70 – 130%	J-HM

Note:

HM = High matrix spike recovery. Result may be biased high.

9. Field duplicate collected?

Yes No

If Yes:

Parent Sample	Field Duplicate

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes No N/A

**Cholla CCR Data Review**

10. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-FAP-33019	Fluoride
CH-CCR-BAP-33019	Alkalinity, Total Dissolved Solids, pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No

If No:

Sample ID	Analyte	Effect on Data Usability

11. Other quality control issues?

Yes     No

If Yes:

Sample ID	Quality Control Issue
CH-CCR-FAP-33019	The laboratory reported two sets of fluoride results for this sample, one analyzed within method-specified hold times, with a detection of 5.1 milligrams per liter (mg/L), and one analyzed outside of the method-specified hold time, with a detection of 68 mg/L. Based on professional judgement, Wood R qualified and rejected the original fluoride result of 5.1 mg/L in favor of the result from the reanalysis. This rejection does not affect completeness since there were multiple datasets for the same parameter and the rejection serves to exclude a potentially redundant result. (R-EX)

Note:

R-EX = There were multiple datasets available for the same parameter and based on professional judgement this result has been rejected in favor of data from the other dataset.

**Cholla CCR Data Review**

12. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes  No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-W317-33019	Lithium	0.20 mg/L
CH-CCR-BAP-33019	Lithium	0.20 mg/L

### Cholla CCR Data Review

<b>Laboratory Name:</b>	Radiation Safety Engineering, Inc.		
<b>Sample Delivery Group:</b>	N/A	<b>Review Date:</b>	4/17/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date	Analysis Date	Analysis Completion Date	Notes
CH-CCR-M50A-21319	February 13, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M51A-21319	February 13, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M64A-21319	February 13, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M65A-21419	February 14, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M66A-21419	February 14, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M67A-21419	February 14, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W123-21319	February 13, 2019	February 22, 2019	March 5, 2019	
CH-CCR-FD01-21319	February 13, 2019	February 22, 2019	March 5, 2019	Duplicate of M64A
CH-CCR-M56A-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M57A-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M58A-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M62A-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-FD02-21519	February 15, 2019	February 22, 2019	March 5, 2019	Duplicate of M62A
CH-CCR-M52A-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M53A-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-M55A-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W301-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W302-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W304-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W305-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W306-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W307-21519	February 15, 2019	February 22, 2019	March 5, 2019	
CH-CCR-W308-21519	February 15, 2019	February 22, 2019	March 5, 2019	

**Analytical Methods:**

Analyte	Analyte Group	Method
Radium 226, Radium 228, Total Radium	Rad	Gamma Ray HPGE



## Cholla CCR Data Review

### Qualifier Definitions:

- J**      The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
  
- R**      The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
  
- U**      The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
  
- UJ**     The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

### Sample Receipt Condition:

COC Signed and Complete?  
If No, provide details.

Yes    No

Sample Login Matched COC?  
If no, provide details.

Yes    No

**Cholla CCR Data Review**

1. Samples analyzed for radium within 180 days of sampling?  Yes  No

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability

2. Target analytes detected in the blank?  Yes  No  Not Applicable

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

3. LCS recoveries within laboratory-specified limits?  Yes  No  Not Applicable

If No:

Analyte	Recovery	Affected Samples

**Cholla CCR Data Review**

4. MS performed on a project-specific sample? Yes No **Not Applicable**

If Yes:

Spiked Sample ID	Spiked Analyte(s)

a. Are MS recoveries and/or precision within laboratory specified limits? Yes No **Not Applicable**

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

5. Field duplicate collected? **Yes** No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M64A-21319	CH-CCR-FD01-21319
CH-CCR-M62A-21519	CH-CCR-FD02-21519

a. Is the RPD between primary and duplicate results  $\leq 20\%$  or is the difference between analyte concentrations  $\leq$  the reporting limit? **Yes** No Not Applicable

Analyte	Units	Primary Result	Duplicate Result	RPD
Samples CH-CCR-M64A-21319 and CH-CCR-FD01-21319				
Radium 226	pCi/L	< 0.5	< 0.4	NC
Radium 228	pCi/L	< 0.6	0.9 ± 0.3	NC
Total Radium	pCi/L	< 0.6	0.9 ± 0.3	NC
Samples CH-CCR-M62A-21519 and CH-CCR-FD02-21519				
Radium 226	pCi/L	< 0.5	< 0.5	NC
Radium 228	pCi/L	< 0.7	< 0.7	NC
Total Radium	pCi/L	< 0.7	< 0.7	NC

Notes:

NC = not calculable

pCi/L = picocuries per liter

**Cholla CCR Data Review**

6. Did the laboratory perform duplicate analyses on project-specific samples?

Yes  No

If Yes:

Sample ID	Analysis

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes  No  Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability

7. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes  No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

### Cholla CCR Data Review

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

## Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-121047-1	<b>Review Date:</b>	7/23/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M50A-41119	04/11/19 11:14	550-121047-1	
CH-CCR-M51A-41019	04/10/19 08:48	550-121047-2	Logged in as CH-CCR-M51A-41119
CH-CCR-w123-41119	04/11/19 11:42	550-121047-3	
CH-CCR-M65A-41119	04/11/19 14:02	550-121047-4	
CH-CCR-M66A-41119	04/11/19 14:26	550-121047-5	
CH-CCR-M67A-41119	04/11/19 13:36	550-121047-6	
CH-CCR-W126-41119	04/11/19 12:20	550-121047-7	
CH-CCR-M64A-41119	04/11/19 15:26	550-121047-8	
CH-CCR-FD01-41119	04/11/19 12:20	550-121047-9	Duplicate of CH-CCR-W126-41119

### Analytical Methods:

Analyte	Analyte Group	Method
Boron, Calcium, Lithium	Metals	EPA 200.7
Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium	Metals	EPA 200.8
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids, pH	General Chemistry	SM 4500 H+ B

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes

No

If No, provide details.

Sample Login Matched COC?

Yes

No

If no, provide details.

The sample recorded on the COC as CH-CCR-MW51A-41019 was logged in as CH-CCR-MW51A-41119.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes

No



### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?  Yes  No
  
2. Samples analyzed for chloride, fluoride, and sulfate within 28 days of sampling?  Yes  No
  
3. Samples Analyzed for total dissolved solids within 7 days of sampling?  Yes  No  N/A
  
4. Samples analyzed for pH within 15 minutes of sampling?  Yes  No  N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M50A-41119	pH	11 days, 1 hour, 13 minutes	J-HT
CH-CCR-M51A-41019	pH	12 days, 3 hours, 39 minutes	J-HT
CH-CCR-w123-41119	pH	11 days, 0 hours, 45 minutes	J-HT
CH-CCR-M65A-41119	pH	10 days, 22 hours, 25 minutes	J-HT
CH-CCR-M66A-41119	pH	10 days, 22 hours, 1 minute	J-HT
CH-CCR-M67A-41119	pH	10 days, 22 hours, 51 minutes	J-HT
CH-CCR-W126-41119	pH	11 days, 0 hours, 7 minutes	J-HT
CH-CCR-M64A-41119	pH	10 days, 21 hours, 1 minute	J-HT
CH-CCR-FD01-41119	pH	11 days, 0 hours, 7 minutes	J-HT

J-HT The maximum recommended hold time was exceeded and the result should be considered an estimated value.

5. Target analytes detected in the blank?  Yes  No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection
Barium	0.657 µg/L	none

**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes    No     N/A

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes  No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-W126-41119	CH-CCR-FD01-41119

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit? Yes  No  N/A

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Chloride	200 mg/L	6,700	6,700	0%	
Fluoride	0.80 mg/L	3.7	3.7	0%	
Sulfate	200 mg/L	3,900	3,900	0%	
Boron	0.050 mg/L	46	47	2%	
Calcium	2.0 mg/L	740	750	1%	
Lithium	0.20 mg/L	0.73	0.73	0%	
Arsenic	0.50 mg/L	1.7	1.6	6%	
Barium	0.50 mg/L	11	9.4	16%	
Chromium	1.0 mg/L	8.5	6.9	21%	J-FD
Cobalt	0.50 mg/L	4.2	4.1	2%	
Molybdenum	0.50 mg/L	220	220	0%	
Selenium	0.50 mg/L	2.0	1.9	5%	
Total Dissolved Solids	200 mg/L	16,000	16,000	0%	
pH	1.7 S.U.	7.4	7.4	0%	

Note:

J-FD = Imprecision between primary and field duplicate results.

### Cholla CCR Data Review

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes       No

If Yes:

Sample ID	Analysis

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes      No       N/A

If No:

Sample ID	Analyte	Effect on Data Usability

10. Other quality control issues?

Yes       No

If Yes:

Sample ID	Quality Control Issue

**Cholla CCR Data Review**

11. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

**Cholla CCR Data Review**

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-121053-1	<b>Review Date:</b>	7/23/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

<b>Field Sample Identification</b>	<b>Collection Date and Time</b>	<b>Laboratory Sample Identification</b>	<b>Notes</b>
CH-CCR-M54-40919	04/09/19 14:27	550-121053-1	
CH-CCR-M59-40919	04/09/19 10:00	550-121053-2	
CH-CCR-M60-40919	04/09/19 12:45	550-121053-3	
CH-CCR-M61-40919	04/09/19 11:41	550-121053-4	

**Analytical Methods:**

<b>Analyte</b>	<b>Analyte Group</b>	<b>Method</b>
Boron, Calcium	Metals	EPA 200.7
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids, pH	General Chemistry	SM 4500 H+ B

**Qualifier Definitions:**

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?  
If No, provide details.

Yes

No

Sample Login Matched COC?

Yes

No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes

No



**Cholla CCR Data Review**

1. Samples analyzed for metals within 180 days of sampling?  Yes  No

2. Samples analyzed for chloride, fluoride, and sulfate within 28 days of sampling?

Yes  No

3. Samples Analyzed for total dissolved solids within 7 days of sampling?

Yes  No  N/A

4. Samples analyzed for pH within 15 minutes of sampling? Yes  No  N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M54-40919	pH	12 days, 22 hours, 0 minutes	J-HT
CH-CCR-M59-40919	pH	13 days, 2 hours, 27 minutes	J-HT
CH-CCR-M59-40919	Total dissolved solids	8 days	J-HT
CH-CCR-M60-40919	pH	12 days, 23 hours, 42 minutes	J-HT
CH-CCR-M61-40919	pH	13 days, 0 hours, 46 minutes	J-HT

J-HT The maximum recommended hold time was exceeded and the result should be considered an estimated value.

5. Target analytes detected in the blank? Yes  No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M61-40919	Fluoride

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes No N/A

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

8. Field duplicate collected?

Yes No

If Yes:

Parent Sample	Field Duplicate

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes No N/A

### Cholla CCR Data Review

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes    No

If Yes:

Sample ID	Analysis
CH-CCR-M54-40919	Total dissolved solids, pH
CH-CCR-M59-40919	Total dissolved solids

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes    No    N/A

If No:

Sample ID	Analyte	Effect on Data Usability

10. Other quality control issues?

Yes     No

If Yes:

Sample ID	Quality Control Issue

**Cholla CCR Data Review**

11. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-121460-1	<b>Review Date:</b>	5/9/2019
<b>Validator's Name:</b>	Caprielle Larsen	<b>Reviewed By:</b>	Marie Bevier

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M52A-41619	4/16/2019 16:33	550-121460-1	
CH-CCR-M53A-41719	4/17/2019 13:11	550-121460-2	
CH-CCR-W305-41719	4/17/2019 12:38	550-121460-3	
CH-CCR-W306-41619	4/16/2019 17:34	550-121460-4	
CH-CCR-W314-41619	4/16/2019 16:00	550-121460-5	
CH-CCR-M64A-41619	4/16/2019 09:51	550-121460-6	
CH-CCR-FD01-41619	4/16/2019 09:51	550-121460-7	Duplicate of CH-CCR-M64A-41619
CH-CCR-M55A-41619	4/16/2019 11:18	550-121460-8	
CH-CCR-W301-41619	4/16/2019 15:15	550-121460-9	
CH-CCR-W302-41719	4/17/2019 11:32	550-121460-10	
CH-CCR-W304-41619	4/16/2019 14:22	550-121460-11	
CH-CCR-W307-41619	4/16/2019 13:31	550-121460-12	

### Analytical Methods:

Analyte	Analyte Group	Method
Lithium	Metals	EPA 200.7
Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Fluoride	Anions	EPA 300.0

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?  
If No, provide details.

Yes  No

Sample Login Matched COC?

Yes  No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes  No

### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?  Yes  No

2. Samples analyzed for mercury, chloride, fluoride, and/or sulfate within 28 days of sampling?

Yes  No

3. Samples analyzed for pH within 15 minutes of sampling?

Yes  No

N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability

4. Target analytes detected in the blank?

Yes

No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

5. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

Analyte	Recovery	Affected Samples

6. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M52A-41619	Arsenic, Barium, Cadmium, Chromium, Cobalt, Fluoride, Lead, Molybdenum, Selenium, Thallium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability



**Cholla CCR Data Review**

7. Field duplicate collected?

Yes  No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M64A-41619	CH-CCR-FD01-41619

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit? Yes  No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Lithium	0.20 mg/L	0.25	0.25	0%	
Arsenic	0.00050 mg/L	0.00058	0.00057	2%	
Barium	0.00050 mg/L	0.012	0.012	0%	
Molybdenum	0.00050 mg/L	0.0050	0.0051	2%	
Selenium	0.00050 mg/L	0.00078	0.00050 U	NC	$\pm$ RL

NC = The RPD is not calculable

$\pm$ RL = The difference between results is less than the reporting limit, indicating acceptable precision.

8. Did the laboratory perform duplicate analyses on project-specific samples?

Yes  No

If Yes:

Sample ID	Analysis

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes  No  N/A

If No:

Sample ID	Analyte	Effect on Data Usability

**Cholla CCR Data Review**

9. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

**No**

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-M53A-41719	Lithium	0.20 mg/L

### Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-121461-1	<b>Review Date:</b>	7/23/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-W308-41619	04/16/19 11:51	550-121461-1	
CH-CCR-W309-41619	04/16/19 12:51	550-121461-2	
CH-CCR-W317-41719	04/17/19 14:01	550-121461-3	
CH-CCR-FD03-41719	04/17/19 14:01	550-121461-4	Duplicate of CH-CCR-W317-41719

**Analytical Methods:**

Analyte	Analyte Group	Method
Lithium	Metals	EPA 200.7
Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Fluoride	Anions	EPA 300.0

**Qualifier Definitions:**

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

**Sample Receipt Condition:**

COC Signed and Complete?  
If No, provide details.

Yes     No

Sample Login Matched COC?

Yes     No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes     No

1. Samples analyzed for metals within 180 days of sampling?     Yes     No

1. Samples analyzed for fluoride within 28 days of sampling?     Yes     No

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability

2. Target analytes detected in the blank?    Yes     No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

3. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

Analyte	Recovery	Affected Samples

4. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W308-41619	Fluoride, Arsenic, Cadmium, Cobalt, Lead, Molybdenum, Selenium, Thallium
CH-CCR-W309-41619	Barium, Selenium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No    N/A

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-W308-41619	Selenium	131%, MS	70 to 130%	J-HM
CH-CCR-W309-41619	Selenium	145%, MSD	70 to 130%	J-HM

Note:

J-HM = High matrix spike recovery. Result may be biased high.

5. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-W317-41719	CH-CCR-FD03-41719

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes     No    N/A

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Arsenic	0.00050 mg/L	0.0035	0.0039	11%	
Barium	0.00050 mg/L	0.032	0.033	3%	
Molybdenum	0.00050 mg/L	0.0028	0.0028	0%	

### Cholla CCR Data Review

6. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes    No     N/A

If No:

Sample ID	Analyte	Effect on Data Usability

7. Other quality control issues?

Yes     No

If Yes:

Sample ID	Quality Control Issue

**Cholla CCR Data Review**

8. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-W317-41719	Lithium	0.20 mg/L
CH-CCR-FD03-41719	Lithium	0.20 mg/L

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-121462-1	<b>Review Date:</b>	5/9/2019
<b>Validator's Name:</b>	Caprielle Larsen	<b>Reviewed By:</b>	Marie Bevier

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M56A-41819	4/18/19 09:58	550-121462-1	
CH-CCR-M57A-41719	4/17/19 15:28	550-121462-2	
CH-CCR-M58A-41719	4/17/19 14:59	550-121462-3	
CH-CCR-M62A-41819	4/18/19 09:10	550-121462-4	
CH-CCR-FD04-41819	4/18/19 09:10	550-121462-5	Duplicate of CH-CCR-M62A-41819

### Analytical Methods:

Analyte	Analyte Group	Method
Beryllium, Lithium	Metals	EPA 200.7
Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Mercury	Metals	EPA 245.1
Fluoride	Anions	EPA 300.0

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.



**Cholla CCR Data Review**

**Sample Receipt Condition:**

COC Signed and Complete?  
If No, provide details.

Yes  No

Sample Login Matched COC?

Yes  No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes  No

### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?  Yes  No

2. Samples analyzed for mercury, chloride, fluoride, and/or sulfate within 28 days of sampling?  Yes  No

3. Samples analyzed for pH within 15 minutes of sampling?  Yes  No  N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability

4. Target analytes detected in the blank?  Yes  No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

5. LCS recoveries within laboratory-specified limits?

Yes  No

If No:

Analyte	Recovery	Affected Samples

6. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M56A-41819	Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Fluoride, Lead, Mercury, Molybdenum, Selenium, Thallium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

**Cholla CCR Data Review**

7. Field duplicate collected?

Yes  No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M62A-41819	CH-CCR-FD04-41819

a. Is the RPD between primary and duplicate results  $\leq 20\%$  or is the difference between analyte concentrations  $\leq$  the reporting limit? Yes  No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Fluoride	0.40 mg/L	0.47	0.40 U	NC	$\pm$ RL
Arsenic	0.00050 mg/L	0.0033	0.0031	6%	
Barium	0.00050 mg/L	0.068	0.068	0%	
Molybdenum	0.00050 mg/L	0.0026	0.0025	4%	

NC = The RPD is not calculable

$\pm$ RL = The difference between the detected result in the primary sample and the non-detect result in the duplicate sample is less than the value of the reporting limit, indicating acceptable precision.

8. Did the laboratory perform duplicate analyses on project-specific samples?

Yes  No

If Yes:

Sample ID	Analysis

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes  No  N/A

If No:

Sample ID	Analyte	Effect on Data Usability

**Cholla CCR Data Review**

9. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

**No**

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-M56A-41819	Lithium	0.20 mg/L
CH-CCR-M57A-41719	Lithium	0.20 mg/L
CH-CCR-M58A-41719	Lithium	0.20 mg/L
CH-CCR-M62A-41819	Lithium	0.20 mg/L
CH-CCR-FD04-41819	Lithium	0.20 mg/L

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-121943-1	<b>Review Date:</b>	5/30/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-APP-FAP-42919	4/29/19 11:35	550-121943-1	
CH-APP-FAP-42919	4/29/19 11:35	550-121943-2	Laboratory filtered
CH-APP-BAP-42919	4/29/19 12:45	550-121943-3	
CH-APP-BAP-42919	4/29/19 12:45	550-121943-4	Laboratory filtered

### Analytical Methods:

Analyte	Analyte Group	Method
Boron, Chromium (Dissolved)	Metals	EPA 200.7
Cadmium, Lead, Thallium, Uranium	Metals	EPA 200.8
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

**Cholla CCR Data Review**

**Sample Receipt Condition:**

COC Signed and Complete?  
If No, provide details.

 Yes

No

Sample Login Matched COC?

 Yes

No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

 Yes

No

**Cholla CCR Data Review**

1. Samples analyzed for metals within 180 days of sampling?       Yes    No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?       Yes    No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?       Yes    No
  
4. Samples analyzed for pH within 15 minutes of sampling?      Yes     No    N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-APP-FAP-42919	pH	7 days, 40 minutes	J-HT
CH-APP-BAP-42919	pH	6 days, 23 hours, 30 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

5. Target analytes detected in the blank?      Yes     No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection



**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes  No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-APP-FAP-42919	Chloride, Fluoride, Sulfate, Boron, Cadmium, Lead, Thallium, Uranium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-APP-FAP-42919	Fluoride	126% (MS)	80 - 120%	J-HM
	Boron	638%, -826%	70 – 130%	None *

Notes:

\* = It is not possible to assess data usability for this analyte because the concentration detected in the unspiked native sample was more than four times the spike concentration.

HM = High matrix spike recovery. Result may be biased high.

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes

No

If Yes:

Parent Sample	Field Duplicate

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?      Yes      No       Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes

No

If Yes:

Sample ID	Analysis
CH-APP-FAP-42919	Total Dissolved Solids

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes

No

Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability

**Cholla CCR Data Review**

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes     No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-127215-1	<b>Review Date:</b>	8/29/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M52A-8119	08/01/19 17:08	550-127215-1	
CH-CCR-M53A-8119	08/01/19 16:16	550-127215-2	
CH-CCR-W305-8119	08/01/19 15:43	550-127215-3	
CH-CCR-W306-8119	08/01/19 13:37	550-127215-4	
CH-CCR-W314-8119	08/01/19 17:40	550-127215-5	
CH-CCR-M64A-8119	08/01/19 12:20	550-127215-6	
CH-CCR-FD01-8119	08/01/19 12:20	550-127215-7	Field duplicate of CH-CCR-M64A-8119
CH-CCR-M55A-8119	08/01/19 18:17	550-127215-8	
CH-CCR-FD02-8119	08/01/19 16:16	550-127215-9	Field duplicate of CH-CCR-M53A-8119

### Analytical Methods:

Analyte	Analyte Group	Method
Boron, Calcium	Metals	EPA 200.7
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

### Qualifier Definitions:

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- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes

No

If No, provide details.

Sample CH-CCR-FD02-8119 was received, but was not listed on the COC. Eurofins TestAmerica analyzed the sample for the same parameters as the other samples.

Sample Login Matched COC?

Yes

No

If no, provide details.

Eurofins TestAmerica used information from the label to log in sample CH-CCR-FD02-8119.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes

No

### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?  Yes  No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?  Yes  No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?  Yes  No
  
4. Samples analyzed for pH within 15 minutes of sampling?  Yes  No  N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M52A-8119	pH	5 days, 16 hours, 22 minutes	J-HT
CH-CCR-M53A-8119	pH	5 days, 17 hours, 14 minutes	J-HT
CH-CCR-W305-8119	pH	5 days, 17 hours, 47 minutes	J-HT
CH-CCR-W306-8119	pH	5 days, 19 hours, 53 minutes	J-HT
CH-CCR-W314-8119	pH	5 days, 15 hours, 50 minutes	J-HT
CH-CCR-M64A-8119	pH	5 days, 21 hours, 10 minutes	J-HT
CH-CCR-FD01-8119	pH	5 days, 21 hours, 10 minutes	J-HT
CH-CCR-M55A-8119	pH	5 days, 15 hours, 13 minutes	J-HT
CH-CCR-FD02-8119	pH	5 days, 17 hours, 14 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

5. Target analytes detected in the blank?  Yes  No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes  No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M64A-8119	Chloride, Fluoride, Sulfate

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M64A-8119	CH-CCR-FD01-8119
CH-CCR-M53A-8119	CH-CCR-FD02-8119

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes     No     Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-MW64A-8119 and CH-CCR-FD01-8119					
Chloride	400 mg/L	4,200	4,300	2.4%	
Sulfate	400 mg/L	4,300	4,300	0%	
Boron	0.050 mg/L	1.3	1.3	0%	
Calcium	2.0 mg/L	450	450	0%	
Total Dissolved Solids	100 mg/L	12,000	12,000	0%	
pH	1.7 S.U.	7.4	7.4	0%	
Samples CH-CCR-MW53A-8119 and CH-CCR-FD02-8119					
Chloride	400 mg/L	2,200	2,200	0%	
Fluoride	0.80 mg/L	2.3	2.3	0%	
Sulfate	400 mg/L	2,900	3,000	3.4%	
Boron	0.050 mg/L	3.2	3.2	0%	
Calcium	2.0 mg/L	590	600	1.7%	
Total Dissolved Solids	100 mg/L	7,800	8,500	8.6%	
pH	1.7 S.U.	7.5	7.3	2.7%	

Notes:

mg/L = milligrams per liter

S.U. = standard units



### Cholla CCR Data Review

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-M64A-8119	Total Dissolved Solids, pH
CH-CCR-W306-8119	pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability

### Cholla CCR Data Review

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes     No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-127722-1	<b>Review Date:</b>	09/05/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M56A-8919	08/09/19 15:18	550-127722-1	
CH-CCR-M57A-8919	08/09/19 14:12	550-127722-2	
CH-CCR-M58A-8919	08/09/19 13:44	550-127722-3	
CH-CCR-M62A-8919	08/09/19 15:51	550-127722-4	
CH-CCR-FD01-8919	08/09/19 14:12	550-127722-5	Field duplicate of CH-CCR-M57A-8919

### Analytical Methods:

Analyte	Analyte Group	Method
Boron, Calcium, Lithium	Metals	EPA 200.7
Arsenic, Barium, Chromium, Cobalt, Molybdenum, Thallium	Metals	EPA 200.8
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes

No

If No, provide details.

Sample Login Matched COC?

Yes

No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes

No

### Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?       Yes     No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?       Yes     No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?       Yes     No
  
4. Samples analyzed for pH within 15 minutes of sampling?      Yes     No    N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M56A-8919	pH	5 days, 21 hours, 7 minutes	J-HT
CH-CCR-M57A-8919	pH	5 days, 22 hours, 13 minutes	J-HT
CH-CCR-M58A-8919	pH	5 days, 22 hours, 41 minutes	J-HT
CH-CCR-M62A-8919	pH	5 days, 20 hours, 34 minutes	J-HT
CH-CCR-FD01-8919	pH	5 days, 22 hours, 13 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

5. Target analytes detected in the blank?      Yes     No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M62A-8919	Chloride, Fluoride, Sulfate, Arsenic, Barium, Chromium, Cobalt, Molybdenum, Thallium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M57A-8919	CH-CCR-FD01-8919

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes     No     Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Chloride	300 mg/L	1,900	1,900	0%	
Sulfate	300 mg/L	1,300	1,300	0%	
Boron	0.050 mg/L	0.56	0.55	1.8%	
Calcium	2.0 mg/L	470	450	4.3%	
Arsenic	0.00050 mg/L	0.0019	0.0021	10%	
Barium	0.00050 mg/L	0.039	0.040	2.5%	
Chromium	0.0010 mg/L	0.038	0.043	12%	
Cobalt	0.00050 mg/L	0.0040	0.0039	2.5%	
Molybdenum	0.00050 mg/L	0.0068	0.0071	4.3%	
Total Dissolved Solids	100 mg/L	4,700	5,000	6.2%	
pH	1.7 S.U.	7.0	7.0	0%	

Notes:

mg/L = milligrams per liter

S.U. = standard units

### Cholla CCR Data Review

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-M62A-8919	Total Dissolved Solids, pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability



### Cholla CCR Data Review

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-M56A-8919	Lithium	0.20 mg/L
CH-CCR-M57A-8919	Lithium	0.20 mg/L
CH-CCR-M58A-8919	Lithium	0.20 mg/L
CH-CCR-M62A-8919	Lithium	0.20 mg/L
CH-CCR-FD01-8919	Lithium	0.20 mg/L

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-127723-1	<b>Review Date:</b>	8/29/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-W301-8919	08/09/19 11:18	550-127723-1	
CH-CCR-W302-8919	08/09/19 11:55	550-127723-2	
CH-CCR-W304-8819	08/08/19 15:02	550-127723-3	
CH-CCR-W307-8819	08/08/19 14:15	550-127723-4	
CH-CCR-W308-8819	08/08/19 13:15	550-127723-5	
CH-CCR-W309-8819	08/08/19 12:05	550-127723-6	
CH-CCR-W317-8919	08/09/19 12:51	550-127723-7	
CH-CCR-FD01-8819	08/08/19 12:05	550-127723-8	Field duplicate of CH-CCR-W309-8819

### Analytical Methods:

Analyte	Analyte Group	Method
Boron, Calcium	Metals	EPA 200.7
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes

No

If No, provide details.

Sample Login Matched COC?

Yes

No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes

No

**Cholla CCR Data Review**

1. Samples analyzed for metals within 180 days of sampling?      Yes      No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?      Yes      No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?      Yes      No
  
4. Samples analyzed for pH within 15 minutes of sampling?      Yes      No      N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-W301-8919	pH	10 days, 2 hours, 12 minutes	J-HT
CH-CCR-W302-8919	pH	10 days, 1 hour, 35 minutes	J-HT
CH-CCR-W304-8819	pH	10 days, 22 hours, 28 minutes	J-HT
CH-CCR-W307-8819	pH	10 days, 23 hours, 15 minutes	J-HT
CH-CCR-W308-8819	pH	11 days, 15 minutes	J-HT
CH-CCR-W309-8819	pH	11 days, 1 hour, 25 minutes	J-HT
CH-CCR-W317-8919	pH	10 days, 39 minutes	J-HT
CH-CCR-FD01-8819	pH	11 days, 1 hour, 25 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

5. Target analytes detected in the blank?      Yes      No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W309-8819	Chloride, Fluoride, Sulfate

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes    No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-W309-8819	CH-CCR-FD01-8819

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes    No    Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Chloride	400 mg/L	1,600	1,600	0%	
Fluoride	0.80 mg/L	1.1	1.0	10%	
Sulfate	400 mg/L	3,200	3,200	0%	
Boron	0.050 mg/L	0.50	0.48	4.1%	
Calcium	2.0 mg/L	470	450	4.3%	
Total Dissolved Solids	100 mg/L	7,300	7,200	1.4%	
pH	1.7 S.U.	7.5	7.5	0%	

Notes:

mg/L = milligrams per liter

S.U. = standard units

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes    No

If Yes:

Sample ID	Analysis
CH-CCR-W309-8819	Total Dissolved Solids, pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes    No    Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability

**Cholla CCR Data Review**

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes  No

<b>Analyte</b>	<b>List</b>	<b>MCL</b>	<b>Alternative GWPS</b>	<b>Units</b>
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

<b>Sample ID</b>	<b>Analyte</b>	<b>Reporting Limit</b>

**APS Cholla CCR Data Review**

<b>Laboratory Name:</b>	Radiation Safety Engineering		
<b>Sample Delivery Group:</b>	N/A	<b>Review Date:</b>	10/30/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date	Laboratory Sample Identification	Notes
CH-CCR-M56A-8919	August 9, 2019	62661	
CH-CCR-M57A-8919	August 9, 2019	62662	
CH-CCR-M58A-8919	August 9, 2019	62663	
CH-CCR-M62A-8919	August 9, 2019	62664	
CH-CCR-FD01-8919	August 9, 2019	62665	Field duplicate of CH-CCR-M57A-8919

**Analytical Methods:**

Analyte	Analyte Group	Method
Radium 226, Radium 228, Total Radium	Rad	Gamma Ray HPGE

**Qualifier Definitions:**

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

**Sample Receipt Condition:**

COC Signed and Complete?

Yes     No

If No, provide details.



**APS Cholla CCR Data Review**

Sample Login Matched COC?

Yes     No

If no, provide details.

--

Sample receipt temperature ≤ 6°C?

Yes     No     Not Applicable

1. Samples analyzed for RAD within 180 days of sampling?

Yes     No

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

2. Field duplicates collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M57A-8919	CH-CCR-FD01-8919

a. Is the RPD between primary and duplicate results ≤ 20% or is the difference between analyte concentrations ≤ the reporting limit?     Yes     No     Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
CH-CCR-M57A-8919 and CH-CCR-FD01-8919					
No detected analytes					

**APS Cholla CCR Data Review**

3. Are non-detect results sufficiently low to meet EPA primary drinking water criteria and/or Alternative GWPS?



No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-132142-1	<b>Review Date:</b>	11/27/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M54-102219	10/22/19 11:49	550-132142-1	
CH-CCR-M59-102319	10/23/19 10:57	550-132142-2	
CH-CCR-M60-102219	10/22/19 14:07	550-132142-3	
CH-CCR-M61-102219	10/22/19 15:17	550-132142-4	
CH-CCR-FD01-102319	10/23/19 10:57	550-132142-5	Field duplicate of CH-CCR-M59

### Analytical Methods:

Analyte	Analyte Group	Method
Boron, Calcium	Metals	EPA 200.7
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes  No

If No, provide details.

Sample Login Matched COC?

Yes  No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes  No

If no, provide details.

Recorded sample receipt temperature was  $6.4^{\circ}\text{C}$  and there is a note stating that the samples were received on ice. The receipt temperature criteria is  $\leq 6^{\circ}\text{C}$ , not less than  $6.0^{\circ}\text{C}$ , and  $6.4$  rounds down to  $6$ . Based on professional judgment, Wood did not qualify data from these samples based on the temperature exceedance.

**Cholla CCR Data Review**

1. Samples analyzed for metals within 180 days of sampling?       Yes      No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?       Yes      No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?       Yes      No
  
4. Samples analyzed for pH within 15 minutes of sampling?      Yes       No      N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M54-102219	pH	9 days, 2 hours, 18 minutes	J-HT
CH-CCR-M59-102319	pH	8 days, 3 hours, 10 minutes	J-HT
CH-CCR-M60-102219	pH	9 days	J-HT
CH-CCR-M61-102219	pH	8 days, 22 hours, 50 minutes	J-HT
CH-CCR-FD01-102319	pH	8 days, 3 hours, 10 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

5. Target analytes detected in the blank?      Yes       No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M54A-102219	Chloride, Fluoride, Sulfate, Boron, Calcium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M59-102319	CH-CCR-FD01-102319

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes     No     Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-M59-102319 and CH-CCR-FD01-102319					
Chloride	100 mg/L	1,400	1,400	0%	
Fluoride	0.40 mg/L	1.3	1.3	0%	
Sulfate	100 mg/L	350	350	0%	
Boron	0.050 mg/L	0.48	0.48	0%	
Calcium	2.0 mg/L	84	85	1.2%	
Total Dissolved Solids	100 mg/L	2,800	2,600	7.4%	
pH	1.7 S.U.	7.5	7.8	3.9%	

Notes:

mg/L = milligrams per liter

S.U. = standard units

### Cholla CCR Data Review

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-M54-102219	Total Dissolved Solids, pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability



### Cholla CCR Data Review

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

### Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-132146-1	<b>Review Date:</b>	11/27/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M52A-102419	10/24/19 07:47	550-132146-1	
CH-CCR-M53A-102319	10/23/19 14:45	550-132146-2	
CH-CCR-W305-102319	10/23/19 15:32	550-132146-3	
CH-CCR-W306-102319	10/23/19 16:17	550-132146-4	
CH-CCR-W314-102419	10/24/19 08:53	550-132146-5	
CH-CCR-M64A-102419	10/24/19 14:53	550-132146-6	
CH-CCR-FD01-102319	10/23/19 15:32	550-132146-7	Field duplicate of CH-CCR-W305
CH-CCR-M55A-102419	10/24/19 12:18	550-132146-8	
CH-CCR-W301-102319	10/23/19 14:02	550-132146-9	
CH-CCR-W302-102319	10/23/19 12:19	550-132146-10	
CH-CCR-W304-102419	10/24/19 09:20	550-132146-11	
CH-CCR-W307-102419	10/24/19 10:06	550-132146-12	
CH-CCR-W308-102419	10/24/19 10:55	550-132146-13	
CH-CCR-W309-102419	10/24/19 11:38	550-132146-14	
CH-CCR-W317-102419	10/24/19 13:50	550-132146-15	
CH-CCR-FD02-102419	10/24/19 09:20	550-132146-16	Field duplicate of CH-CCR-W304

**Analytical Methods:**

Analyte	Analyte Group	Method
Boron, Calcium, Lithium	Metals	EPA 200.7
Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Mercury	Metals	EPA 245.1
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

## Cholla CCR Data Review

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

### Sample Receipt Condition:

COC Signed and Complete?  
If No, provide details.

Yes     No

Sample Login Matched COC?  
If no, provide details.

Yes     No

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?  
If no, provide details.

Yes     No

Recorded sample receipt temperature was  $6.8^{\circ}\text{C}$  for one of the coolers. Wood J qualified the detected and UJ qualified the non-detected chloride, fluoride, sulfate, TDS, and pH results from samples FD-02, M53A, W301, W302, W308, W309, W314, and W317 because of the temperature exceedance. (J/UJ-RT)  
Metals do not require thermal preservation and data usability is not adversely affected by the temperature exceedance.

Note:

RT = Elevated sample receipt temperature.

## Cholla CCR Data Review

1. Samples analyzed for metals within 180 days of sampling?  Yes  No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?  Yes  No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?  Yes  No
  
4. Samples analyzed for pH within 15 minutes of sampling?  Yes  No  N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M52A-102419	pH	7 days, 6 hours, 20 minutes	J-HT
CH-CCR-M53A-102319	pH	7 days, 23 hours, 22 minutes	J-HT
CH-CCR-W305-102319	pH	7 days 22 hours, 35 minutes	J-HT
CH-CCR-W306-102319	pH	7 days, 21 hours, 50 minutes	J-HT
CH-CCR-W314-102419	pH	7 days, 5 hours, 14 minutes	J-HT
CH-CCR-M64A-102419	pH	6 days, 23 hours, 14 minutes	J-HT
CH-CCR-FD01-102319	pH	7 days, 22 hours, 35 minutes	J-HT
CH-CCR-M55A-102419	pH	7 days, 1 hour, 49 minutes	J-HT
CH-CCR-W301-102319	pH	8 days, 5 minutes	J-HT
CH-CCR-W302-102319	pH	8 days, 1 hour, 48 minutes	J-HT
CH-CCR-W304-102419	pH	7 days, 4 hours, 47 minutes	J-HT
CH-CCR-W307-102419	pH	7 days, 4 hours, 1 minute	J-HT
CH-CCR-W308-102419	pH	7 Days, 3 hours, 12 minutes	J-HT
CH-CCR-W309-102419	pH	7 days, 2 hours, 29 minutes	J-HT
CH-CCR-W317-102419	pH	7 days, 17 minutes	J-HT
CH-CCR-FD02-102419	pH	7 days 4 hours, 47 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

**Cholla CCR Data Review**

5. Target analytes detected in the blank?

Yes

 No

If Yes:

<b>Detected Analyte</b>	<b>Concentration</b>	<b>Samples with concentrations less than 5 times the blank detection</b>

6. LCS recoveries within laboratory-specified limits?

Yes

No

If No:

<b>Analyte</b>	<b>Recovery</b>	<b>Affected Samples</b>

**Cholla CCR Data Review**

7. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M64A-102419	Chloride, Fluoride, Sulfate, Boron, Calcium, Beryllium, Lithium, Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium, Mercury

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-M64A-102419	Calcium	-12%/33%	70 - 130%	None <sup>A</sup>
CH-CCR-M64A-102419	Barium	148%-MSD	70 – 130%	J-HM

Notes:

<sup>A</sup> = Concentration detected in the unspiked native sample is more than four times the spike concentration and it is not possible to assess data usability for this analyte in this sample based on MS recovery.

HM = High MS recovery. Result may be biased high.

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-W305-102319	CH-CCR-FD01-102319
CH-CCR-W304-102419	CH-CCR-FD02-102419

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes     No     Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-W305-102319 and CH-CCR-FD01-102319					
Chloride	400 mg/L	2,400	2,300	4.3%	
Sulfate	400 mg/L	2,300	2,400	4.3%	
Boron	0.050 mg/L	0.34	0.34	0%	
Calcium	2.0 mg/L	690	680	1.5%	
Lithium	0.20 mg/L	0.20	0.20	0%	
Arsenic	0.0010 mg/L	0.0019	0.0015	24%	± RL
Barium	0.0010 mg/L	0.014	0.013	7.4%	
Cadmium	0.00020 mg/L	0.00022	0.00021	4.7%	
Cobalt	0.0010 mg/L	0.018	0.018	0%	
Lead	0.0010 mg/L	0.0026	0.0025	3.9%	
Molybdenum	0.0010 mg/L	0.023	0.022	4.4%	
Thallium	0.00020 mg/L	0.00024	0.00020 U	NC	± RL
Total Dissolved Solids	100 mg/L	7,000	7,100	1.4%	
Samples CH-CCR-W304-102419 and CH-CCR-FD02-102419					
Chloride	400 mg/L	3,300	3,400	3.0%	
Sulfate	400 mg/L	2,900	2,900	0%	
Boron	0.050 mg/L	0.52	0.52	0%	
Calcium	2.0 mg/L	610	610	0%	
Lithium	0.20 mg/L	0.45	0.45	0%	
Arsenic	0.0010 mg/L	0.0014	0.00093	40%	± RL
Barium	0.0010 mg/L	0.014	0.015	6.9%	
Chromium	0.0010 mg/L	0.0010 U	0.0016	NC	± RL
Cobalt	0.0010 mg/L	0.0028	0.0029	4%	
Molybdenum	0.0010 mg/L	0.0042	0.0036	15%	
Selenium	0.0010 mg/L	0.0012	0.0010 U	NC	± RL
Total Dissolved Solids	100 mg/L	9,100	9,200	1.1%	
pH	1.7 S.U.	7.4	7.4	0%	

## Cholla CCR Data Review

**Notes:**

± RL = The difference between analyte concentrations is less than the reporting limit, indicating acceptable sampling and analytical precision.

mg/L = milligrams per liter

NC = not calculable

S.U. = standard units

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-M64A-102419	Total Dissolved Solids, pH
CH-CCR-W307-102419	Total Dissolved Solids
CH-CCR-W308-102419	pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability



**Cholla CCR Data Review**

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes  No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

### Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-133983-1	<b>Review Date:</b>	12/20/2020
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M50A-112519	11/25/19 15:17	550-133983-1	
CH-CCR-M51A-112519	11/25/19 16:08	550-133983-2	
CH-CCR-W123-112519	11/25/19 14:43	550-133983-3	
CH-CCR-FD01-112619	11/26/19 08:39	550-133983-4	Field duplicate of CH-CCR-M66A-112619
CH-CCR-M65A-112619	11/26/19 09:30	550-133983-5	
CH-CCR-M66A-112619	11/26/19 08:39	550-133983-6	
CH-CCR-M67A-112619	11/26/19 10:17	550-133983-7	
CH-CCR-W126-112619	11/26/19 08:07	550-133983-8	
CH-CCR-M46A-112619	11/26/19 12:38	550-133983-9	

**Analytical Methods:**

Analyte	Analyte Group	Method
Boron, Calcium, Lithium	Metals	EPA 200.7
Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium	Metals	EPA 200.8
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

## Cholla CCR Data Review

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

### Sample Receipt Condition:

COC Signed and Complete?  
If No, provide details.

Yes  No

Sample Login Matched COC?

Yes  No

If no, provide details.

The samples were recorded on the COC as CH-CCR-M-50A-112519, CH-CCR-M-51A-112519, CH-CCR-W-123-112519, CH-CCR-FD-01-112619, CH-CCR-M-65A-112619, CH-CCR-M-66A-112619, CH-CCR-M-67A-112619, CH-CCR-W-126-112619, and CH-CCR-M-46A-112619; but the laboratory logged in the samples without the dash that precedes the last three digits of the sample ID before the date.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes  No

If no, provide details.

**Cholla CCR Data Review**

1. Samples analyzed for metals within 180 days of sampling?  Yes  No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?  Yes  No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?  Yes  No
  
4. Samples analyzed for pH within 15 minutes of sampling?  Yes  No  N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M50A-112519	pH	7 days, 2 hours, 4 minutes	J-HT
CH-CCR-M51A-112519	pH	7 days, 1 hour, 13 minutes	J-HT
CH-CCR-W123-112519	pH	7 days 2 hours, 38 minutes	J-HT
CH-CCR-FD01-112619	pH	6 days, 8 hours, 42 minutes	J-HT
CH-CCR-M65A-112619	pH	6 days, 7 hours, 51 minutes	J-HT
CH-CCR-M66A-112619	pH	6 days, 8 hours, 42 minutes	J-HT
CH-CCR-M67A-112619	pH	6 days, 7 hours, 4 minutes	J-HT
CH-CCR-W126-112619	pH	6 days, 9 hours, 14 minutes	J-HT
CH-CCR-M46A-112619	pH	6 days, 4 hours, 43 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

**Cholla CCR Data Review**

5. Target analytes detected in the blank?

Yes     No

If Yes:

<b>Detected Analyte</b>	<b>Concentration</b>	<b>Samples with concentrations less than 5 times the blank detection</b>
Chromium	0.00155 mg/L	None

6. LCS recoveries within laboratory-specified limits?

Yes     No

If No:

<b>Analyte</b>	<b>Recovery</b>	<b>Affected Samples</b>

**Cholla CCR Data Review**

7. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W123-112519	Chloride, Fluoride, Sulfate, Boron, Calcium, Lithium, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-W123-112519	Boron	-37%/29%	70 - 130%	None <sup>A</sup>
CH-CCR-W123-112519	Calcium	-31%/57%	70 – 130%	None <sup>A</sup>

Note:

<sup>A</sup> = Concentration detected in the unspiked native sample is more than four times the spike concentration and it is not possible to assess data usability for this analyte in this sample based on MS recovery.

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes  No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M66A-112619	CH-CCR-FD01-112619

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes  No  Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-M66A-112619 and CH-CCR-FD01-112619					
Chloride	400 mg/L	4,600	4,600	0%	
Fluoride	0.80 mg/L	1.1	1.1	0%	
Sulfate	400 mg/L	3,100	3,100	0%	
Boron	0.050 mg/L	1.5	1.5	0%	
Calcium	2.0 mg/L	780	780	0%	
Lithium	0.20 mg/L	0.48	0.48	0%	
Arsenic	0.0020 mg/L	0.0039	0.0020 U	NC	$\pm$ RL
Barium	0.00050 mg/L	0.022	0.016	32%	J-FD
Cadmium	0.00010 mg/L	0.00038	0.00028	30%	$\pm$ RL
Chromium	0.0010 mg/L	0.016	0.0026	144%	J-FD
Lead	0.00050 mg/L	0.00061	0.00050 U	NC	$\pm$ RL
Molybdenum	0.00050 mg/L	0.016	0.015	6.5%	
Selenium	0.0020 mg/L	0.060	0.026	79%	J-FD
Total Dissolved Solids	100 mg/L	11,000	11,000	0%	
pH	1.7 S.U.	7.2	7.2	0%	

Notes:

$\pm$  RL = The difference between analyte concentrations is less than the reporting limit, indicating acceptable sampling and analytical precision.

mg/L = milligrams per liter

J-FD = imprecision between primary and field duplicate results. Potential sampling and/or analytical imprecision.

NC = not calculable

S.U. = standard units

**Cholla CCR Data Review**

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

<b>Sample ID</b>	<b>Analysis</b>
CH-CCR-W123-112519	Total dissolved solids, pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     Not Applicable

If No:

<b>Sample ID</b>	<b>Analyte</b>	<b>Effect on Data Usability</b>



**Cholla CCR Data Review**

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

**No**

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-M67A-112619	Lithium	0.20 mg/L

## Cholla CCR Data Review

<b>Laboratory Name:</b>	Eurofins TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-133984-1	<b>Review Date:</b>	1/6/2020
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-M56A-112519	11/25/19 11:19	550-133984-1	
CH-CCR-M57A-112519	11/25/19 10:41	550-133984-2	
CH-CCR-M58A-112519	11/25/19 09:07	550-133984-3	
CH-CCR-M62A-112519	11/25/19 12:47	550-133984-4	
CH-CCR-FD-01-112519	11/25/19 10:41	550-133984-5	Field duplicate of CH-CCR-M57A-112519

### Analytical Methods:

Analyte	Analyte Group	Method
Boron, Calcium	Metals	EPA 200.7
Arsenic, Barium, Chromium, Cobalt, Molybdenum, Thallium	Metals	EPA 200.8
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Total Dissolved Solids	General Chemistry	SM 2540C
pH	General Chemistry	SM 4500 H <sup>+</sup> B

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

**Cholla CCR Data Review**

**Sample Receipt Condition:**

COC Signed and Complete?  
If No, provide details.

Yes     No

Sample Login Matched COC?

Yes     No

If no, provide details.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes     No

If no, provide details.

**Cholla CCR Data Review**

1. Samples analyzed for metals within 180 days of sampling?       Yes      No
  
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?  
 Yes      No
  
3. Samples analyzed for total dissolved solids within 7 days of sampling?  
 Yes      No
  
4. Samples analyzed for pH within 15 minutes of sampling?      Yes       No      N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-M56A-112519	pH	7 days, 6 hours, 2 minutes	J-HT
CH-CCR-M57A-112519	pH	7 days, 6 hours, 40 minutes	J-HT
CH-CCR-M58A-112519	pH	7 days 8 hours, 14 minutes	J-HT
CH-CCR-M62A-112519	pH	7 days, 4 hours, 34 minutes	J-HT
CH-CCR-FD-01-112519	pH	7 days, 6 hours, 40 minutes	J-HT

Note:

HT = The maximum recommended hold time was exceeded, and the result should be considered an estimated value.

5. Target analytes detected in the blank?      Yes       No

If Yes:

Detected Analyte	Concentration	Samples with concentrations less than 5 times the blank detection

**Cholla CCR Data Review**

6. LCS recoveries within laboratory-specified limits?

Yes  No

If No:

Analyte	Recovery	Affected Samples

7. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-M62A-112519	Fluoride, Boron, Calcium, Arsenic, Barium, Chromium, Cobalt, Molybdenum, Thallium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes  No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-M62A-112519	Calcium	20% (MS)	70 – 130%	None <sup>A</sup>
CH-CCR-M62A-112519	Barium	133% (MS)	70 – 130%	J-HM

Notes:

<sup>A</sup> = Concentration detected in the unspiked native sample is more than four times the spike concentration and it is not possible to assess data usability for this analyte in this sample based on MS recovery.

HM = High MS recovery. Result may be biased high.

**Cholla CCR Data Review**

8. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M57A-112519	CH-CCR-FD-01-112519

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?

Yes     No     Not Applicable

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-M57A-112519 and CH-CCR-FD-01-112519					
Chloride	400 mg/L	1,900	1,800	5.4%	
Sulfate	400 mg/L	1,400	1,400	0.0%	
Boron	0.050 mg/L	0.54	0.58	7.1%	
Calcium	2.0 mg/L	440	480	8.7%	
Arsenic	0.00050 mg/L	0.021	0.021	0.0%	
Barium	0.00050 mg/L	0.047	0.047	0.0%	
Chromium	0.0010 mg/L	0.0038	0.0035	8.2%	
Cobalt	0.00050 mg/L	0.0044	0.0046	4.4%	
Molybdenum	0.00050 mg/L	0.012	0.012	0.0%	
Total Dissolved Solids	100 mg/L	4,900	4,800	2.1%	
pH	1.7 S.U.	7.0	7.0	0.0%	

Notes:

mg/L = milligrams per liter

S.U. = standard units

### Cholla CCR Data Review

9. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-M62A-112519	Total Dissolve Solids, pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     Not Applicable

If No:

Sample ID	Analyte	Effect on Data Usability

**Cholla CCR Data Review**

10. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes  No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	s.u.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit



## **APPENDIX G**

**WOOD TECHNICAL MEMORANDUM DOCUMENTING THE UPDATE OF  
BACKGROUND THRESHOLD VALUES AND STATISTICAL ANALYSIS OF APPENDIX III  
CONSTITUENT DATA COLLECTED FROM THE BAM THROUGH OCTOBER 2018**



# Technical Memorandum

**To:** Michele Robertson, RG  
Pamela Norris  
**From:** Natalie Chrisman Lazarr, PE  
Carla Landrum, PhD  
**Date:** April 15, 2019  
**File No:** 14-2018-2040  
**cc:** File

**Subject: CCR GROUNDWATER DETECTION MONITORING  
STATISTICAL ANALYSIS AND RESULTS FOR THE BOTTOM ASH MONOFILL  
Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents the statistical evaluation of detection monitoring (i.e., Appendix III constituent) groundwater data associated with the Bottom Ash Monofill (BAM) located at the Arizona Public Service (APS) Cholla Power Plant (Cholla) in Navajo County, Arizona. The statistical methods and analysis include the determination of groundwater background threshold values (BTVs) for Appendix III constituents pursuant to the Coal Combustion Residuals (CCR) Rule (40 CFR § 257.93) and the analysis approach documented in both the *Cholla Power Plant Coal Combustion Residuals Program – Statistical Method Selection for Evaluation of Groundwater Monitoring Data* (Montgomery & Associates, 2017a) and the *Statistical Data Analysis Work Plan* (SDAWP) (Wood Environment & Infrastructure Solutions, Inc. [Wood], 2018) prepared for the site. This statistical evaluation is an update to the baseline detection monitoring statistical evaluations for the BAM initially prepared in January 2018 and revised in May 2018 (Montgomery & Associates, 2018).

The following sections detail data inputs, statistical evaluations, results and recommendations for the subject analysis.

## 2.0 DATA INPUTS

### 2.1 Appendix III Constituent Data

The BAM groundwater monitoring well network consists of one background monitoring well (M-54) and three compliance (i.e., downgradient), monitoring wells (M-59, M-53A, M-60 and M-61). The period of evaluation for this BAM Appendix III constituent statistical analysis ranges from December 2015 through October 2018 and includes the minimum of eight initial, or baseline, sampling rounds and three subsequent sampling rounds of detection monitoring. Due principally to the CCR Rule requirement that a minimum of eight initial rounds of data be collected from the site prior to October 17, 2017, the frequency of sample collection prior to this date is short and variable (e.g., biweekly to quarterly sampling).

This data evaluation evaluates 16 samples for boron, calcium, chloride, fluoride, sulfate and TDS within each compliance and background monitoring well and 15 samples for pH within each compliance and background monitoring well. Sample counts were initially higher for monitoring well M-60 because of field duplicates, which were removed prior to performing the statistical evaluation. The first, second and third

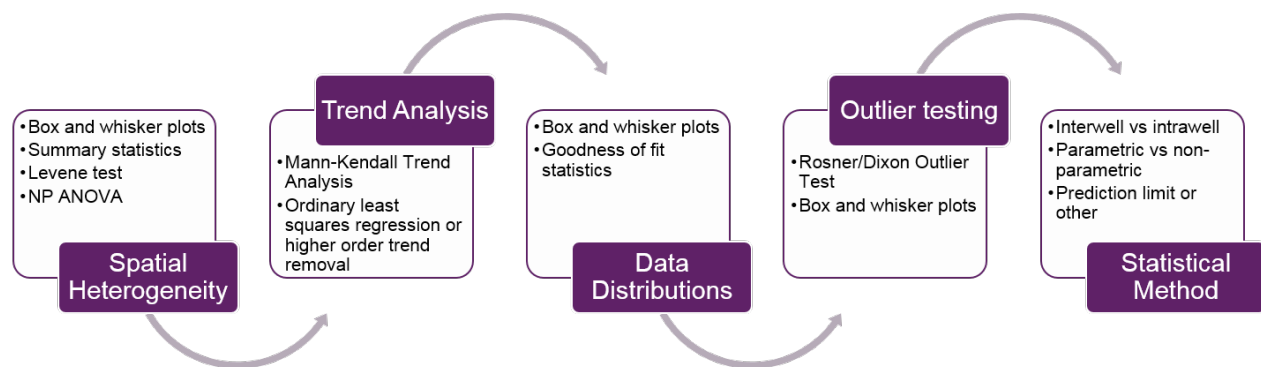


rounds of detection monitoring at the BAM were conducted in December 2017, May 2018 and October 2018, respectively; all Appendix III constituents were evaluated in collected samples during these monitoring events.

Appendix A contains the contents of the ProUCL data upload tables for the subject analysis. The Appendix III analytes are listed by name or chemical symbol as column headers in the ProUCL data upload table. By ProUCL convention, each analyte has a corresponding data column (indicated with a "D\_" prefix) that indicates if the analyte was detected or not at a concentration that exceeds the analytical reporting limit, where detectable concentrations are symbolized by a "1" and non-detectable concentrations are symbolized by a "0." The detection frequency is 100% for all sample data listed in Appendix A.

### 3.0 METHODS

Exploratory data analysis (EDA) is a data diagnostic step that generates qualitative and quantitative information necessary to select a defensible statistical method for determining if there is a statistical significant increase (SSI) in constituent concentrations over background levels. EDA Detection Monitoring Assessment methods are captured in Figure 1, including evaluation of spatial heterogeneity, trend detection, data distribution assessment, and outlier detection. Sample number, sampling frequency and non-detect frequency were the primary considerations defining the scope of EDA methods listed. The final EDA step is selection of an adequate statistical method for determining if an SSI over background has occurred.

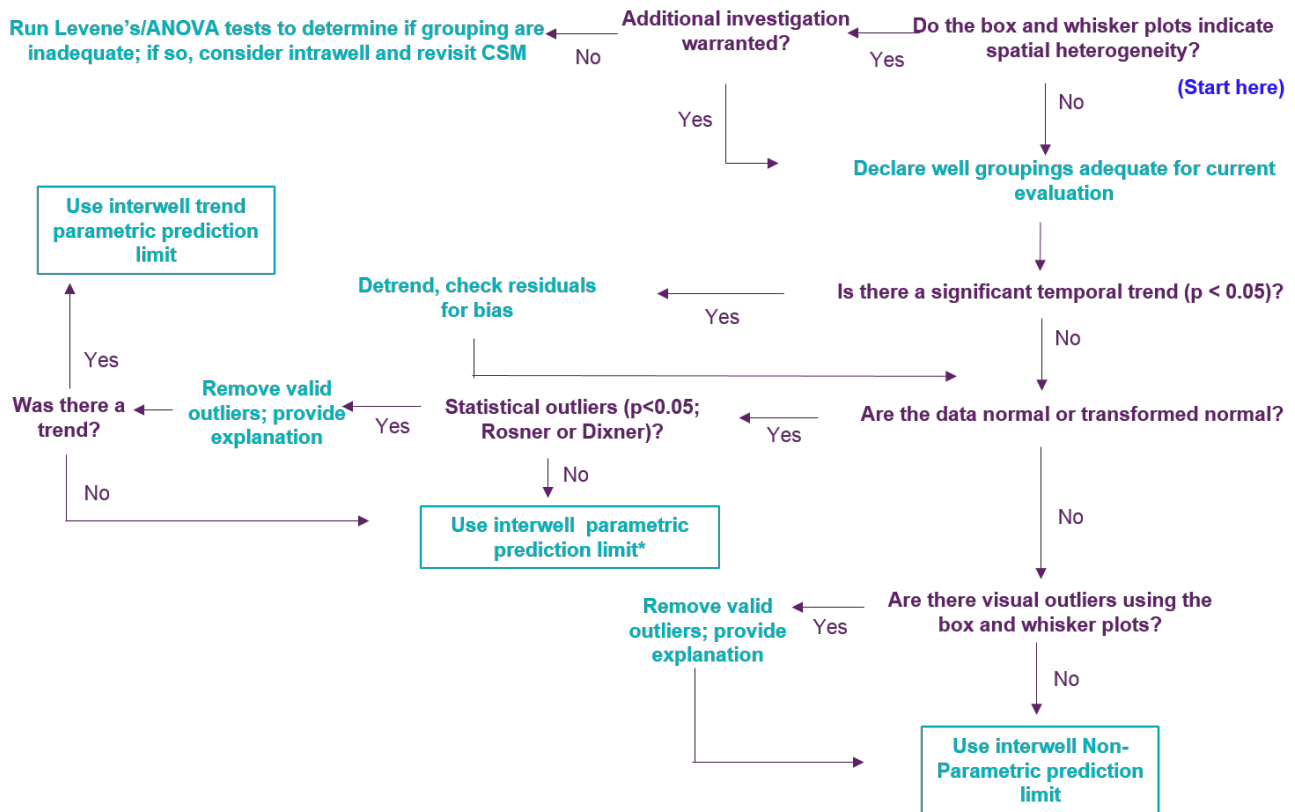


**Figure 1. Detection monitoring EDA and statistical method workflow procedures.** Each box represent as separate step in the EDA workflow process. The items listed in each box identifies the statistical method(s) applied for each step. Both quantitative and qualitative methods are listed.

The site SDAWP proposes using the interwell prediction limit method with possible resampling to confirm if there is an SSI over background. The interwell statistical comparison uses sample data from a designated background well to establish BTVs and then compares sample data from each compliance well to the calculated BTV. The interwell method assumes that the groundwater conditions between each sampling location are homogeneous. Figure 2 (next page) generalizes the decision process for selecting an appropriate prediction limit method.

The US EPA recommends a resampling strategy when implementing the prediction limit method (US EPA, 2009). A resampling strategy is appropriate to reduce the overall false positive occurrence (falsely identifying an SSI) while maintaining adequate statistical power. Resampling strategies depend on several criteria, such as the size of the background dataset, sampling frequency, and number of active monitoring wells, among other considerations. For example, for a 1 of 2 resampling strategy, if an initial exceedance is declared during

the analysis documented herein, the collection of a second statistically independent sample is necessary and subsequently compared to the relevant background prediction limit. If both the results for the initial sample and resample are in exceedance of the background prediction limit, then an SSI is declared. If only one of the two samples are in exceedance, then a SSI is not declared. Resampling strategies are established prior to performing statistical compliance testing. The overall defensibility of a resampling strategy decreases when the sample data are statistically dependent (i.e., sampled so close in time that they are correlated), which is usually the case when sampling at a frequency higher than quarterly. The value of a resampling strategy generally decreases when the observed concentrations in downgradient wells are distinctly higher than concentrations observed in background wells (e.g., all samples are order(s) of magnitude higher); in this case, background might be inadequate or a release from the evaluated unit has occurred.



**Figure 2. Generalized decision matrix for EDA and statistical prediction limit method selection.** Matrix does not include resampling strategies. Any background constituent with a non-detect frequency 50%<ND<100% was automatically qualified for non-parametric prediction limit. Background constituents with a non-detect frequency <50% were processed using the Kaplan-Meier method or regression order statistic. The Double Quantification rule is used for 100% background non-detect frequency.

The EDA procedures, including trend and outlier detection, are applicable to data collected from both upgradient and downgradient wells. Prediction limit calculations with resampling are only applicable to background designated samples. Sample concentrations in downgradient wells were compared to the corresponding background prediction limit to assess whether an SSI is indicated.

## 4.0 RESULTS

Table 1 summarizes the BTV calculation for each Appendix III constituent.

Table 1 also identifies the type of resampling strategy in effect for each Appendix III constituent. A 1 of 2 resampling strategy is in place for constituents that implement a parametric prediction limit, including boron, pH, sulfate and TDS. A 1 of 2 resampling strategy means that one more statistically independent sample should be collected following the declaration of an initial exceedance but before the next scheduled sampling event. It is critical that enough time pass before the second sample is collected to ensure the sample is statistically independent from the initial exceedance. If the second sample is in exceedance of the prediction limit, then an SSI is declared because both the initial and second sample are in exceedance. If the second sample is not in exceedance, an SSI is not declared and Detection Monitoring should continue. Based on the results from this evaluation, the second sample should not be collected at a frequency higher than quarterly.

A 1 of 3 resampling strategy is in place for constituents that exhibit a non-parametric prediction limit, including calcium, chloride and fluoride. These constituents require a 1 of 3 resampling strategy to maintain a low false positive rate while maintaining adequate statistical power for the non-parametric prediction limit. The 1 of 3 resampling strategy uses the maximum order statistic (highest sample value) for each constituent. The same general resampling criteria apply except a third statistically independent sample should be collected since all three consecutive samples (e.g., the initial exceedance, second sample and third sample) must be in exceedance to declare an SSI at the unit. If the second sample is not in exceedance, then the third sample is not necessary and Detection Monitoring should continue.

Table 2 summarizes: 1) which Appendix III constituents exhibit exceedances above their respective BTVs by compliance well and 2) which constituents exhibit statistically significant temporal trends.

The attached appendices contain the raw ProUCL EDA outputs as reference for the following statistical findings:

**Monitoring Well M-59.** This statistical analysis indicates there are exceedances for fluoride and pH in monitoring well M-59. Fluoride exhibits two consecutive exceedances for the June 2017 and July 2017 sampling events. These sampling events are 30 days apart, making them prone to temporal correlation (i.e., the samples may be statistically dependent). The subsequent four sample events exhibit fluoride concentrations that are equal to, but do not exceed, the calculated BTV for fluoride. The apparent increasing trend in sample concentrations for fluoride is believed to be a statistical artifact because the sample dataset consists of only three distinct values and the four most recent sampling events showing no variance in their sample concentrations (see Appendix B). The exceedance for pH at monitoring well M-59 is for April 2017 and the subsequent nine sampling dates exhibit sample concentrations that are equal to, or below, the relevant upper prediction limit. At the current time, there is insufficient evidence to declare an SSI over background for fluoride or pH at monitoring well M-59. Notably, sulfate exhibits a statistically significant ( $p < 0.05$ ) increasing temporal trend for the current sampling duration (see Appendix B). Recommendations for monitoring this trend are presented in Section 5.0.

**Monitoring Well M-60.** This statistical analysis indicates there are multiple sample exceedances for fluoride and pH in monitoring well M-60. There are six exceedances for fluoride, with the most recent exceedance in May 2018. This statistical analysis indicates there is sufficient evidence to declare an SSI for fluoride at monitoring well M-60. Notably, the exceedances for fluoride at M-60 are, at most, one tenth of an mg/L

above the respective 1.4 mg/L BTV. There are two exceedances for pH sampled in March 2016 and April 2017. The earlier exceedance for pH is an artifact resulting from an inconsistent number of significant figures for the reported pH sample value. The recent exceedance for pH is followed by nine sampling events that are equal to, or below, the relevant upper pH prediction limit.

**Monitoring Well M-61.** This statistical analysis indicates there are sample exceedances for fluoride, pH and sulfate in monitoring well M-61. There are five exceedances for fluoride for the current sample duration, with the most recent in May 2018. This statistical analysis indicates there is sufficient evidence to declare an SSI for fluoride at monitoring well M-61. Notably, the exceedances for fluoride at M-61 are at most one tenth of an mg/L above the respective 1.4 mg/L BTV. There are three exceedances for pH, the first is less than the lower prediction limit and the latter two are greater than the upper prediction limit. These exceedances are followed by nine sampling events that are equal to, or within bounds, of the pH background prediction limits. There is a single exceedance for sulfate in May 2018. The subsequent and most recent sampling event for sulfate does not exceed its respective BTV. Sulfate exhibits a statistically significant ( $p < 0.05$ ) increasing trend for the current study duration.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

This statistical analysis results in the following conclusions and recommendations for the BAM detection monitoring statistical analysis:

- There is sufficient evidence to declare SSIs for fluoride in monitoring wells M-60 and M-61. The exceedances in these compliance wells are consistently no more than one tenth of a sample unit (mg/L) above the respective BTV value equal to 1.4 mg/L.
- The exceedances for fluoride in wells M-60 and M-61 are believed to result of documented spatial heterogeneity in groundwater quality conditions in the Coconino Sandstone aquifer beneath the BAM (Montgomery & Associates, 2017b). Spatial heterogeneity means that there is natural variability in the range of constituent (i.e., fluoride) concentrations among monitoring well locations. This naturally occurring heterogeneity possibly explains the small, yet consistent, (i.e., one tenth of a measurement unit) margin of exceedance observed in these downgradient locations.
- Based on the findings from this statistical analysis, Wood recommends performing an Alternative Source Demonstration (ASD) for the BAM with a focus on using the current CSM, and supporting professional knowledge and judgement, to validate that spatial heterogeneity is present at the site, thereby violating one of the statistical assumptions for the interwell statistical comparison method and making the SSI declaration herein invalid. In this case, we recommend continuing the current Detection Monitoring program and implementing intrawell statistical comparisons for fluoride at the BAM, which is a valid approach put forth by the US EPA (2009) in cases where adequate and representative background cannot be established to perform detection monitoring for a constituent of concern (by comparison to the current interwell comparison).
- There are three distinct fluoride sample values within each monitoring well for this statistical evaluation, which constitutes 16 sampling events for each monitoring well. The range of distinct fluoride concentrations in monitoring wells is small, ranging between 1.2 mg/L and 1.4 mg/L for the background well and between 1.3 mg/L and 1.5 mg/L for the compliance wells. This means there is little variability in fluoride concentrations over time. A lack of temporal variability is one indication the data are statistically dependent and the sampling frequency might not be representative of the true frequency(ies) of variation occurring in groundwater constituent

concentrations. Therefore, non-representative sampling over time might also be a source to the declared SSIs for fluoride.

- The Mann-Kendall Trend declarations are potentially misleading for fluoride and possibly other constituents on account of the suspected non-representative sampling frequency, which averages monthly or bi-weekly prior to October 2017. The semiannual sampling frequency currently in place for the BAM should help avoid temporal-dependence in future groundwater monitoring data and sample a more representative range of constituent concentrations. We recommend performing trend testing iteratively after each sampling round, or every other sampling round, to assess changes in temporal trend significance.
- To increase the sensitivity of the current Detection Monitoring program, we recommend increasing the number of significant digits for reporting analytical concentrations for all Appendix III constituents (as feasible).
- Statistical method selection and background threshold values should be updated after 1-2 years of future sampling events (assuming the current semiannual sampling frequency holds).

## 6.0 REFERENCES

- Montgomery & Associates, 2017a. *Cholla Power Plant Coal Combustion Residuals Program – Statistical Method Selection for Evaluation of Groundwater Monitoring Data*. Document # CH\_GW\_StatCert\_020\_20170919. Prepared for Arizona Public Service. September 19, 2017.
- Montgomery & Associates, 2017b. *Cholla Power Plant Coal Combustion Residuals Program – Design, Installation, and Evaluation of Completeness of Groundwater Monitoring Networks*, Navajo County, Arizona. Document # CH\_GW\_SystemCert\_020\_20170919. Prepared for Arizona Public Service. September 19, 2017.
- Montgomery & Associates, 2018. *Cholla Power Plant Coal Combustion Residuals Program – Statistical Analysis of Baseline Groundwater Monitoring Data November 2015 through September 2017*. Prepared for Arizona Public Service. January 12, 2018 Revised May 22, 2018.
- United States Environmental Protection Agency (U.S. EPA), 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance*. EPA 530/R-09-007. Environmental Protection Agency Office of Resource Conservation and Recovery.
- U.S. EPA, 2015. *ProUCL (Version 5.1.1) User Guide, Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*. EPA/600/R-07/041. Washington D.C. October 2015.
- Wood Environment & Infrastructure Solutions, Inc. (Wood), 2018. *Statistical Data Analysis Work Plan*. Coal Combustion Residual Rule Groundwater Monitoring System Compliance. Cholla Power Plant. Navajo County, Arizona. Prepared for Arizona Public Service. October 15, 2018.

## ATTACHMENTS

Table 1 – Background Threshold Value Calculation for the Cholla BAM

Table 2 – Cholla BAM Downgradient Sample Data Summary

Appendix A – ProUCL Data Upload Table

Appendix B – Box and Whisker Plots

Appendix C – ProUCL Mann-Kendall Trend Tests

Appendix D – ProUCL Goodness of Fit Tests

Appendix E – ProUCL Parametric Outlier Tests



**wood.**

**TABLES**



**Table 1**  
**Background Threshold Value Calculation for the Cholla BAM**  
**Appendix III Statistical Analysis**

Background Well	Constituent	Background Threshold Value (Calculation Method <sup>1</sup> )	Units	Resampling Strategy <sup>2</sup>
M-54	Boron	0.55 (P-UPL)	mg/L	1 of 2
M-54	Calcium	100 (NP-UPL)	mg/L	1 of 3
M-54	Chloride	1,600 (NP-UPL)	mg/L	1 of 3
M-54	Fluoride	1.4 (NP-UPL)	mg/L	1 of 3
M-54	pH (upper limit)	7.8 (P-UPL)	SU	1 of 2
M-54	pH (lower limit)	7.3 (P-LPL)	SU	1 of 2
M-54	Sulfate	380 (P-UPL)	mg/L	1 of 2
M-54	TDS	3200 (P-UPL)	mg/L	1 of 2

**Notes:**

BAM = Bottom Ash Pond

BTV = background threshold value

mg/L = milligrams per liter

SU = standard units

<sup>1</sup> Parametric Upper Prediction Limit (P-UPL), Non-Parametric Upper Prediction Limit (NP-UPL), Parametric Lower Prediction Limit (P-LPL)



<sup>2</sup> A 1 of 3 resampling strategy is in place for non-parametric prediction limits and the limit represents the maximum concentration value of the data set (i.e., maximum order statistic). The BTV for calcium represents the second highest concentration value because the maximum concentration value is a perceived outlier and was removed from the evaluation.

**Table 2**  
**Cholla BAM Downgradient Sample Data Summary**  
**Appendix III Statistical Analysis**

Well	Sample_ID	SampDate	Constituent Concentration						
			Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
M-59	7803_O	03-Dec-15	0.5	87	1300	1.3	7.53	340	2700
M-59	CH-M-59-0316_O	10-Mar-16	0.48	85	1400	1.3	7.57	350	2700
M-59	CH-CCR-M59-516_O	20-May-16	0.49	86	1400	1.4	---	340	2700
M-59	CH-CCR-M59-816_O	27-Aug-16	0.50	89	1400	1.4	7.6	350	2700
M-59	CH-CCR-M59-916_O	22-Sep-16	0.50	88	1300	1.4	7.8	340	2900
M-59	CH-CCR-M59-217_O	22-Feb-17	0.48	86	1200	1.3	7.8	330	2800
M-59	CH-CCR-M59-41117_O	11-Apr-17	0.49	90	1400	1.3	<b>8.1</b>	350	2800
M-59	CH-CCR-M59-42417_O	24-Apr-17	0.52	89	1300	1.4	7.7	350	2800
M-59	CH-CCR-M59-51917_O	19-May-17	0.50	93	1400	1.4	7.8	360	2700
M-59	CH-CCR-M59-52517_O	25-May-17	0.50	88	1300	1.4	7.6	350	2700
M-59	CH-CCR-M59-62917_O	29-Jun-17	0.49	84	1400	<b>1.5</b>	7.8	370	2500
M-59	CH-CCR-M59-72917_O	29-Jul-17	0.53	92	1300	<b>1.5</b>	7.6	340	2800
M-59	CH-CCR-M59-90517_O	05-Sep-17	0.51	90	1300	1.4	7.7	360	2700
M-59	CH-CCR-M59-120717_O	07-Dec-17	0.49	86	1400	1.4	7.7	350	2700
M-59	CH-CCR-M-59-52518_O	25-May-18	0.49	85	1400	1.4	7.5	350	2700
M-59	CH-CCR-M-59-102618	26-Oct-18	0.48	88	1400	1.4	7.6	360	2500
		<i>Units:</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>SU</i>	<i>mg/L</i>	<i>mg/L</i>
		<i>BTV<sup>1</sup>:</i>	<i>0.55</i>	<i>100</i>	<i>1600</i>	<i>1.4</i>	<i>7.8/7.3</i>	<i>380</i>	<i>3200</i>
		<i>Temporal Trend<sup>2</sup>:</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>Increasing</i>	<i>None</i>	<i>Increasing</i>	<i>None</i>

**Notes:**

BTV = background threshold value  
 mg/L = milligrams per liter  
 TDS = total dissolved solids  
 SU = standard units

 Reported value exceeds the respective BTV  
 Statistically significant increasing trend present  
 None Insufficient evidence to identify a trend.

<sup>1</sup> For pH: Upper Prediction Limit/Lower Prediction Limit



<sup>2</sup> Temporal trends evaluated with Mann-Kendall trend tests (p<0.05); tied values (sequential sample concentrations that are equal overtime) can cause misleading trend results.

**Table 2**  
**Cholla BAM Downgradient Sample Data Summary**  
**Appendix III Statistical Analysis**

Well	Sample_ID	SampDate	Constituent Concentration						
			Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
M-60	7801_O	03-Dec-15	0.54	88	1400	1.3	7.56	350	2800
M-60	CH-M-60A-0316_O	09-Mar-16	0.50	86	1400	1.4	7.83	350	2800
M-60	CH-CCR-M60-516_O	20-May-16	0.50	89	1400	1.5	---	350	2800
M-60	CH-CCR-M60-816_O	27-Aug-16	0.52	90	1400	1.5	7.5	360	2800
M-60	CH-CCR-M60-916_O	22-Sep-16	0.51	88	1300	1.4	7.8	350	3000
M-60	CH-CCR-M60-217_O	22-Feb-17	0.52	91	1300	1.4	7.8	340	2800
M-60	CH-CCR-M60-41117_O	11-Apr-17	0.48	90	1400	1.4	8.0	360	2900
M-60	CH-CCR-M60-42417_O	24-Apr-17	0.53	86	1400	1.4	7.8	350	2700
M-60	CH-CCR-M60-51917_O	19-May-17	0.53	92	1400	1.4	7.7	360	2800
M-60	CH-CCR-M60-52517_O	25-May-17	0.51	86	1300	1.4	7.7	350	2800
M-60	CH-CCR-M60-62917_O	29-Jun-17	0.51	84	1500	1.5	7.7	440	2500
M-60	CH-CCR-M60-72917_O	29-Jul-17	0.53	89	1400	1.5	7.6	370	2800
M-60	CH-CCR-M60-90517_O	05-Sep-17	0.53	90	1400	1.5	7.6	360	2800
M-60	CH-CCR-M60-120717_O	07-Dec-17	0.50	85	1500	1.4	7.6	360	2900
M-60	CH-CCR-M-60-52518_O	25-May-18	0.50	83	1400	1.5	7.5	350	2800
M-60	CH-CCR-M-60-102618	26-Oct-18	0.49	88	1400	1.4	7.7	350	2600
		<i>Units:</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>SU</i>	<i>mg/L</i>	<i>mg/L</i>
		<i>BTV<sup>1</sup>:</i>	<i>0.55</i>	<i>100</i>	<i>1600</i>	<i>1.4</i>	<i>7.8/7.3</i>	<i>380</i>	<i>3200</i>
		<i>Temporal Trend<sup>2</sup>:</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>

**Notes:**

BTV = background threshold value  
 mg/L = milligrams per liter  
 TDS = total dissolved solids  
 SU = standard units

 Reported value exceeds the respective BTV  
 Statistically significant increasing trend present  
 None Insufficient evidence to identify a trend.

<sup>1</sup> For pH: Upper Prediction Limit/Lower Prediction Limit



<sup>2</sup> Temporal trends evaluated with Mann-Kendall trend tests (p<0.05); tied values (sequential sample concentrations that are equal overtime) can cause misleading trend results.

**Table 2**  
**Cholla BAM Downgradient Sample Data Summary**  
**Appendix III Statistical Analysis**

Well	Sample_ID	SampDate	Constituent Concentration						
			Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
M-61	7802_O	03-Dec-15	0.51	90	1400	1.3	7.22	350	2800
M-61	CH-M-61-0316_O	10-Mar-16	0.49	90	1400	1.4	7.59	340	2800
M-61	CH-CCR-M61-516_O	20-May-16	0.49	89	1400	1.4	---	350	2800
M-61	CH-CCR-M61-816_O	27-Aug-16	0.50	90	1400	1.5	7.5	360	2900
M-61	CH-CCR-M61-916_O	22-Sep-16	0.50	90	1300	1.4	7.9	350	3000
M-61	CH-CCR-M61-217_O	22-Feb-17	0.50	92	1100	1.4	7.8	340	2700
M-61	CH-CCR-M61-41117_O	11-Apr-17	0.50	93	1700	1.4	8.0	420	3000
M-61	CH-CCR-M61-42417_O	24-Apr-17	0.52	88	1400	1.4	7.7	360	2700
M-61	CH-CCR-M61-51917_O	19-May-17	0.5	92	1400	1.3	7.8	370	2800
M-61	CH-CCR-M61-52517_O	25-May-17	0.51	92	1400	1.4	7.7	370	2800
M-61	CH-CCR-M61-62917_O	29-Jun-17	0.50	86	1500	1.5	7.8	380	2700
M-61	CH-CCR-M61-72917_O	29-Jul-17	0.52	94	1300	1.5	7.6	360	2900
M-61	CH-CCR-M61-90517_O	05-Sep-17	0.50	91	1400	1.5	7.6	360	2800
M-61	CH-CCR-M61-120717_O	07-Dec-17	0.49	88	1500	1.4	7.6	360	2900
M-61	CH-CCR-M-61-52518_O	25-May-18	0.48	87	1400	1.5	7.5	390	2800
M-61	CH-CCR-M-61-102618	26-Oct-18	0.48	91	1400	1.4	7.5	360	2600
		<i>Units:</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>SU</i>	<i>mg/L</i>	<i>mg/L</i>
		<i>BTV<sup>1</sup>:</i>	<i>0.55</i>	<i>100</i>	<i>1600</i>	<i>1.4</i>	<i>7.8/7.3</i>	<i>380</i>	<i>3200</i>
		<i>Temporal Trend<sup>2</sup>:</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<b>Increasing</b>	<i>None</i>

**Notes:**

BTV = background threshold value  
 mg/L = milligrams per liter  
 TDS = total dissolved solids  
 SU = standard units

 Reported value exceeds the respective BTV  
 Statistically significant increasing trend present  
 None Insufficient evidence to identify a trend.

<sup>1</sup> For pH: Upper Prediction Limit/Lower Prediction Limit

<sup>2</sup> Temporal trends evaluated with Mann-Kendall trend tests (p<0.05); tied values (sequential sample concentrations that are equal overtime) can cause misleading trend results.

**APPENDIX A**

**PROUCL DATA UPLOAD TABLE**



**APPENDIX A  
PROUCL DATA INPUTS  
BAM DETECTION MONITORING  
APRIL 2019**

Well	Sample_ID	SampDate	B	D_B	Ca	D_Ca	Cl	D_Cl	F	D_F	pH	D_pH	Sulfate	D_Sulfate	TDS	D_TDS
M-54	7799_O	03-Dec-15	0.52	1	100	1	1500	1	1.2	1	7.34	1	380	1	3000	1
M-54	CH-M-54-0316_O	10-Mar-16	0.53	1	100	1	1600	1	1.3	1	7.56	1	360	1	2900	1
M-54	CH-CCR-M54-516_O	20-May-16	0.51	1	100	1	1500	1	1.4	1			350	1	3000	1
M-54	CH-CCR-M54-816_O	27-Aug-16	0.53	1	110	1	1600	1	1.4	1	7.5	1	370	1	3100	1
M-54	CH-CCR-M54-916_O	22-Sep-16	0.52	1	99	1	1400	1	1.3	1	7.7	1	350	1	3200	1
M-54	CH-CCR-M54-217_O	21-Feb-17	0.52	1	100	1	1300	1	1.3	1	7.7	1	350	1	2900	1
M-54	CH-CCR-M54-41117_O	11-Apr-17	0.51	1	100	1	1500	1	1.3	1	7.7	1	360	1	3100	1
M-54	CH-CCR-M54-42417_O	24-Apr-17	0.53	1	95	1	1500	1	1.3	1	7.6	1	370	1	3000	1
M-54	CH-CCR-M54-51917_O	19-May-17	0.5	1	99	1	1600	1	1.3	1	7.8	1	380	1	3200	1
M-54	CH-CCR-M54-52517_O	25-May-17	0.52	1	100	1	1500	1	1.4	1	7.7	1	370	1	3200	1
M-54	CH-CCR-M54-62917_O	29-Jun-17	0.51	1	97	1	1600	1	1.4	1	7.6	1	380	1	2900	1
M-54	CH-CCR-M54-72917_O	29-Jul-17	0.56	1	100	1	1500	1	1.4	1	7.4	1	350	1	3100	1
M-54	CH-CCR-M54-90517_O	05-Sep-17	0.55	1	100	1	1500	1	1.4	1	7.5	1	370	1	3100	1
M-54	CH-CCR-M54-120717_O	07-Dec-17	0.51	1	97	1	1600	1	1.4	1	7.6	1	360	1	3000	1
M-54	CH-CCR-M-54-52518_O	25-May-18	0.5	1	96	1	1500	1	1.4	1	7.4	1	350	1	3000	1
M-54	CH-CCR-M-54-102618	26-Oct-18	0.5	1	100	1	1500	1	1.4	1	7.5	1	360	1	2900	1
M-59	7803_O	03-Dec-15	0.5	1	87	1	1300	1	1.3	1	7.53	1	340	1	2700	1
M-59	CH-M-59-0316_O	10-Mar-16	0.48	1	85	1	1400	1	1.3	1	7.57	1	350	1	2700	1
M-59	CH-CCR-M59-516_O	20-May-16	0.49	1	86	1	1400	1	1.4	1			340	1	2700	1
M-59	CH-CCR-M59-816_O	27-Aug-16	0.5	1	89	1	1400	1	1.4	1	7.6	1	350	1	2700	1
M-59	CH-CCR-M59-916_O	22-Sep-16	0.5	1	88	1	1300	1	1.4	1	7.8	1	340	1	2900	1
M-59	CH-CCR-M59-217_O	22-Feb-17	0.48	1	86	1	1200	1	1.3	1	7.8	1	330	1	2800	1
M-59	CH-CCR-M59-41117_O	11-Apr-17	0.49	1	90	1	1400	1	1.3	1	8.1	1	350	1	2800	1
M-59	CH-CCR-M59-42417_O	24-Apr-17	0.52	1	89	1	1300	1	1.4	1	7.7	1	350	1	2800	1
M-59	CH-CCR-M59-51917_O	19-May-17	0.5	1	93	1	1400	1	1.4	1	7.8	1	360	1	2700	1
M-59	CH-CCR-M59-52517_O	25-May-17	0.5	1	88	1	1300	1	1.4	1	7.6	1	350	1	2700	1
M-59	CH-CCR-M59-62917_O	29-Jun-17	0.49	1	84	1	1400	1	1.5	1	7.8	1	370	1	2500	1
M-59	CH-CCR-M59-72917_O	29-Jul-17	0.53	1	92	1	1300	1	1.5	1	7.6	1	340	1	2800	1
M-59	CH-CCR-M59-90517_O	05-Sep-17	0.51	1	90	1	1300	1	1.4	1	7.7	1	360	1	2700	1
M-59	CH-CCR-M59-120717_O	07-Dec-17	0.49	1	86	1	1400	1	1.4	1	7.7	1	350	1	2700	1
M-59	CH-CCR-M-59-52518_O	25-May-18	0.49	1	85	1	1400	1	1.4	1	7.5	1	350	1	2700	1
M-59	CH-CCR-M-59-102618	26-Oct-18	0.48	1	88	1	1400	1	1.4	1	7.6	1	360	1	2500	1
M-60	7801_O	03-Dec-15	0.54	1	88	1	1400	1	1.3	1	7.56	1	350	1	2800	1
M-60	CH-M-60A-0316_O	09-Mar-16	0.5	1	86	1	1400	1	1.4	1	7.83	1	350	1	2800	1
M-60	CH-CCR-M60-516_O	20-May-16	0.5	1	89	1	1400	1	1.5	1			350	1	2800	1
M-60	CH-CCR-M60-816_O	27-Aug-16	0.52	1	90	1	1400	1	1.5	1	7.5	1	360	1	2800	1
M-60	CH-CCR-M60-916_O	22-Sep-16	0.51	1	88	1	1300	1	1.4	1	7.8	1	350	1	3000	1
M-60	CH-CCR-M60-217_O	22-Feb-17	0.52	1	91	1	1300	1	1.4	1	7.8	1	340	1	2800	1
M-60	CH-CCR-M60-41117_O	11-Apr-17	0.48	1	90	1	1400	1	1.4	1	8	1	360	1	2900	1
M-60	CH-CCR-M60-42417_O	24-Apr-17	0.53	1	86	1	1400	1	1.4	1	7.8	1	350	1	2700	1
M-60	CH-CCR-M60-51917_O	19-May-17	0.53	1	92	1	1400	1	1.4	1	7.7	1	360	1	2800	1
M-60	CH-CCR-M60-52517_O	25-May-17	0.51	1	86	1	1300	1	1.4	1	7.7	1	350	1	2800	1
M-60	CH-CCR-M60-62917_O	29-Jun-17	0.51	1	84	1	1500	1	1.5	1	7.7	1	440	1	2500	1
M-60	CH-CCR-M60-72917_O	29-Jul-17	0.53	1	89	1	1400	1	1.5	1	7.6	1	370	1	2800	1

**APPENDIX A  
PROUCL DATA INPUTS  
BAM DETECTION MONITORING  
APRIL 2019**

Well	Sample_ID	SampDate	B	D_B	Ca	D_Ca	Cl	D_Cl	F	D_F	pH	D_pH	Sulfate	D_Sulfate	TDS	D_TDS
M-60	CH-CCR-M60-90517_O	05-Sep-17	0.53	1	90	1	1400	1	1.5	1	7.6	1	360	1	2800	1
M-60	CH-CCR-M60-120717_O	07-Dec-17	0.5	1	85	1	1500	1	1.4	1	7.6	1	360	1	2900	1
M-60	CH-CCR-M-60-52518_O	25-May-18	0.5	1	83	1	1400	1	1.5	1	7.5	1	350	1	2800	1
M-60	CH-CCR-M-60-102618	26-Oct-18	0.49	1	88	1	1400	1	1.4	1	7.7	1	350	1	2600	1
M-61	7802_O	03-Dec-15	0.51	1	90	1	1400	1	1.3	1	7.22	1	350	1	2800	1
M-61	CH-M-61-0316_O	10-Mar-16	0.49	1	90	1	1400	1	1.4	1	7.59	1	340	1	2800	1
M-61	CH-CCR-M61-516_O	20-May-16	0.49	1	89	1	1400	1	1.4	1			350	1	2800	1
M-61	CH-CCR-M61-816_O	27-Aug-16	0.5	1	90	1	1400	1	1.5	1	7.5	1	360	1	2900	1
M-61	CH-CCR-M61-916_O	22-Sep-16	0.5	1	90	1	1300	1	1.4	1	7.9	1	350	1	3000	1
M-61	CH-CCR-M61-217_O	22-Feb-17	0.5	1	92	1	1100	1	1.4	1	7.8	1	340	1	2700	1
M-61	CH-CCR-M61-41117_O	11-Apr-17	0.5	1	93	1	1700	1	1.4	1	8	1	420	1	3000	1
M-61	CH-CCR-M61-42417_O	24-Apr-17	0.52	1	88	1	1400	1	1.4	1	7.7	1	360	1	2700	1
M-61	CH-CCR-M61-51917_O	19-May-17	0.5	1	92	1	1400	1	1.3	1	7.8	1	370	1	2800	1
M-61	CH-CCR-M61-52517_O	25-May-17	0.51	1	92	1	1400	1	1.4	1	7.7	1	370	1	2800	1
M-61	CH-CCR-M61-62917_O	29-Jun-17	0.5	1	86	1	1500	1	1.5	1	7.8	1	380	1	2700	1
M-61	CH-CCR-M61-72917_O	29-Jul-17	0.52	1	94	1	1300	1	1.5	1	7.6	1	360	1	2900	1
M-61	CH-CCR-M61-90517_O	05-Sep-17	0.5	1	91	1	1400	1	1.5	1	7.6	1	360	1	2800	1
M-61	CH-CCR-M61-120717_O	07-Dec-17	0.49	1	88	1	1500	1	1.4	1	7.6	1	360	1	2900	1
M-61	CH-CCR-M-61-52518_O	25-May-18	0.48	1	87	1	1400	1	1.5	1	7.5	1	390	1	2800	1
M-61	CH-CCR-M-61-102618	26-Oct-18	0.48	1	91	1	1400	1	1.4	1	7.5	1	360	1	2600	1

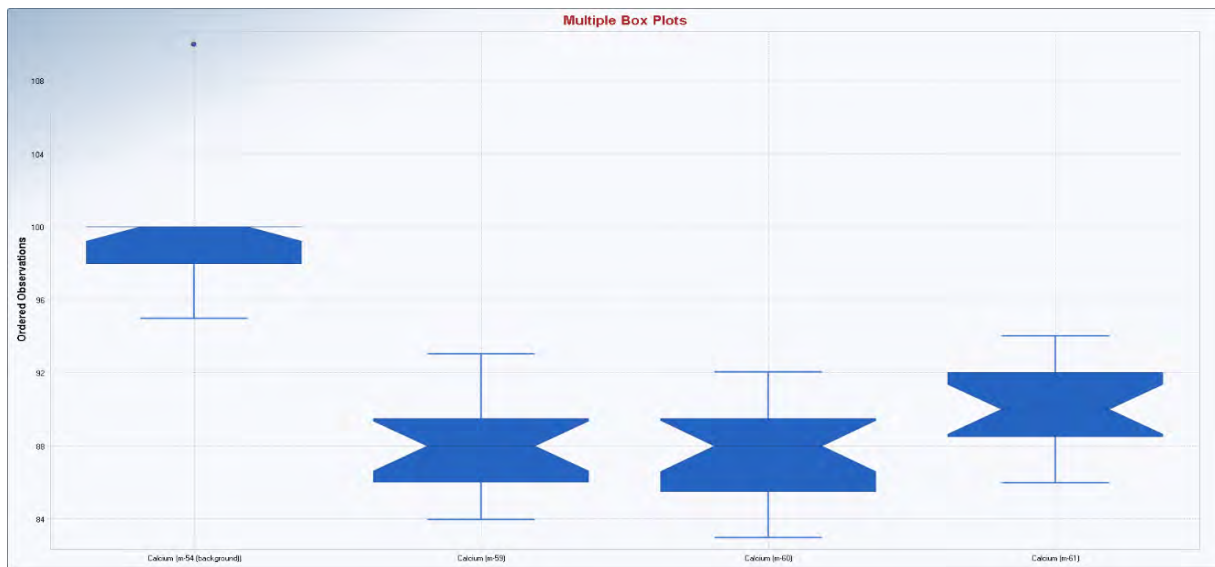
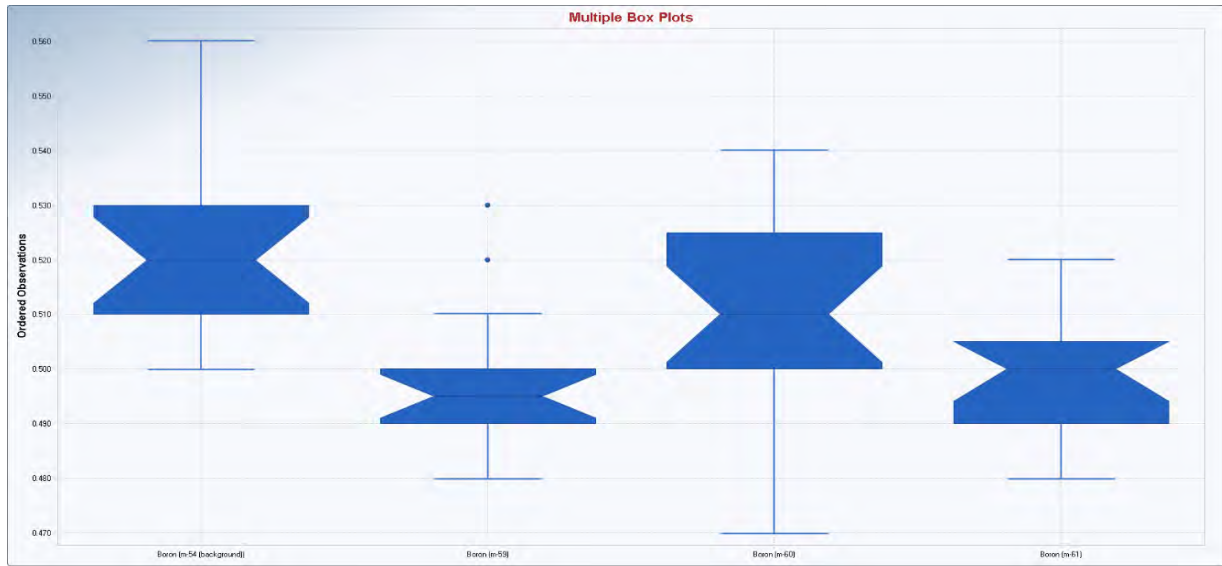


**APPENDIX B**

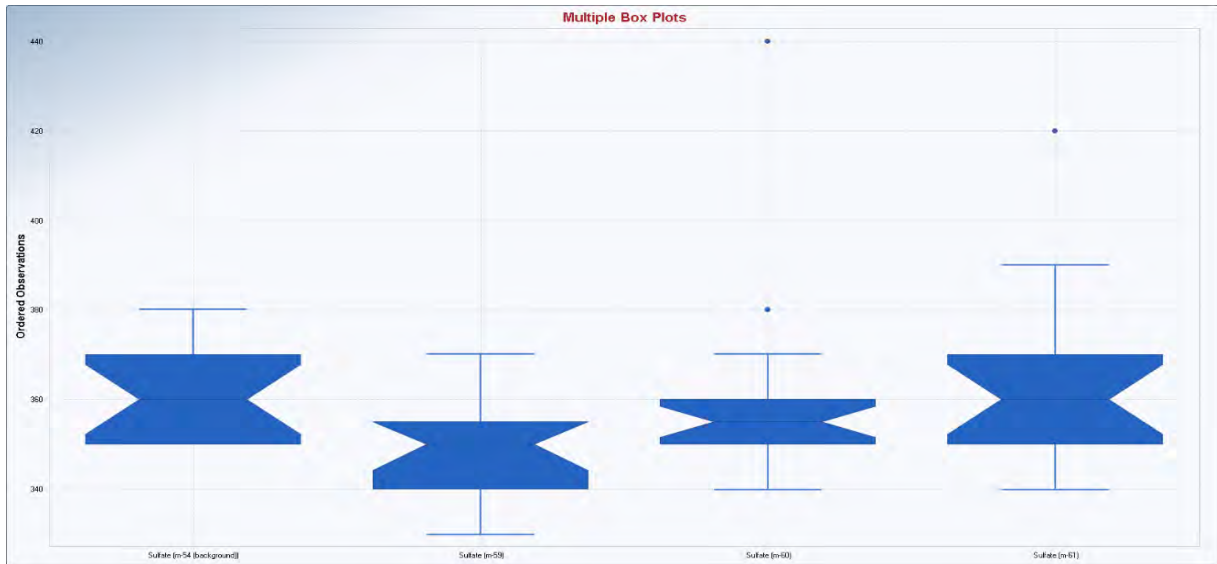
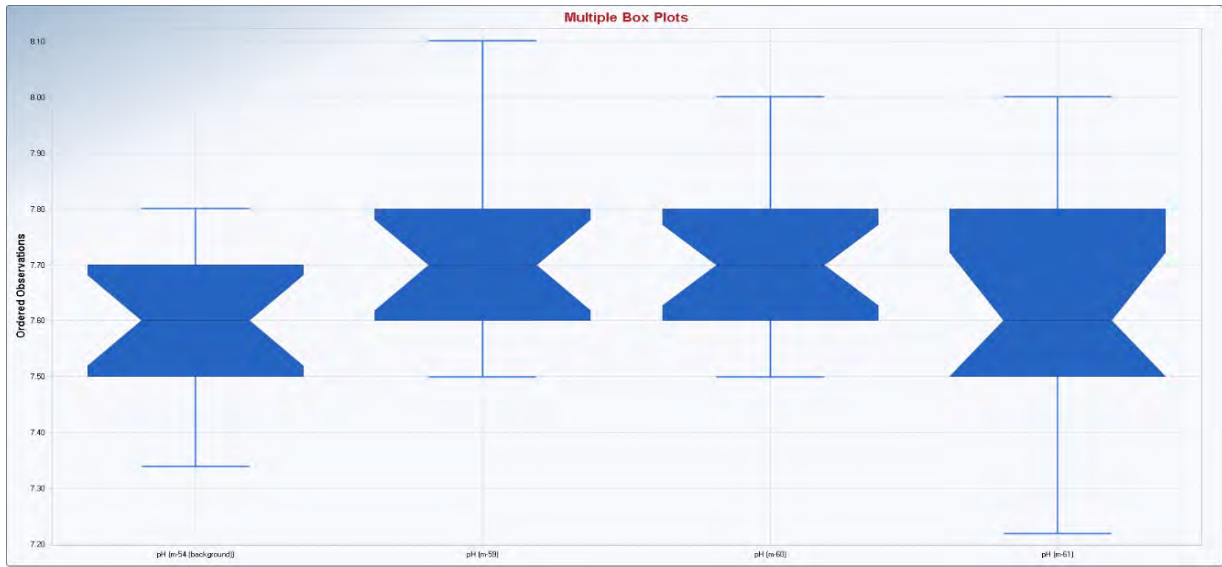
**BOX AND WHISKER PLOTS**



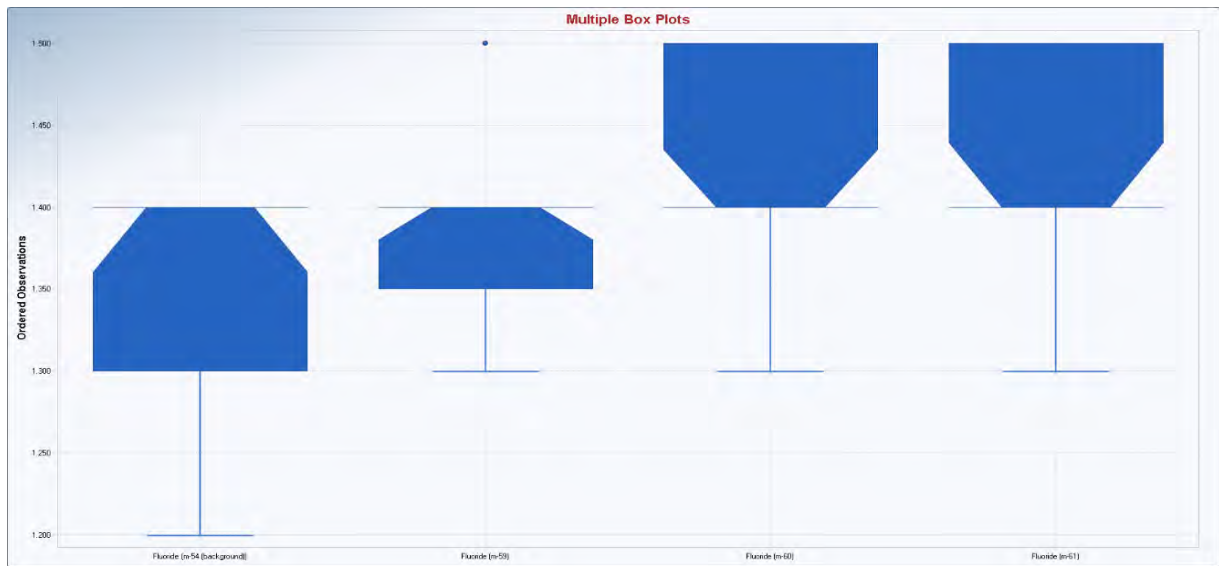
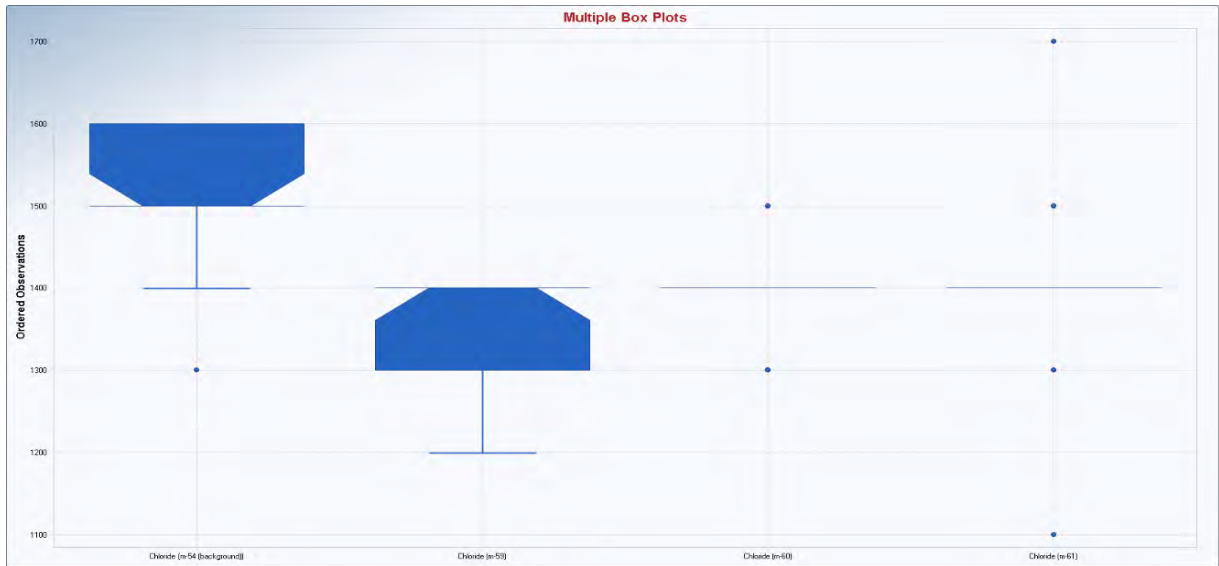
**APPENDIX B**  
**PROUCL BOX WHISKER PLOTS**  
**BAM DETECTION MONITORING**  
**APRIL 2019**



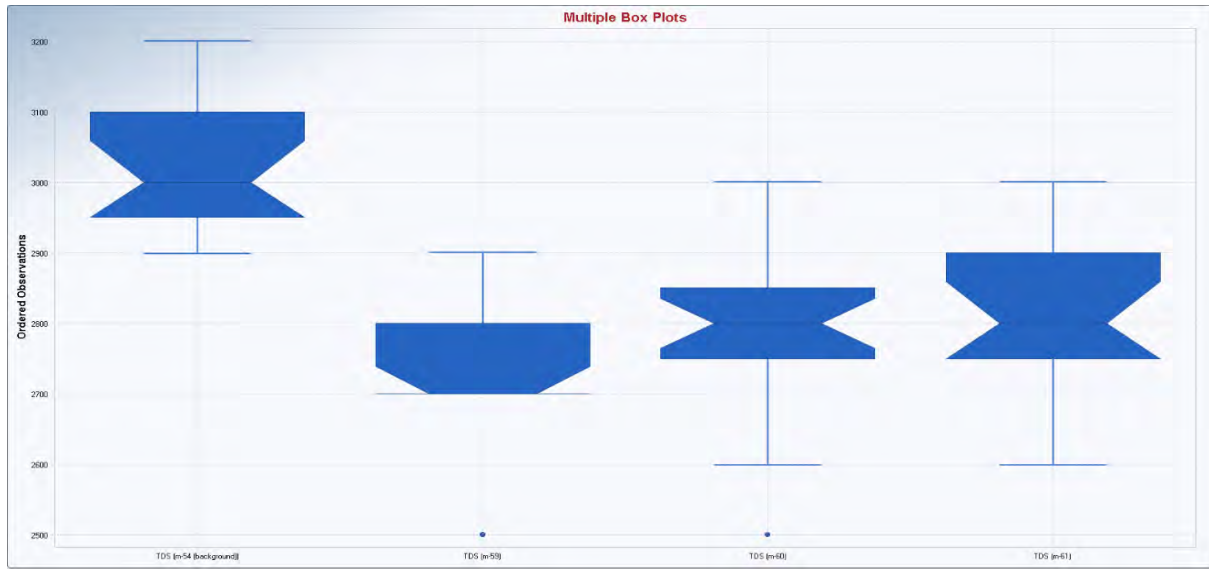
APPENDIX B  
PROUCL BOX WHISKER PLOTS  
BAM DETECTION MONITORING  
APRIL 2019



APPENDIX B  
PROUCL BOX WHISKER PLOTS  
BAM DETECTION MONITORING  
APRIL 2019



**APPENDIX B  
PROUCL BOX WHISKER PLOTS  
BAM DETECTION MONITORING  
APRIL 2019**



**APPENDIX C**

**PROUCL MANN-KENDALL TREND TESTS**



**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**Boron-m-54 (background)**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 0.5  
Maximum 0.56  
Mean 0.52  
Geometric Mean 0.52  
Median 0.52  
Standard Deviation 0.0171  
Coefficient of Variation 0.0329

**Mann-Kendall Test**

M-K Test Value (S) -28  
Tabulated p-value 0.114  
Standard Deviation of S 21.65  
Standardized Value of S -1.247  
Approximate p-value 0.106

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**APPENDIX C  
PROUCL MANN-KENDALL TEST  
BAM DETECTION MONITORING  
APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
 Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95  
 Level of Significance 0.05

**Boron-m-59**

**General Statistics**

Number or Reported Events Not Used 0  
 Number of Generated Events 16  
 Number Values Reported (n) 16  
 Minimum 0.48  
 Maximum 0.53  
 Mean 0.497  
 Geometric Mean 0.497  
 Median 0.495  
 Standard Deviation 0.014  
 Coefficient of Variation 0.0282

**Mann-Kendall Test**

M-K Test Value (S) 1  
 Tabulated p-value 0.518  
 Standard Deviation of S 21.36  
 Standardized Value of S 0  
 Approximate p-value 0.5

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Boron-m-60**

**General Statistics**

Number or Reported Events Not Used 0  
 Number of Generated Events 16  
 Number Values Reported (n) 16  
 Minimum 0.48  
 Maximum 0.54  
 Mean 0.513  
 Geometric Mean 0.512  
 Median 0.51



**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Standard Deviation 0.0169  
Coefficient of Variation 0.033

**Mann-Kendall Test**

M-K Test Value (S) -16  
Tabulated p-value 0.253  
Standard Deviation of S 21.71  
Standardized Value of S -0.691  
Approximate p-value 0.245

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Boron-m-61**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 0.48  
Maximum 0.52  
Mean 0.499  
Geometric Mean 0.499  
Median 0.5  
Standard Deviation 0.0118  
Coefficient of Variation 0.0237

**Mann-Kendall Test**

M-K Test Value (S) -17  
Tabulated p-value 0.253  
Standard Deviation of S 21.03  
Standardized Value of S -0.761  
Approximate p-value 0.223

**Insufficient evidence to identify a significant**

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**trend at the specified level of significance.**

**Calcium-m-54 (background)**

**General Statistics**

Number or Reported Events Not Used	0
Number of Generated Events	16
Number Values Reported (n)	16
Minimum	95
Maximum	110
Mean	99.56
Geometric Mean	99.51
Median	100
Standard Deviation	3.245
Coefficient of Variation	0.0326

**Mann-Kendall Test**

M-K Test Value (S)	-30
Tabulated p-value	0.097
Standard Deviation of S	19.98
Standardized Value of S	-1.451
Approximate p-value	0.0734

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Calcium-m-59**

**General Statistics**

Number or Reported Events Not Used	0
Number of Generated Events	16
Number Values Reported (n)	16
Minimum	84
Maximum	93
Mean	87.88

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Geometric Mean 87.84  
Median 88  
Standard Deviation 2.553  
Coefficient of Variation 0.0291

**Mann-Kendall Test**

M-K Test Value (S) 9  
Tabulated p-value 0.378  
Standard Deviation of S 21.98  
Standardized Value of S 0.364  
Approximate p-value 0.358

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Calcium-m-60**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 83  
Maximum 92  
Mean 87.81  
Geometric Mean 87.78  
Median 88  
Standard Deviation 2.588  
Coefficient of Variation 0.0295

**Mann-Kendall Test**

M-K Test Value (S) -22  
Tabulated p-value 0.175  
Standard Deviation of S 21.94  
Standardized Value of S -0.957  
Approximate p-value 0.169

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Calcium-m-61**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 86  
Maximum 94  
Mean 90.19  
Geometric Mean 90.16  
Median 90  
Standard Deviation 2.198  
Coefficient of Variation 0.0244

**Mann-Kendall Test**

M-K Test Value (S) -1  
Tabulated p-value 0.518  
Standard Deviation of S 21.89  
Standardized Value of S 0  
Approximate p-value 0.5

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Chloride-m-54 (background)**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 1300

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Maximum 1600  
Mean 1513  
Geometric Mean 1510  
Median 1500  
Standard Deviation 80.62  
Coefficient of Variation 0.0533

**Mann-Kendall Test**

M-K Test Value (S) 4  
Tabulated p-value 0.447  
Standard Deviation of S 19.61  
Standardized Value of S 0.153  
Approximate p-value 0.439

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Chloride-m-59**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 1200  
Maximum 1400  
Mean 1350  
Geometric Mean 1349  
Median 1400  
Standard Deviation 63.25  
Coefficient of Variation 0.0468

**Mann-Kendall Test**

M-K Test Value (S) 11  
Tabulated p-value 0.345  
Standard Deviation of S 19.31

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Standardized Value of S 0.518  
Approximate p-value 0.302

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Chloride-m-60**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 1300  
Maximum 1500  
Mean 1394  
Geometric Mean 1393  
Median 1400  
Standard Deviation 57.37  
Coefficient of Variation 0.0412

**Mann-Kendall Test**

M-K Test Value (S) 19  
Tabulated p-value 0.225  
Standard Deviation of S 17.99  
Standardized Value of S 1.001  
Approximate p-value 0.159

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Chloride-m-61**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Minimum 1100  
Maximum 1700  
Mean 1400  
Geometric Mean 1395  
Median 1400  
Standard Deviation 121.1  
Coefficient of Variation 0.0865

**Mann-Kendall Test**

M-K Test Value (S) 11  
Tabulated p-value 0.345  
Standard Deviation of S 19.14  
Standardized Value of S 0.522  
Approximate p-value 0.301

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Fluoride-m-54 (background)**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 1.2  
Maximum 1.4  
Mean 1.35  
Geometric Mean 1.349  
Median 1.4  
Standard Deviation 0.0632  
Coefficient of Variation 0.0468

**Mann-Kendall Test**

M-K Test Value (S) 49

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options	
Date/Time of Computation	ProUCL 5.14/4/2019 10:30:04 AM
From File	Copy of Cholla_Data_Export_20190325NoDups.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05
Tabulated p-value	0.016
Standard Deviation of S	19.31
Standardized Value of S	2.485
Approximate p-value	0.00647

**Statistically significant evidence of an increasing trend at the specified level of significance.**

**Fluoride-m-59**

**General Statistics**

Number or Reported Events Not Used	0
Number of Generated Events	16
Number Values Reported (n)	16
Minimum	1.3
Maximum	1.5
Mean	1.388
Geometric Mean	1.386
Median	1.4
Standard Deviation	0.0619
Coefficient of Variation	0.0446

**Mann-Kendall Test**

M-K Test Value (S)	40
Tabulated p-value	0.039
Standard Deviation of S	18.94
Standardized Value of S	2.059
Approximate p-value	0.0197

**Statistically significant evidence of an increasing trend at the specified level of significance.**

**Fluoride-m-60**

**General Statistics**

Number or Reported Events Not Used	0
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**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 1.3  
Maximum 1.5  
Mean 1.431  
Geometric Mean 1.43  
Median 1.4  
Standard Deviation 0.0602  
Coefficient of Variation 0.0421

**Mann-Kendall Test**

M-K Test Value (S) 23  
Tabulated p-value 0.175  
Standard Deviation of S 19.31  
Standardized Value of S 1.139  
Approximate p-value 0.127

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Fluoride-m-61**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 1.3  
Maximum 1.5  
Mean 1.419  
Geometric Mean 1.417  
Median 1.4  
Standard Deviation 0.0655  
Coefficient of Variation 0.0462

**Mann-Kendall Test**

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options	
Date/Time of Computation	ProUCL 5.14/4/2019 10:30:04 AM
From File	Copy of Cholla_Data_Export_20190325NoDups.xls
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05
M-K Test Value (S)	31
Tabulated p-value	0.097
Standard Deviation of S	19.59
Standardized Value of S	1.532
Approximate p-value	0.0628

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**pH-m-54 (background)**

**General Statistics**

Number or Reported Events Not Used	0
Number of Generated Events	15
Number Values Reported (n)	16
Number Values Missing	1
Number Values Used	15
Minimum	7.34
Maximum	7.8
Mean	7.573
Geometric Mean	7.572
Median	7.6
Standard Deviation	0.133
Coefficient of Variation	0.0176

**Mann-Kendall Test**

M-K Test Value (S)	-12
Tabulated p-value	0.279
Standard Deviation of S	19.78
Standardized Value of S	-0.556
Approximate p-value	0.289

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**pH-m-59**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 15  
Number Values Reported (n) 16  
Number Values Missing 1  
Number Values Used 15  
Minimum 7.5  
Maximum 8.1  
Mean 7.693  
Geometric Mean 7.692  
Median 7.7  
Standard Deviation 0.152  
Coefficient of Variation 0.0198

**Mann-Kendall Test**

M-K Test Value (S) -4  
Tabulated p-value 0.423  
Standard Deviation of S 19.68  
Standardized Value of S -0.152  
Approximate p-value 0.439

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**pH-m-60**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 15  
Number Values Reported (n) 16  
Number Values Missing 1  
Number Values Used 15  
Minimum 7.5

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

Maximum	8
Mean	7.693
Geometric Mean	7.692
Median	7.7
Standard Deviation	0.138
Coefficient of Variation	0.0179

**Mann-Kendall Test**

M-K Test Value (S)	-32
Tabulated p-value	0.057
Standard Deviation of S	19.78
Standardized Value of S	-1.567
Approximate p-value	0.0585

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**pH-m-61**

**General Statistics**

Number or Reported Events Not Used	0
Number of Generated Events	15
Number Values Reported (n)	16
Number Values Missing	1
Number Values Used	15
Minimum	7.22
Maximum	8
Mean	7.654
Geometric Mean	7.652
Median	7.6
Standard Deviation	0.193
Coefficient of Variation	0.0252

**Mann-Kendall Test**

M-K Test Value (S)	-17
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**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Tabulated p-value 0.218  
Standard Deviation of S 19.91  
Standardized Value of S -0.804  
Approximate p-value 0.211

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Sulfate-m-54 (background)**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 350  
Maximum 380  
Mean 363.1  
Geometric Mean 363  
Median 360  
Standard Deviation 11.38  
Coefficient of Variation 0.0313

**Mann-Kendall Test**

M-K Test Value (S) -5  
Tabulated p-value 0.447  
Standard Deviation of S 21.35  
Standardized Value of S -0.187  
Approximate p-value 0.426

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Sulfate-m-59**

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 330  
Maximum 370  
Mean 349.4  
Geometric Mean 349.2  
Median 350  
Standard Deviation 9.979  
Coefficient of Variation 0.0286

**Mann-Kendall Test**

M-K Test Value (S) 42  
Tabulated p-value 0.032  
Standard Deviation of S 20.9  
Standardized Value of S 1.962  
Approximate p-value 0.0249

**Statistically significant evidence of an increasing trend at the specified level of significance.**

**Sulfate-m-60**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 340  
Maximum 440  
Mean 359.4  
Geometric Mean 358.8  
Median 350  
Standard Deviation 22.65  
Coefficient of Variation 0.063

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**Mann-Kendall Test**

M-K Test Value (S) 22  
Tabulated p-value 0.175  
Standard Deviation of S 20.28  
Standardized Value of S 1.035  
Approximate p-value 0.15

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**Sulfate-m-61**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 340  
Maximum 420  
Mean 363.8  
Geometric Mean 363.3  
Median 360  
Standard Deviation 19.96  
Coefficient of Variation 0.0549

**Mann-Kendall Test**

M-K Test Value (S) 44  
Tabulated p-value 0.026  
Standard Deviation of S 21.43  
Standardized Value of S 2.006  
Approximate p-value 0.0224

**Statistically significant evidence of an increasing trend at the specified level of significance.**

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**TDS-m-54 (background)**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 2900  
Maximum 3200  
Mean 3038  
Geometric Mean 3036  
Median 3000  
Standard Deviation 108.8  
Coefficient of Variation 0.0358

**Mann-Kendall Test**

M-K Test Value (S) -3  
Tabulated p-value 0.482  
Standard Deviation of S 21.35  
Standardized Value of S -0.0937  
Approximate p-value 0.463

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**TDS-m-59**

**General Statistics**

Number or Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 2500  
Maximum 2900  
Mean 2713  
Geometric Mean 2711



**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05  
Median 2700  
Standard Deviation 102.5  
Coefficient of Variation 0.0378

**Mann-Kendall Test**

M-K Test Value (S) -25  
Tabulated p-value 0.153  
Standard Deviation of S 19.79  
Standardized Value of S -1.213  
Approximate p-value 0.113

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**TDS-m-60**

**General Statistics**

Number of Reported Events Not Used 0  
Number of Generated Events 16  
Number Values Reported (n) 16  
Minimum 2500  
Maximum 3000  
Mean 2788  
Geometric Mean 2785  
Median 2800  
Standard Deviation 114.7  
Coefficient of Variation 0.0412

**Mann-Kendall Test**

M-K Test Value (S) -16  
Tabulated p-value 0.253  
Standard Deviation of S 19.17  
Standardized Value of S -0.783  
Approximate p-value 0.217

**APPENDIX C**  
**PROUCL MANN-KENDALL TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Mann-Kendall Trend Test Analysis**

User Selected Options  
Date/Time of Computation ProUCL 5.14/4/2019 10:30:04 AM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95  
Level of Significance 0.05

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**TDS-m-61**

**General Statistics**

Number or Reported Events Not Used	0
Number of Generated Events	16
Number Values Reported (n)	16
Minimum	2600
Maximum	3000
Mean	2813
Geometric Mean	2811
Median	2800
Standard Deviation	108.8
Coefficient of Variation	0.0387

**Mann-Kendall Test**

M-K Test Value (S)	-14
Tabulated p-value	0.282
Standard Deviation of S	20.99
Standardized Value of S	-0.619
Approximate p-value	0.268

**Insufficient evidence to identify a significant trend at the specified level of significance.**

**APPENDIX D**

**PROUCL GOODNESS OF FIT TESTS**



**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**  
**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

**Boron (m-54 (background))**

**Raw Statistics**

Number of Valid Observations	16
Number of Distinct Observations	6
Minimum	0.5
Maximum	0.56
Mean of Raw Data	0.52
Standard Deviation of Raw Data	0.0171
Khat	1001
Theta hat	5.1942E-4
Kstar	813.4
Theta star	6.3926E-4
Mean of Log Transformed Data	-0.654
Standard Deviation of Log Transformed Data	0.0325

**Normal GOF Test Results**

Correlation Coefficient R	0.947
Shapiro Wilk Test Statistic	0.894
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.0681
Lilliefors Test Statistic	0.188
Lilliefors Critical (0.05) Value	0.213

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.95
A-D Test Statistic	0.61
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.184
K-S Critical(0.05) Value	0.214

**APPENDIX D  
PROUCL GOODNESS OF FIT  
BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.951  
 Shapiro Wilk Test Statistic 0.901  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0887  
 Lilliefors Test Statistic 0.181  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Lognormal at (0.05) Significance Level**

**Boron (m-59)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 6  
 Minimum 0.48  
 Maximum 0.53  
 Mean of Raw Data 0.497  
 Standard Deviation of Raw Data 0.014  
 Khat 1362  
 Theta hat 3.6475E-4  
 Kstar 1107  
 Theta star 4.4891E-4  
 Mean of Log Transformed Data -0.7  
 Standard Deviation of Log Transformed Data 0.0279

**Normal GOF Test Results**

Correlation Coefficient R 0.943  
 Shapiro Wilk Test Statistic 0.89  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0568

**APPENDIX D  
PROUCL GOODNESS OF FIT  
BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Lilliefors Test Statistic 0.224  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.947  
 A-D Test Statistic 0.703  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.217  
 K-S Critical(0.05) Value 0.214

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.947  
 Shapiro Wilk Test Statistic 0.895  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0703  
 Lilliefors Test Statistic 0.218  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate\_Lognormal at (0.05) Significance Level**

**Boron (m-60)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 7  
 Minimum 0.48  
 Maximum 0.54  
 Mean of Raw Data 0.513  
 Standard Deviation of Raw Data 0.0169  
 Khat 973.3  
 Theta hat 5.2654E-4

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Kstar 790.9  
Theta star 6.4801E-4  
Mean of Log Transformed Data -0.669  
Standard Deviation of Log Transformed Data 0.0331

**Normal GOF Test Results**

Correlation Coefficient R 0.976  
Shapiro Wilk Test Statistic 0.947  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 0.48  
Lilliefors Test Statistic 0.162  
Lilliefors Critical (0.05) Value 0.213

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.974  
A-D Test Statistic 0.45  
A-D Critical (0.05) Value 0.736  
K-S Test Statistic 0.169  
K-S Critical(0.05) Value 0.214

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.975  
Shapiro Wilk Test Statistic 0.946  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 0.466  
Lilliefors Test Statistic 0.161  
Lilliefors Critical (0.05) Value 0.213

**Data appear Lognormal at (0.05) Significance Level**

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**  
**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

**Boron (m-61)**

**Raw Statistics**

Number of Valid Observations	16
Number of Distinct Observations	5
Minimum	0.48
Maximum	0.52
Mean of Raw Data	0.499
Standard Deviation of Raw Data	0.0118
Khat	1908
Theta hat	2.6171E-4
Kstar	1550
Theta star	3.2209E-4
Mean of Log Transformed Data	-0.695
Standard Deviation of Log Transformed Data	0.0236

**Normal GOF Test Results**

Correlation Coefficient R	0.959
Shapiro Wilk Test Statistic	0.914
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.149
Lilliefors Test Statistic	0.229
Lilliefors Critical (0.05) Value	0.213

**Data appear Approximate Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.96
A-D Test Statistic	0.681
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.225
K-S Critical(0.05) Value	0.214

**Data follow Appr. Gamma Distribution at (0.05) Significance Level**



**APPENDIX D  
PROUCL GOODNESS OF FIT  
BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects  
User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Lognormal GOF Test Results**

Correlation Coefficient R 0.96  
 Shapiro Wilk Test Statistic 0.915  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.153  
 Lilliefors Test Statistic 0.224  
 Lilliefors Critical (0.05) Value 0.213

Data appear **Approximate\_Lognormal at (0.05) Significance Level**

**Calcium (m-54 (background))**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 6  
 Minimum 95  
 Maximum 110  
 Mean of Raw Data 99.56  
 Standard Deviation of Raw Data 3.245  
 Khat 1043  
 Theta hat 0.0954  
 Kstar 847.6  
 Theta star 0.117  
 Mean of Log Transformed Data 4.6  
 Standard Deviation of Log Transformed Data 0.0317

**Normal GOF Test Results**

Correlation Coefficient R 0.813  
 Shapiro Wilk Test Statistic 0.696  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 6.1083E-5  
 Lilliefors Test Statistic 0.384

**APPENDIX D  
PROUCL GOODNESS OF FIT  
BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.821  
 A-D Test Statistic 1.872  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.377  
 K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.824  
 Shapiro Wilk Test Statistic 0.713  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 1.0083E-4  
 Lilliefors Test Statistic 0.377  
 Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Calcium (m-59)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 9  
 Minimum 84  
 Maximum 93  
 Mean of Raw Data 87.88

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Standard Deviation of Raw Data 2.553  
 Khat 1273  
 Theta hat 0.069  
 Kstar 1034  
 Theta star 0.085  
 Mean of Log Transformed Data 4.476  
 Standard Deviation of Log Transformed Data 0.0289

**Normal GOF Test Results**

Correlation Coefficient R 0.983  
 Shapiro Wilk Test Statistic 0.959  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.676  
 Lilliefors Test Statistic 0.144  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.984  
 A-D Test Statistic 0.28  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.151  
 K-S Critical(0.05) Value 0.214

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.984  
 Shapiro Wilk Test Statistic 0.962  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.728  
 Lilliefors Test Statistic 0.143

**APPENDIX D  
PROUCL GOODNESS OF FIT  
BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Lilliefors Critical (0.05) Value 0.213

**Data appear Lognormal at (0.05) Significance Level**

**Calcium (m-60)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 9  
 Minimum 83  
 Maximum 92  
 Mean of Raw Data 87.81  
 Standard Deviation of Raw Data 2.588  
 Khat 1221  
 Theta hat 0.0719  
 Kstar 992.4  
 Theta star 0.0885  
 Mean of Log Transformed Data 4.475  
 Standard Deviation of Log Transformed Data 0.0296

**Normal GOF Test Results**

Correlation Coefficient R 0.985  
 Shapiro Wilk Test Statistic 0.962  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.73  
 Lilliefors Test Statistic 0.154  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.983  
 A-D Test Statistic 0.335  
 A-D Critical (0.05) Value 0.736

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

K-S Test Statistic 0.159  
 K-S Critical(0.05) Value 0.214

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.983  
 Shapiro Wilk Test Statistic 0.96  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.692  
 Lilliefors Test Statistic 0.159  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Lognormal at (0.05) Significance Level**

**Calcium (m-61)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 9  
 Minimum 86  
 Maximum 94  
 Mean of Raw Data 90.19  
 Standard Deviation of Raw Data 2.198  
 Khat 1790  
 Theta hat 0.0504  
 Kstar 1454  
 Theta star 0.062  
 Mean of Log Transformed Data 4.502  
 Standard Deviation of Log Transformed Data 0.0244

**Normal GOF Test Results**

Correlation Coefficient R 0.988  
 Shapiro Wilk Test Statistic 0.973

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.885  
 Lilliefors Test Statistic 0.154  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.988  
 A-D Test Statistic 0.257  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.148  
 K-S Critical(0.05) Value 0.214

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.987  
 Shapiro Wilk Test Statistic 0.972  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.862  
 Lilliefors Test Statistic 0.158  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Lognormal at (0.05) Significance Level**

**Chloride (m-54 (background))**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 4  
 Minimum 1300  
 Maximum 1600  
 Mean of Raw Data 1513  
 Standard Deviation of Raw Data 80.62

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Khat 360.8  
 Theta hat 4.192  
 Kstar 293.2  
 Theta star 5.158  
 Mean of Log Transformed Data 7.32  
 Standard Deviation of Log Transformed Data 0.055

**Normal GOF Test Results**

Correlation Coefficient R 0.88  
 Shapiro Wilk Test Statistic 0.784  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.00124  
 Lilliefors Test Statistic 0.313  
 Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.877  
 A-D Test Statistic 1.564  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.319  
 K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.872  
 Shapiro Wilk Test Statistic 0.772  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 8.1235E-4  
 Lilliefors Test Statistic 0.325  
 Lilliefors Critical (0.05) Value 0.213

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Chloride (m-59)**

**Raw Statistics**

Number of Valid Observations	16
Number of Distinct Observations	3
Minimum	1200
Maximum	1400
Mean of Raw Data	1350
Standard Deviation of Raw Data	63.25
Khat	473.1
Theta hat	2.854
Kstar	384.4
Theta star	3.512
Mean of Log Transformed Data	7.207
Standard Deviation of Log Transformed Data	0.0478

**Normal GOF Test Results**

Correlation Coefficient R	0.856
Shapiro Wilk Test Statistic	0.729
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	2.4752E-4
Lilliefors Test Statistic	0.348
Lilliefors Critical (0.05) Value	0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**



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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Correlation Coefficient R 0.848  
 A-D Test Statistic 2.089  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.354  
 K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.854  
 Shapiro Wilk Test Statistic 0.727  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 2.3326E-4  
 Lilliefors Test Statistic 0.346  
 Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Chloride (m-60)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 3  
 Minimum 1300  
 Maximum 1500  
 Mean of Raw Data 1394  
 Standard Deviation of Raw Data 57.37  
 Khat 627.6  
 Theta hat 2.221  
 Kstar 510  
 Theta star 2.733

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Mean of Log Transformed Data 7.239  
Standard Deviation of Log Transformed Data 0.0413

**Normal GOF Test Results**

Correlation Coefficient R 0.861  
Shapiro Wilk Test Statistic 0.748  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 3.7841E-4  
Lilliefors Test Statistic 0.356  
Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.863  
A-D Test Statistic 2.216  
A-D Critical (0.05) Value 0.736  
K-S Test Statistic 0.362  
K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.86  
Shapiro Wilk Test Statistic 0.747  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 3.6787E-4  
Lilliefors Test Statistic 0.363  
Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Chloride (m-61)**

**Raw Statistics**

Number of Valid Observations	16
Number of Distinct Observations	5
Minimum	1100
Maximum	1700
Mean of Raw Data	1400
Standard Deviation of Raw Data	121.1
Khat	139.9
Theta hat	10
Kstar	113.7
Theta star	12.31
Mean of Log Transformed Data	7.241
Standard Deviation of Log Transformed Data	0.088

**Normal GOF Test Results**

Correlation Coefficient R	0.872
Shapiro Wilk Test Statistic	0.8
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.00145
Lilliefors Test Statistic	0.313
Lilliefors Critical (0.05) Value	0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.878
A-D Test Statistic	1.715
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.324

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.867  
 Shapiro Wilk Test Statistic 0.792  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0011  
 Lilliefors Test Statistic 0.329  
 Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Fluoride (m-54 (background))**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 3  
 Minimum 1.2  
 Maximum 1.4  
 Mean of Raw Data 1.35  
 Standard Deviation of Raw Data 0.0632  
 Khat 473.1  
 Theta hat 0.00285  
 Kstar 384.4  
 Theta star 0.00351  
 Mean of Log Transformed Data 0.299  
 Standard Deviation of Log Transformed Data 0.0478

**Normal GOF Test Results**

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Correlation Coefficient R 0.856  
Shapiro Wilk Test Statistic 0.729  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 2.4752E-4  
Lilliefors Test Statistic 0.348  
Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.848  
A-D Test Statistic 2.089  
A-D Critical (0.05) Value 0.736  
K-S Test Statistic 0.354  
K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.854  
Shapiro Wilk Test Statistic 0.727  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 2.3326E-4  
Lilliefors Test Statistic 0.346  
Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Fluoride (m-59)**

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**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Raw Statistics**

Number of Valid Observations	16
Number of Distinct Observations	3
Minimum	1.3
Maximum	1.5
Mean of Raw Data	1.388
Standard Deviation of Raw Data	0.0619
Khat	535.4
Theta hat	0.00259
Kstar	435
Theta star	0.00319
Mean of Log Transformed Data	0.327
Standard Deviation of Log Transformed Data	0.0447

**Normal GOF Test Results**

Correlation Coefficient R	0.883
Shapiro Wilk Test Statistic	0.778
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.00113
Lilliefors Test Statistic	0.33
Lilliefors Critical (0.05) Value	0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.884
A-D Test Statistic	1.88
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.338
K-S Critical(0.05) Value	0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects  
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 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Correlation Coefficient R 0.883  
 Shapiro Wilk Test Statistic 0.777  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0011  
 Lilliefors Test Statistic 0.338  
 Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Fluoride (m-60)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 3  
 Minimum 1.3  
 Maximum 1.5  
 Mean of Raw Data 1.431  
 Standard Deviation of Raw Data 0.0602  
 Khat 598.7  
 Theta hat 0.00239  
 Kstar 486.5  
 Theta star 0.00294  
 Mean of Log Transformed Data 0.358  
 Standard Deviation of Log Transformed Data 0.0423

**Normal GOF Test Results**

Correlation Coefficient R 0.872  
 Shapiro Wilk Test Statistic 0.759  
 Shapiro Wilk Critical (0.05) Value 0.887

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Approximate Shapiro Wilk P Value 6.2467E-4

Lilliefors Test Statistic 0.323

Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.87

A-D Test Statistic 1.978

A-D Critical (0.05) Value 0.736

K-S Test Statistic 0.325

K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.871

Shapiro Wilk Test Statistic 0.759

Shapiro Wilk Critical (0.05) Value 0.887

Approximate Shapiro Wilk P Value 6.2123E-4

Lilliefors Test Statistic 0.317

Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Fluoride (m-61)**

**Raw Statistics**

Number of Valid Observations 16

Number of Distinct Observations 3

Minimum 1.3



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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Maximum	1.5
Mean of Raw Data	1.419
Standard Deviation of Raw Data	0.0655
Khat	496.6
Theta hat	0.00286
Kstar	403.5
Theta star	0.00352
Mean of Log Transformed Data	0.349
Standard Deviation of Log Transformed Data	0.0465

**Normal GOF Test Results**

Correlation Coefficient R	0.895
Shapiro Wilk Test Statistic	0.793
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.00203
Lilliefors Test Statistic	0.3
Lilliefors Critical (0.05) Value	0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.893
A-D Test Statistic	1.639
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.298
K-S Critical(0.05) Value	0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.895
Shapiro Wilk Test Statistic	0.793
Shapiro Wilk Critical (0.05) Value	0.887

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Approximate Shapiro Wilk P Value 0.00197  
 Lilliefors Test Statistic 0.292  
 Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**pH (m-54 (background))**

**Raw Statistics**

Number of Valid Observations 15  
 Number of Missing Observations 1  
 Number of Distinct Observations 7  
 Minimum 7.34  
 Maximum 7.8  
 Mean of Raw Data 7.573  
 Standard Deviation of Raw Data 0.133  
 Khat 3455  
 Theta hat 0.00219  
 Kstar 2764  
 Theta star 0.00274  
 Mean of Log Transformed Data 2.024  
 Standard Deviation of Log Transformed Data 0.0176

**Normal GOF Test Results**

Correlation Coefficient R 0.979  
 Shapiro Wilk Test Statistic 0.951  
 Shapiro Wilk Critical (0.05) Value 0.881  
 Approximate Shapiro Wilk P Value 0.573  
 Lilliefors Test Statistic 0.162  
 Lilliefors Critical (0.05) Value 0.22

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.977  
 A-D Test Statistic 0.397  
 A-D Critical (0.05) Value 0.734  
 K-S Test Statistic 0.171  
 K-S Critical(0.05) Value 0.221

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.978  
 Shapiro Wilk Test Statistic 0.95  
 Shapiro Wilk Critical (0.05) Value 0.881  
 Approximate Shapiro Wilk P Value 0.564  
 Lilliefors Test Statistic 0.162  
 Lilliefors Critical (0.05) Value 0.22

**Data appear Lognormal at (0.05) Significance Level**

**pH (m-59)**

**Raw Statistics**

Number of Valid Observations 15  
 Number of Missing Observations 1  
 Number of Distinct Observations 7  
 Minimum 7.5  
 Maximum 8.1  
 Mean of Raw Data 7.693  
 Standard Deviation of Raw Data 0.152  
 Khat 2770  
 Theta hat 0.00278  
 Kstar 2216

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Theta star 0.00347  
Mean of Log Transformed Data 2.04  
Standard Deviation of Log Transformed Data 0.0196

**Normal GOF Test Results**

Correlation Coefficient R 0.929  
Shapiro Wilk Test Statistic 0.875  
Shapiro Wilk Critical (0.05) Value 0.881  
Approximate Shapiro Wilk P Value 0.0354  
Lilliefors Test Statistic 0.197  
Lilliefors Critical (0.05) Value 0.22

**Data appear Approximate Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.933  
A-D Test Statistic 0.667  
A-D Critical (0.05) Value 0.734  
K-S Test Statistic 0.209  
K-S Critical(0.05) Value 0.221

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.933  
Shapiro Wilk Test Statistic 0.882  
Shapiro Wilk Critical (0.05) Value 0.881  
Approximate Shapiro Wilk P Value 0.0447  
Lilliefors Test Statistic 0.197  
Lilliefors Critical (0.05) Value 0.22

**Data appear Lognormal at (0.05) Significance Level**

**pH (m-60)**

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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Raw Statistics**

Number of Valid Observations	15
Number of Missing Observations	1
Number of Distinct Observations	7
Minimum	7.5
Maximum	8
Mean of Raw Data	7.693
Standard Deviation of Raw Data	0.138
Khat	3358
Theta hat	0.00229
Kstar	2686
Theta star	0.00286
Mean of Log Transformed Data	2.04
Standard Deviation of Log Transformed Data	0.0178

**Normal GOF Test Results**

Correlation Coefficient R	0.97
Shapiro Wilk Test Statistic	0.941
Shapiro Wilk Critical (0.05) Value	0.881
Approximate Shapiro Wilk P Value	0.392
Lilliefors Test Statistic	0.149
Lilliefors Critical (0.05) Value	0.22

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.971
A-D Test Statistic	0.406
A-D Critical (0.05) Value	0.734
K-S Test Statistic	0.164
K-S Critical(0.05) Value	0.221

**Data appear Gamma Distributed at (0.05) Significance Level**

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Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Lognormal GOF Test Results**

Correlation Coefficient R 0.971  
 Shapiro Wilk Test Statistic 0.943  
 Shapiro Wilk Critical (0.05) Value 0.881  
 Approximate Shapiro Wilk P Value 0.419  
 Lilliefors Test Statistic 0.149  
 Lilliefors Critical (0.05) Value 0.22

**Data appear Lognormal at (0.05) Significance Level**

**pH (m-61)**

**Raw Statistics**

Number of Valid Observations 15  
 Number of Missing Observations 1  
 Number of Distinct Observations 8  
 Minimum 7.22  
 Maximum 8  
 Mean of Raw Data 7.654  
 Standard Deviation of Raw Data 0.193  
 Khat 1678  
 Theta hat 0.00456  
 Kstar 1343  
 Theta star 0.0057  
 Mean of Log Transformed Data 2.035  
 Standard Deviation of Log Transformed Data 0.0253

**Normal GOF Test Results**

Correlation Coefficient R 0.974  
 Shapiro Wilk Test Statistic 0.959  
 Shapiro Wilk Critical (0.05) Value 0.881  
 Approximate Shapiro Wilk P Value 0.589

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**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Lilliefors Test Statistic 0.146  
Lilliefors Critical (0.05) Value 0.22

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.975  
A-D Test Statistic 0.337  
A-D Critical (0.05) Value 0.734  
K-S Test Statistic 0.147  
K-S Critical(0.05) Value 0.221

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.972  
Shapiro Wilk Test Statistic 0.956  
Shapiro Wilk Critical (0.05) Value 0.881  
Approximate Shapiro Wilk P Value 0.538  
Lilliefors Test Statistic 0.148  
Lilliefors Critical (0.05) Value 0.22

**Data appear Lognormal at (0.05) Significance Level**

**Sulfate (m-54 (background))**

**Raw Statistics**

Number of Valid Observations 16  
Number of Distinct Observations 4  
Minimum 350  
Maximum 380  
Mean of Raw Data 363.1  
Standard Deviation of Raw Data 11.38  
Khat 1089  
Theta hat 0.333

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BAM DETECTION MONITORING  
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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Kstar 885  
 Theta star 0.41  
 Mean of Log Transformed Data 5.894  
 Standard Deviation of Log Transformed Data 0.0313

**Normal GOF Test Results**

Correlation Coefficient R 0.943  
 Shapiro Wilk Test Statistic 0.864  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0303  
 Lilliefors Test Statistic 0.188  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.941  
 A-D Test Statistic 0.847  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.197  
 K-S Critical(0.05) Value 0.214

**Data follow Appr. Gamma Distribution at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.943  
 Shapiro Wilk Test Statistic 0.864  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0306  
 Lilliefors Test Statistic 0.19  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate\_Lognormal at (0.05) Significance Level**



**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Sulfate (m-59)**

**Raw Statistics**

Number of Valid Observations	16
Number of Distinct Observations	5
Minimum	330
Maximum	370
Mean of Raw Data	349.4
Standard Deviation of Raw Data	9.979
Khat	1309
Theta hat	0.267
Kstar	1064
Theta star	0.328
Mean of Log Transformed Data	5.856
Standard Deviation of Log Transformed Data	0.0285

**Normal GOF Test Results**

Correlation Coefficient R	0.957
Shapiro Wilk Test Statistic	0.925
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.187
Lilliefors Test Statistic	0.225
Lilliefors Critical (0.05) Value	0.213

**Data appear Approximate Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.959
A-D Test Statistic	0.731
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.221
K-S Critical(0.05) Value	0.214

**Data appear Gamma Distributed at (0.05) Significance Level**

**APPENDIX D  
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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects  
User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Lognormal GOF Test Results**

Correlation Coefficient R 0.957  
 Shapiro Wilk Test Statistic 0.926  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.191  
 Lilliefors Test Statistic 0.22  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate\_Lognormal at (0.05) Significance Level**

**Sulfate (m-60)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 5  
 Minimum 340  
 Maximum 440  
 Mean of Raw Data 359.4  
 Standard Deviation of Raw Data 22.65  
 Khat 300.3  
 Theta hat 1.197  
 Kstar 244  
 Theta star 1.473  
 Mean of Log Transformed Data 5.883  
 Standard Deviation of Log Transformed Data 0.058

**Normal GOF Test Results**

Correlation Coefficient R 0.714  
 Shapiro Wilk Test Statistic 0.543  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 1.0104E-6  
 Lilliefors Test Statistic 0.364

**APPENDIX D  
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APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.732  
A-D Test Statistic 2.629  
A-D Critical (0.05) Value 0.736  
K-S Test Statistic 0.355  
K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.733  
Shapiro Wilk Test Statistic 0.571  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 2.0616E-6  
Lilliefors Test Statistic 0.352  
Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**Sulfate (m-61)**

**Raw Statistics**

Number of Valid Observations 16  
Number of Distinct Observations 7  
Minimum 340  
Maximum 420  
Mean of Raw Data 363.8

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
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**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Standard Deviation of Raw Data 19.96  
 Khat 371  
 Theta hat 0.981  
 Kstar 301.4  
 Theta star 1.207  
 Mean of Log Transformed Data 5.895  
 Standard Deviation of Log Transformed Data 0.053

**Normal GOF Test Results**

Correlation Coefficient R 0.914  
 Shapiro Wilk Test Statistic 0.849  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0108  
 Lilliefors Test Statistic 0.262  
 Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.923  
 A-D Test Statistic 0.832  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.26  
 K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.926  
 Shapiro Wilk Test Statistic 0.869  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0225  
 Lilliefors Test Statistic 0.255

**APPENDIX D**  
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**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**TDS (m-54 (background))**

**Raw Statistics**

Number of Valid Observations	16
Number of Distinct Observations	4
Minimum	2900
Maximum	3200
Mean of Raw Data	3038
Standard Deviation of Raw Data	108.8
Khat	834.2
Theta hat	3.641
Kstar	677.8
Theta star	4.481
Mean of Log Transformed Data	8.018
Standard Deviation of Log Transformed Data	0.0357

**Normal GOF Test Results**

Correlation Coefficient R	0.95
Shapiro Wilk Test Statistic	0.88
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.0535
Lilliefors Test Statistic	0.197
Lilliefors Critical (0.05) Value	0.213

**Data appear Approximate Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

**APPENDIX D  
PROUCL GOODNESS OF FIT  
BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

Correlation Coefficient R 0.948  
 A-D Test Statistic 0.754  
 A-D Critical (0.05) Value 0.736  
 K-S Test Statistic 0.198  
 K-S Critical(0.05) Value 0.214

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.951  
 Shapiro Wilk Test Statistic 0.881  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0548  
 Lilliefors Test Statistic 0.192  
 Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate\_Lognormal at (0.05) Significance Level**

**TDS (m-59)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 4  
 Minimum 2500  
 Maximum 2900  
 Mean of Raw Data 2713  
 Standard Deviation of Raw Data 102.5  
 Khat 734.4  
 Theta hat 3.693  
 Kstar 596.7  
 Theta star 4.546  
 Mean of Log Transformed Data 7.905  
 Standard Deviation of Log Transformed Data 0.0383

**APPENDIX D  
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BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

**Normal GOF Test Results**

Correlation Coefficient R	0.9
Shapiro Wilk Test Statistic	0.823
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.0043
Lilliefors Test Statistic	0.326
Lilliefors Critical (0.05) Value	0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.901
A-D Test Statistic	1.49
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.33
K-S Critical(0.05) Value	0.214

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.895
Shapiro Wilk Test Statistic	0.814
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	0.00318
Lilliefors Test Statistic	0.334
Lilliefors Critical (0.05) Value	0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**TDS (m-60)**

**APPENDIX D**  
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**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

**Raw Statistics**

Number of Valid Observations 16  
Number of Distinct Observations 6  
Minimum 2500  
Maximum 3000  
Mean of Raw Data 2788  
Standard Deviation of Raw Data 114.7  
Khat 613.6  
Theta hat 4.542  
Kstar 498.6  
Theta star 5.59  
Mean of Log Transformed Data 7.932  
Standard Deviation of Log Transformed Data 0.042

**Normal GOF Test Results**

Correlation Coefficient R 0.89  
Shapiro Wilk Test Statistic 0.818  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 0.00311  
Lilliefors Test Statistic 0.356  
Lilliefors Critical (0.05) Value 0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.892  
A-D Test Statistic 1.671  
A-D Critical (0.05) Value 0.736  
K-S Test Statistic 0.362  
K-S Critical(0.05) Value 0.214

**Data not Gamma Distributed at (0.05) Significance Level**



**APPENDIX D  
PROUCL GOODNESS OF FIT  
BAM DETECTION MONITORING  
APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
 From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

**Lognormal GOF Test Results**

Correlation Coefficient R 0.885  
 Shapiro Wilk Test Statistic 0.808  
 Shapiro Wilk Critical (0.05) Value 0.887  
 Approximate Shapiro Wilk P Value 0.0022  
 Lilliefors Test Statistic 0.363  
 Lilliefors Critical (0.05) Value 0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Significance**

**TDS (m-61)**

**Raw Statistics**

Number of Valid Observations 16  
 Number of Distinct Observations 5  
 Minimum 2600  
 Maximum 3000  
 Mean of Raw Data 2813  
 Standard Deviation of Raw Data 108.8  
 Khat 713.1  
 Theta hat 3.944  
 Kstar 579.5  
 Theta star 4.854  
 Mean of Log Transformed Data 7.941  
 Standard Deviation of Log Transformed Data 0.0387

**Normal GOF Test Results**

Correlation Coefficient R 0.96  
 Shapiro Wilk Test Statistic 0.922

**APPENDIX D**  
**PROUCL GOODNESS OF FIT**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/4/2019 7:40:53 PM  
From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls  
Full Precision OFF  
Confidence Coefficient 0.95

Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 0.186  
Lilliefors Test Statistic 0.233  
Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R 0.961  
A-D Test Statistic 0.685  
A-D Critical (0.05) Value 0.736  
K-S Test Statistic 0.23  
K-S Critical(0.05) Value 0.214

**Data follow Appr. Gamma Distribution at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R 0.96  
Shapiro Wilk Test Statistic 0.923  
Shapiro Wilk Critical (0.05) Value 0.887  
Approximate Shapiro Wilk P Value 0.191  
Lilliefors Test Statistic 0.226  
Lilliefors Critical (0.05) Value 0.213

**Data appear Approximate\_Lognormal at (0.05) Significance Level**

**APPENDIX E**

**PROUCL PARAMETRIC OUTLIER TESTS**



**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

**Dixon's Outlier Test for Boron (m-54 (background))**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 0.56 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.500

For 10% significance level, 0.56 is an outlier.

For 5% significance level, 0.56 is not an outlier.

For 1% significance level, 0.56 is not an outlier.

**2. Observation Value 0.5 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.000

For 10% significance level, 0.5 is not an outlier.

For 5% significance level, 0.5 is not an outlier.

For 1% significance level, 0.5 is not an outlier.

**Dixon's Outlier Test for Boron (m-59)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 0.53 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.400

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

For 10% significance level, 0.53 is not an outlier.

For 5% significance level, 0.53 is not an outlier.

For 1% significance level, 0.53 is not an outlier.

**2. Observation Value 0.48 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.000

For 10% significance level, 0.48 is not an outlier.

For 5% significance level, 0.48 is not an outlier.

For 1% significance level, 0.48 is not an outlier.

**Dixon's Outlier Test for Boron (m-60)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 0.54 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.250

For 10% significance level, 0.54 is not an outlier.

For 5% significance level, 0.54 is not an outlier.

For 1% significance level, 0.54 is not an outlier.

**2. Observation Value 0.48 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.400

For 10% significance level, 0.48 is not an outlier.

For 5% significance level, 0.48 is not an outlier.

For 1% significance level, 0.48 is not an outlier.

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
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Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

**Dixon's Outlier Test for Boron (m-61)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 0.52 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.333

For 10% significance level, 0.52 is not an outlier.

For 5% significance level, 0.52 is not an outlier.

For 1% significance level, 0.52 is not an outlier.

**2. Observation Value 0.48 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.333

For 10% significance level, 0.48 is not an outlier.

For 5% significance level, 0.48 is not an outlier.

For 1% significance level, 0.48 is not an outlier.

**Dixon's Outlier Test for Calcium (m-54 (background))**

Number of Observations = 15

10% critical value: 0.472

5% critical value: 0.525

1% critical value: 0.616

**1. Observation Value 100 is a Potential Outlier (Upper Tail)?**

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

Test Statistic: 0.000

For 10% significance level, 100 is not an outlier.

For 5% significance level, 100 is not an outlier.

For 1% significance level, 100 is not an outlier.

**2. Observation Value 95 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.400

For 10% significance level, 95 is not an outlier.

For 5% significance level, 95 is not an outlier.

For 1% significance level, 95 is not an outlier.

**Dixon's Outlier Test for Calcium (m-59)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 93 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.375

For 10% significance level, 93 is not an outlier.

For 5% significance level, 93 is not an outlier.

For 1% significance level, 93 is not an outlier.

**2. Observation Value 84 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.167

For 10% significance level, 84 is not an outlier.

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

For 5% significance level, 84 is not an outlier.

For 1% significance level, 84 is not an outlier.

**Dixon's Outlier Test for Calcium (m-60)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 92 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.286

For 10% significance level, 92 is not an outlier.

For 5% significance level, 92 is not an outlier.

For 1% significance level, 92 is not an outlier.

**2. Observation Value 83 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.286

For 10% significance level, 83 is not an outlier.

For 5% significance level, 83 is not an outlier.

For 1% significance level, 83 is not an outlier.

**Dixon's Outlier Test for Calcium (m-61)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595



**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

**1. Observation Value 94 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.333

For 10% significance level, 94 is not an outlier.

For 5% significance level, 94 is not an outlier.

For 1% significance level, 94 is not an outlier.

**2. Observation Value 86 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.333

For 10% significance level, 86 is not an outlier.

For 5% significance level, 86 is not an outlier.

For 1% significance level, 86 is not an outlier.

**Dixon's Outlier Test for Chloride (m-54 (background))**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 1600 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.000

For 10% significance level, 1600 is not an outlier.

For 5% significance level, 1600 is not an outlier.

For 1% significance level, 1600 is not an outlier.

**2. Observation Value 1300 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.667

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

For 10% significance level, 1300 is an outlier.

For 5% significance level, 1300 is an outlier.

For 1% significance level, 1300 is an outlier.

**Dixon's Outlier Test for Chloride (m-59)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 1400 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.000

For 10% significance level, 1400 is not an outlier.

For 5% significance level, 1400 is not an outlier.

For 1% significance level, 1400 is not an outlier.

**2. Observation Value 1200 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.500

For 10% significance level, 1200 is an outlier.

For 5% significance level, 1200 is not an outlier.

For 1% significance level, 1200 is not an outlier.

**Dixon's Outlier Test for Chloride (m-60)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

1% critical value: 0.595

**1. Observation Value 1500 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.500

For 10% significance level, 1500 is an outlier.

For 5% significance level, 1500 is not an outlier.

For 1% significance level, 1500 is not an outlier.

**2. Observation Value 1300 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.000

For 10% significance level, 1300 is not an outlier.

For 5% significance level, 1300 is not an outlier.

For 1% significance level, 1300 is not an outlier.

**Dixon's Outlier Test for Chloride (m-61)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 1700 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.500

For 10% significance level, 1700 is an outlier.

For 5% significance level, 1700 is not an outlier.

For 1% significance level, 1700 is not an outlier.

**2. Observation Value 1100 is a Potential Outlier (Lower Tail)?**

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

Test Statistic: 0.500

For 10% significance level, 1100 is an outlier.

For 5% significance level, 1100 is not an outlier.

For 1% significance level, 1100 is not an outlier.

**Dixon's Outlier Test for Fluoride (m-54 (background))**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 1.4 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.000

For 10% significance level, 1.4 is not an outlier.

For 5% significance level, 1.4 is not an outlier.

For 1% significance level, 1.4 is not an outlier.

**2. Observation Value 1.2 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.500

For 10% significance level, 1.2 is an outlier.

For 5% significance level, 1.2 is not an outlier.

For 1% significance level, 1.2 is not an outlier.

**Dixon's Outlier Test for Fluoride (m-59)**

Number of Observations = 16

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 1.5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.500

For 10% significance level, 1.5 is an outlier.

For 5% significance level, 1.5 is not an outlier.

For 1% significance level, 1.5 is not an outlier.

**2. Observation Value 1.3 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.000

For 10% significance level, 1.3 is not an outlier.

For 5% significance level, 1.3 is not an outlier.

For 1% significance level, 1.3 is not an outlier.

**Dixon's Outlier Test for Fluoride (m-60)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 1.5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.000

For 10% significance level, 1.5 is not an outlier.

For 5% significance level, 1.5 is not an outlier.

For 1% significance level, 1.5 is not an outlier.

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

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Full Precision OFF

**2. Observation Value 1.3 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.500

For 10% significance level, 1.3 is an outlier.

For 5% significance level, 1.3 is not an outlier.

For 1% significance level, 1.3 is not an outlier.

**Dixon's Outlier Test for Fluoride (m-61)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 1.5 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.000

For 10% significance level, 1.5 is not an outlier.

For 5% significance level, 1.5 is not an outlier.

For 1% significance level, 1.5 is not an outlier.

**2. Observation Value 1.3 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.500

For 10% significance level, 1.3 is an outlier.

For 5% significance level, 1.3 is not an outlier.

For 1% significance level, 1.3 is not an outlier.

**Dixon's Outlier Test for pH (m-54 (background))**

**APPENDIX C  
PROUCL DIXON'S OUTLIER TEST  
BAM DETECTION MONITORING  
APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

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Full Precision OFF

Number of Observations = 15

10% critical value: 0.472

5% critical value: 0.525

1% critical value: 0.616

**1. Observation Value 7.8 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.250

For 10% significance level, 7.8 is not an outlier.

For 5% significance level, 7.8 is not an outlier.

For 1% significance level, 7.8 is not an outlier.

**2. Observation Value 7.34 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.167

For 10% significance level, 7.34 is not an outlier.

For 5% significance level, 7.34 is not an outlier.

For 1% significance level, 7.34 is not an outlier.

**Dixon's Outlier Test for pH (m-59)**

Number of Observations = 15

10% critical value: 0.472

5% critical value: 0.525

1% critical value: 0.616

**1. Observation Value 8.1 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.566

For 10% significance level, 8.1 is an outlier.

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

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Full Precision OFF

For 5% significance level, 8.1 is an outlier.

For 1% significance level, 8.1 is not an outlier.

**2. Observation Value 7.5 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.233

For 10% significance level, 7.5 is not an outlier.

For 5% significance level, 7.5 is not an outlier.

For 1% significance level, 7.5 is not an outlier.

**Dixon's Outlier Test for pH (m-60)**

Number of Observations = 15

10% critical value: 0.472

5% critical value: 0.525

1% critical value: 0.616

**1. Observation Value 8 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.455

For 10% significance level, 8 is not an outlier.

For 5% significance level, 8 is not an outlier.

For 1% significance level, 8 is not an outlier.

**2. Observation Value 7.5 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.200

For 10% significance level, 7.5 is not an outlier.

For 5% significance level, 7.5 is not an outlier.

For 1% significance level, 7.5 is not an outlier.



**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

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Full Precision OFF

**Dixon's Outlier Test for pH (m-61)**

Number of Observations = 15

10% critical value: 0.472

5% critical value: 0.525

1% critical value: 0.616

**1. Observation Value 8 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.400

For 10% significance level, 8 is not an outlier.

For 5% significance level, 8 is not an outlier.

For 1% significance level, 8 is not an outlier.

**2. Observation Value 7.22 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.483

For 10% significance level, 7.22 is an outlier.

For 5% significance level, 7.22 is not an outlier.

For 1% significance level, 7.22 is not an outlier.

**Dixon's Outlier Test for Sulfate (m-54 (background))**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 380 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.000

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

For 10% significance level, 380 is not an outlier.

For 5% significance level, 380 is not an outlier.

For 1% significance level, 380 is not an outlier.

**2. Observation Value 350 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.000

For 10% significance level, 350 is not an outlier.

For 5% significance level, 350 is not an outlier.

For 1% significance level, 350 is not an outlier.

**Dixon's Outlier Test for Sulfate (m-59)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 370 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.333

For 10% significance level, 370 is not an outlier.

For 5% significance level, 370 is not an outlier.

For 1% significance level, 370 is not an outlier.

**2. Observation Value 330 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.333

For 10% significance level, 330 is not an outlier.

For 5% significance level, 330 is not an outlier.

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

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Full Precision OFF

For 1% significance level, 330 is not an outlier.

**Dixon's Outlier Test for Sulfate (m-60)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 440 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.889

For 10% significance level, 440 is an outlier.

For 5% significance level, 440 is an outlier.

For 1% significance level, 440 is an outlier.

**2. Observation Value 340 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.500

For 10% significance level, 340 is an outlier.

For 5% significance level, 340 is not an outlier.

For 1% significance level, 340 is not an outlier.

**Dixon's Outlier Test for Sulfate (m-61)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 420 is a Potential Outlier (Upper Tail)?**

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

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Full Precision OFF

Test Statistic: 0.571

For 10% significance level, 420 is an outlier.

For 5% significance level, 420 is an outlier.

For 1% significance level, 420 is not an outlier.

**2. Observation Value 340 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.250

For 10% significance level, 340 is not an outlier.

For 5% significance level, 340 is not an outlier.

For 1% significance level, 340 is not an outlier.

**Dixon's Outlier Test for TDS (m-54 (background))**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 3200 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.000

For 10% significance level, 3200 is not an outlier.

For 5% significance level, 3200 is not an outlier.

For 1% significance level, 3200 is not an outlier.

**2. Observation Value 2900 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.000

**APPENDIX C  
PROUCL DIXON'S OUTLIER TEST  
BAM DETECTION MONITORING  
APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

For 10% significance level, 2900 is not an outlier.

For 5% significance level, 2900 is not an outlier.

For 1% significance level, 2900 is not an outlier.

**Dixon's Outlier Test for TDS (m-59)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 2900 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.500

For 10% significance level, 2900 is an outlier.

For 5% significance level, 2900 is not an outlier.

For 1% significance level, 2900 is not an outlier.

**2. Observation Value 2500 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.667

For 10% significance level, 2500 is an outlier.

For 5% significance level, 2500 is an outlier.

For 1% significance level, 2500 is an outlier.

**Dixon's Outlier Test for TDS (m-60)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

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Full Precision OFF

**1. Observation Value 3000 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.333

For 10% significance level, 3000 is not an outlier.

For 5% significance level, 3000 is not an outlier.

For 1% significance level, 3000 is not an outlier.

**2. Observation Value 2500 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.500

For 10% significance level, 2500 is an outlier.

For 5% significance level, 2500 is not an outlier.

For 1% significance level, 2500 is not an outlier.

**Dixon's Outlier Test for TDS (m-61)**

Number of Observations = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Observation Value 3000 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.333

For 10% significance level, 3000 is not an outlier.

For 5% significance level, 3000 is not an outlier.

For 1% significance level, 3000 is not an outlier.

**2. Observation Value 2600 is a Potential Outlier (Lower Tail)?**

**APPENDIX C**  
**PROUCL DIXON'S OUTLIER TEST**  
**BAM DETECTION MONITORING**  
**APRIL 2019**

**Outlier Tests for Selected Uncensored Variables**

**User Selected Options**

Date/Time of Computation ProUCL 5.14/8/2019 2:24:24 PM

From File Copy of Cholla\_Data\_Export\_20190325NoDups.xls

Full Precision OFF

Test Statistic: 0.333

For 10% significance level, 2600 is not an outlier.

For 5% significance level, 2600 is not an outlier.

For 1% significance level, 2600 is not an outlier.

**APPENDIX H**  
**WOOD TECHNICAL MEMORANDUM DOCUMENTING THE STATISTICAL ANALYSIS**  
**OF APPENDIX III CONSTITUENT DATA COLLECTED FROM THE BAM IN APRIL**  
**2019**





# Technical Memorandum

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**To:** Michele Robertson, RG  
Pamela Norris

**File No:** 14-2018-2040

**From:** Tim Glover

**Reviewed by:** Natalie Chrisman Lazarr, PE  
Louis S. Venne, PhD

**Date:** October 15, 2019

**Subject:** **CCR GROUNDWATER DETECTION MONITORING  
STATISTICAL ANALYSIS AND RESULTS FOR THE BOTTOM ASH MONOFILL  
APPENDIX III CONSTITUENT DATA COLLECTED THROUGH APRIL 2019  
Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

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## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents the ongoing statistical evaluation of detection monitoring (i.e., Appendix III constituent) groundwater data associated with the Bottom Ash Monofill (BAM) located at the Arizona Public Service (APS) Cholla Power Plant (Cholla) in Navajo County, Arizona.

Recent analysis of Appendix III constituent data collected from BAM compliance wells (i.e., M-59, M-60, and M-61) between December 2015 and October 2018 declared statistically significant increases over the Background Threshold Value (BTV) for fluoride at downgradient wells M-60 and M-61 in April 2019 (Wood Environment & Infrastructure Solutions, Inc. [Wood], 2019a). The exceedances at these compliance wells were consistently no more than one tenth of a sample unit (i.e., 0.1 milligrams per liter [mg/L]) above the respective BTV (1.4 mg/L). An Alternative Source Demonstration (ASD) prepared thereafter concluded that the exceedance was attributable to natural spatial variation and recommended that intrawell statistical comparisons for fluoride in monitoring wells M-60 and M-61 be performed in the future (Wood, 2019b).

The statistical evaluation documented herein incorporates the results of detection monitoring at the BAM in April 2019 and the recommendations presented in the ASD. The following sections present data inputs, statistical methods, results and recommendations for the subject analysis.

## 2.0 DATA INPUTS

The BAM groundwater monitoring well network consists of one background monitoring well (M-54) and three compliance (i.e., downgradient), monitoring wells (M-59, M-60 and M-61). The period of evaluation for this BAM Appendix III constituent statistical analysis ranges from December 2015 through April 2019 and includes the minimum of eight initial, or baseline, sampling rounds and four subsequent sampling rounds of detection monitoring. Due principally to the CCR Rule requirement that a minimum of eight initial rounds of data be collected from the site prior to October 17, 2017, the frequency of sample collection prior to this date is short and variable (e.g., biweekly to quarterly sampling).



This data evaluation evaluates 17 samples for boron, calcium, chloride, fluoride, sulfate and total dissolved solids (TDS) within each compliance and background monitoring well and 16 samples for pH within each compliance and background monitoring well. The first, second, third, and fourth rounds of detection monitoring at the BAM were conducted in December 2017, May 2018, October 2018, and April 2019, respectively; all Appendix III constituents were evaluated in collected samples during these monitoring events.

Appendix A contains the contents of the ProUCL data upload tables for the subject analysis. The Appendix III analytes are listed by name or chemical symbol as column headers in the ProUCL data upload table. By ProUCL convention (United States Environmental Protection Agency [USEPA], 2015), each analyte has a corresponding data column (indicated with a "D\_" prefix) that indicates if the analyte was detected or not at a concentration that exceeds the analytical reporting limit, where detectable concentrations are symbolized by a "1" and non-detectable concentrations are symbolized by a "0." The detection frequency is 100% for all sample data listed in Appendix A.

### 3.0 METHODS

The statistical methods and analysis approach used to evaluate collected BAM Appendix III constituent data are documented in the *Statistical Data Analysis Work Plan (SDAWP)* (Wood, 2018) prepared for the site. Using these methods and the referenced USEPA Unified Guidance (2009), new upper prediction limits (UPLs) for fluoride based on intrawell data collected during the baseline sampling rounds (before compliance monitoring began in December 2017) from each well were calculated. The new non-parametric UPLs for fluoride at M-60 and M-61 were both 1.5 mg/L.

Prior to comparing sample concentrations to corresponding BTVs to assess whether an SSI is indicated, exploratory data analysis (EDA) including preparation of box plots, goodness of fit testing, Mann-Kendall trend testing, and outlier testing was performed.

### 4.0 RESULTS

Table 1 summarizes previously calculated BTVs (Wood, 2019a) and the new intrawell UPLs for each Appendix III constituent. Table 1 also identifies the type of resampling strategy in effect by constituent.

Table 2 summarizes: 1) which Appendix III constituents exhibit exceedances above their respective BTVs by compliance well and 2) which constituents exhibit statistically significant temporal trends.

Appendix B contains the raw ProUCL EDA outputs as reference for the following statistical findings:

**Monitoring Well M-59.** As documented in a previous statistical analyses report (Wood, 2019a), there have been past initial exceedances identified for fluoride and pH in monitoring well M-59. Although these initial exceedances were not confirmed with resampling, a new initial exceedance for pH was identified (Table 2). Additionally, the increasing temporal trend in fluoride concentrations that was previously documented continued through April 2019 (Appendix B). The apparent increasing trend in sample concentrations for fluoride is believed to be a statistical artifact because the sample dataset consists of only three distinct values and the five most recent sampling events show no variance in their sample concentrations (all results

are 1.4 mg/L). It is notable that sulfate no longer exhibits a statistically significant ( $p < 0.05$ ) increasing temporal trend based on testing of data collected through April 2019 (Appendix B).

**Monitoring Well M-60.** Previous statistical analyses indicate that there have been initial exceedances for fluoride and pH at well M-60 (Wood, 2019a). The pH exceedances were not confirmed but as discussed earlier in this Tech Memo, fluoride exceedances at M-60 were declared. These exceedances were attributed to natural spatial variation in an ASD (Wood, 2019b) and intrawell comparisons were initiated with the April 2019 sample data. No exceedances of applicable BTVs or the fluoride intrawell UPL were noted in April 2019 sample data.

**Monitoring Well M-61.** Previous statistical analyses indicate that there have been initial exceedances for fluoride, pH, and sulfate at well M-60 (Wood, 2019a). The pH and sulfate exceedances were not confirmed but as discussed earlier in this Tech Memo, fluoride exceedances at M-61 were declared. These exceedances were attributed to natural spatial variation in an ASD (Wood, 2019b) and intrawell comparisons were initiated with the April 2019 sample data. No exceedances of applicable BTVs or the fluoride intrawell UPL were noted in April 2019 sample data. Sulfate no longer exhibits a statistically significant ( $p < 0.05$ ) increasing temporal trend based on testing of data collected through April 2019 (Appendix B).

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

This statistical analysis results in the following conclusions and recommendations for the BAM detection monitoring statistical analysis:

- There is sufficient evidence to declare an initial exceedance for pH at M-59. The exceedance is 0.1 SU above the BTV. Analysis of this exceedance using the 1 of 2 resampling strategy in place for pH during the next scheduled Detection Monitoring event in November 2018 is recommended.
- Detection Monitoring should continue at the BAM.
- Trend testing after each sampling round should continue to assess changes in temporal trend significance.
- Statistical method selection and background threshold values should be updated after 1-2 years of future sampling events.

## 6.0 REFERENCES

United States Environmental Protection Agency (U.S. EPA), 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance*. EPA 530/R-09-007. Environmental Protection Agency Office of Resource Conservation and Recovery.

U.S. EPA, 2015. *ProUCL (Version 5.1.1) User Guide, Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*. EPA/600/R-07/041. Washington D.C. October 2015.

Wood Environment & Infrastructure Solutions, Inc. (Wood), 2018. *Statistical Data Analysis Work Plan*. Coal Combustion Residual Rule Groundwater Monitoring System Compliance. Cholla Power Plant. Navajo County, Arizona. Prepared for Arizona Public Service. October 15, 2018.

Wood, 2019a. *CCR Groundwater Detection Monitoring Statistical Analysis and Results for the Bottom Ash Monofill*. Arizona Public Service Cholla Power Plant. Navajo County, Arizona. April 15, 2019.

Wood, 2019b. *Alternative Source Demonstration for Fluoride at the BAM*. Arizona Public Service Cholla Power Plant. Navajo County, Arizona. August 14, 2019.

## ATTACHMENTS

Table 1 – BTVs and Intrawell UPLs for the Cholla BAM

Table 2 – Cholla BAM Downgradient Sample Data Summary

Appendix A – ProUCL Data Upload Table

Appendix B – ProUCL EDA Output Files

**TABLES**



**Table 1**  
**BTVs and Intrawell UPLs for the Cholla BAM**  
**Appendix III Statistical Analysis**

Background Well	Dates Corresponding to Data Used to Derive UPL	Constituent	BTV (Calculation Method)	Units	Resampling Strategy <sup>1</sup>	Reference
M-54	12/3/2015-9/5/2017	Boron	0.55 (P-UPL)	mg/L	1 of 2	Wood, 2019a
M-54	12/3/2015-9/5/2017	Calcium	100 (NP-UPL)	mg/L	1 of 3	Wood, 2019a
M-54	12/3/2015-9/5/2017	Chloride	1,600 (NP-UPL)	mg/L	1 of 3	Wood, 2019a
M-54	12/3/2015-9/5/2017	Fluoride	1.4 (NP-UPL) <sup>2</sup>	mg/L	1 of 3	Wood, 2019a
M-54	12/3/2015-9/5/2017	pH (upper limit)	7.8 (P-UPL)	SU	1 of 2	Wood, 2019a
M-54	12/3/2015-9/5/2017	pH (lower limit)	7.3 (P-LPL)	SU	1 of 2	Wood, 2019a
M-54	12/3/2015-9/5/2017	Sulfate	380 (P-UPL)	mg/L	1 of 2	Wood, 2019a
M-54	12/3/2015-9/5/2017	TDS	3200 (P-UPL)	mg/L	1 of 2	Wood, 2019a

Compliance Well	Dates Corresponding to Data Used to Derive UPL	Constituent	Intrawell UPL (Calculation Method <sup>1</sup> )	Units	Resampling Strategy <sup>2</sup>	Reference
M-60	12/3/15-9/5/2017	Fluoride	1.5 (NP-UPL)	mg/L	1 of 3	<i>New UPL</i>
M-61	12/3/15-9/5/2017	Fluoride	1.5 (NP-UPL)	mg/L	1 of 3	<i>New UPL</i>

**Notes:**

BAM = Bottom Ash Pond  
 BTV = background threshold value  
 LPL = lower prediction limit

mg/L = milligrams per liter  
 NP = Non Parametric  
 P = Parametric

SU = standard units  
 TDS = total dissolved solids  
 UPL = upper prediction limit

<sup>1</sup> A 1 of 2 resampling strategy is in place for parametric prediction limits. A 1 of 3 resampling strategy is in place for non-parametric prediction limits and the limit represents the maximum concentration value of the data set (i.e., maximum order statistic). The BTV for calcium represents the second highest concentration value because the maximum concentration value is a perceived outlier and was removed from the evaluation.

<sup>2</sup> Only applicable to M-59.

**Table 2**  
**Cholla BAM Downgradient Sample Data Summary**  
**Appendix III Statistical Analysis**

Well	Sample_ID	SampDate	Constituent Concentration						
			Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
M-59	7803_O	03-Dec-15	0.5	87	1300	1.3	7.53	340	2700
M-59	CH-M-59-0316_O	10-Mar-16	0.48	85	1400	1.3	7.57	350	2700
M-59	CH-CCR-M59-516_O	20-May-16	0.49	86	1400	1.4	---	340	2700
M-59	CH-CCR-M59-816_O	27-Aug-16	0.50	89	1400	1.4	7.6	350	2700
M-59	CH-CCR-M59-916_O	22-Sep-16	0.50	88	1300	1.4	7.8	340	2900
M-59	CH-CCR-M59-217_O	22-Feb-17	0.48	86	1200	1.3	7.8	330	2800
M-59	CH-CCR-M59-41117_O	11-Apr-17	0.49	90	1400	1.3	8.1	350	2800
M-59	CH-CCR-M59-42417_O	24-Apr-17	0.52	89	1300	1.4	7.7	350	2800
M-59	CH-CCR-M59-51917_O	19-May-17	0.50	93	1400	1.4	7.8	360	2700
M-59	CH-CCR-M59-52517_O	25-May-17	0.50	88	1300	1.4	7.6	350	2700
M-59	CH-CCR-M59-62917_O	29-Jun-17	0.49	84	1400	1.5	7.8	370	2500
M-59	CH-CCR-M59-72917_O	29-Jul-17	0.53	92	1300	1.5	7.6	340	2800
M-59	CH-CCR-M59-90517_O	05-Sep-17	0.51	90	1300	1.4	7.7	360	2700
M-59	CH-CCR-M59-120717_O	07-Dec-17	0.49	86	1400	1.4	7.7	350	2700
M-59	CH-CCR-M-59-52518_O	25-May-18	0.49	85	1400	1.4	7.5	350	2700
M-59	CH-CCR-M-59-102618	26-Oct-18	0.48	88	1400	1.4	7.6	360	2500
M-59	CH-CCR-M59-40919	09-Apr-19	0.5	86	1200	1.4	7.9	330	2700
		<i>Units:</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>SU</i>	<i>mg/L</i>	<i>mg/L</i>
		<i>BTV or Intrawell UPL<sup>1,2</sup>:</i>	<i>0.55</i>	<i>100</i>	<i>1600</i>	<i>1.4</i>	<i>7.8/7.3</i>	<i>380</i>	<i>3200</i>
		<i>Temporal Trend<sup>3</sup>:</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>Increasing</i>	<i>None</i>	<i>None</i>	<i>None</i>

**Table 2**  
**Cholla BAM Downgradient Sample Data Summary**  
**Appendix III Statistical Analysis**

Well	Sample_ID	SampDate	Constituent Concentration						
			Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
M-60	7801_O	03-Dec-15	0.54	88	1400	1.3	7.56	350	2800
M-60	CH-M-60A-0316_O	09-Mar-16	0.50	86	1400	1.4	7.83	350	2800
M-60	CH-CCR-M60-516_O	20-May-16	0.50	89	1400	1.5	---	350	2800
M-60	CH-CCR-M60-816_O	27-Aug-16	0.52	90	1400	1.5	7.5	360	2800
M-60	CH-CCR-M60-916_O	22-Sep-16	0.51	88	1300	1.4	7.8	350	3000
M-60	CH-CCR-M60-217_O	22-Feb-17	0.52	91	1300	1.4	7.8	340	2800
M-60	CH-CCR-M60-41117_O	11-Apr-17	0.48	90	1400	1.4	8.0	360	2900
M-60	CH-CCR-M60-42417_O	24-Apr-17	0.53	86	1400	1.4	7.8	350	2700
M-60	CH-CCR-M60-51917_O	19-May-17	0.53	92	1400	1.4	7.7	360	2800
M-60	CH-CCR-M60-52517_O	25-May-17	0.51	86	1300	1.4	7.7	350	2800
M-60	CH-CCR-M60-62917_O	29-Jun-17	0.51	84	1500	1.5	7.7	440	2500
M-60	CH-CCR-M60-72917_O	29-Jul-17	0.53	89	1400	1.5	7.6	370	2800
M-60	CH-CCR-M60-90517_O	05-Sep-17	0.53	90	1400	1.5	7.6	360	2800
M-60	CH-CCR-M60-120717_O	07-Dec-17	0.50	85	1500	1.4	7.6	360	2900
M-60	CH-CCR-M-60-52518_O	25-May-18	0.50	83	1400	1.5	7.5	350	2800
M-60	CH-CCR-M-60-102618	26-Oct-18	0.49	88	1400	1.4	7.7	350	2600
M-60	CH-CCR-M60-40919	09-Apr-19	0.51	84	1300	1.4	7.7	350	2800
		<i>Units:</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>mg/L</i>	<i>SU</i>	<i>mg/L</i>	<i>mg/L</i>
		<i>BTV or Intrawell UPL<sup>1,2</sup>:</i>	<i>0.55</i>	<i>100</i>	<i>1600</i>	<i>1.5</i>	<i>7.8/7.3</i>	<i>380</i>	<i>3200</i>
		<i>Temporal Trend<sup>3</sup>:</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>	<i>None</i>



**Table 2**  
**Cholla BAM Downgradient Sample Data Summary**  
**Appendix III Statistical Analysis**

Well	Sample_ID	SampDate	Constituent Concentration						
			Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
M-61	7802_O	03-Dec-15	0.51	90	1400	1.3	7.22	350	2800
M-61	CH-M-61-0316_O	10-Mar-16	0.49	90	1400	1.4	7.59	340	2800
M-61	CH-CCR-M61-516_O	20-May-16	0.49	89	1400	1.4	---	350	2800
M-61	CH-CCR-M61-816_O	27-Aug-16	0.50	90	1400	1.5	7.5	360	2900
M-61	CH-CCR-M61-916_O	22-Sep-16	0.50	90	1300	1.4	7.9	350	3000
M-61	CH-CCR-M61-217_O	22-Feb-17	0.50	92	1100	1.4	7.8	340	2700
M-61	CH-CCR-M61-41117_O	11-Apr-17	0.50	93	1700	1.4	8.0	420	3000
M-61	CH-CCR-M61-42417_O	24-Apr-17	0.52	88	1400	1.4	7.7	360	2700
M-61	CH-CCR-M61-51917_O	19-May-17	0.5	92	1400	1.3	7.8	370	2800
M-61	CH-CCR-M61-52517_O	25-May-17	0.51	92	1400	1.4	7.7	370	2800
M-61	CH-CCR-M61-62917_O	29-Jun-17	0.50	86	1500	1.5	7.8	380	2700
M-61	CH-CCR-M61-72917_O	29-Jul-17	0.52	94	1300	1.5	7.6	360	2900
M-61	CH-CCR-M61-90517_O	05-Sep-17	0.50	91	1400	1.5	7.6	360	2800
M-61	CH-CCR-M61-120717_O	07-Dec-17	0.49	88	1500	1.4	7.6	360	2900
M-61	CH-CCR-M-61-52518_O	25-May-18	0.48	87	1400	1.5	7.5	390	2800
M-61	CH-CCR-M-61-102618	26-Oct-18	0.48	91	1400	1.4	7.5	360	2600
M-61	CH-CCR-M61-40919	09-Apr-19	0.5	88	1300	1.4	7.7	340	2800
		Units:	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
		BTV or Intrawell UPL <sup>1,2</sup> :	0.55	100	1600	1.5	7.8/7.3	380	3200
		Temporal Trend <sup>3</sup> :	None	None	None	None	None	None	None

**Table 2**  
**Cholla BAM Downgradient Sample Data Summary**  
**Appendix III Statistical Analysis**

Well	Sample_ID	SampDate	Constituent Concentration					
			Boron	Calcium	Chloride	Fluoride	pH	Sulfate

**Notes:**

BTV = background threshold value  
 mg/L = milligrams per liter  
 TDS = total dissolved solids  
 UPL = upper prediction limit  
 SU = standard units

0.50	Value from baseline monitoring period (December 2015 to September 2017)
	Reported value in current sampling round (April 2019) exceeds the BTV or UPL
	Statistically significant increasing trend present
None	Insufficient evidence to identify a trend.

<sup>1</sup> New values calculated for this sampling round presented in bolded red text; <sup>5</sup> see Table 1 for relevant BTV and Intrawell UPL information

<sup>2</sup> For pH, values presented refer to the Upper Prediction Limit/Lower Prediction Limit, respectively

<sup>3</sup> Temporal trends evaluated with Mann-Kendall trend tests ( $p < 0.05$ ); tied values (sequential sample concentrations)

**APPENDIX A**

**PROUCL DATA UPLOAD TABLE**



**Appendix A - PROUCL DATA UPLOAD TABLE**

QC_SampleID	SampDate	NumDate	Boron	D_Boron	Calcium	D_Calcium	Chloride	D_Chloride	Fluoride	D_Fluoride	pH	D_pH	Sulfate	D_Sulfate	DissolvedSolids	D_DissolvedSolids
7799	12/3/2015	42341.00	0.52	1	100	1	1500	1	1.2	1	7.34	1	380	1	3000	1
CH-M-54-0316	3/10/2016	42439.00	0.53	1	100	1	1600	1	1.3	1	7.56	1	360	1	2900	1
CH-CCR-M54-516	5/20/2016	42510.00	0.51	1	100	1	1500	1	1.4	1	--	--	350	1	3000	1
CH-CCR-M54-816	8/27/2016	42609.00	0.53	1	110	1	1600	1	1.4	1	7.5	1	370	1	3100	1
CH-CCR-M54-916	9/22/2016	42635.00	0.52	1	99	1	1400	1	1.3	1	7.7	1	350	1	3200	1
CH-CCR-M54-217	2/21/2017	42787.00	0.52	1	100	1	1300	1	1.3	1	7.7	1	350	1	2900	1
CH-CCR-M54-41117	4/11/2017	42836.00	0.51	1	100	1	1500	1	1.3	1	7.7	1	360	1	3100	1
CH-CCR-M54-42417	4/24/2017	42849.00	0.53	1	95	1	1500	1	1.3	1	7.6	1	370	1	3000	1
CH-CCR-M54-51917	5/19/2017	42874.00	0.5	1	99	1	1600	1	1.3	1	7.8	1	380	1	3200	1
CH-CCR-M54-52517	5/25/2017	42880.00	0.52	1	100	1	1500	1	1.4	1	7.7	1	370	1	3200	1
CH-CCR-M54-62917	6/29/2017	42915.00	0.51	1	97	1	1600	1	1.4	1	7.6	1	380	1	2900	1
CH-CCR-M54-72917	7/29/2017	42945.00	0.56	1	100	1	1500	1	1.4	1	7.4	1	350	1	3100	1
CH-CCR-M54-90517	9/5/2017	42983.00	0.55	1	100	1	1500	1	1.4	1	7.5	1	370	1	3100	1
CH-CCR-M54-120717	12/7/2017	43076.00	0.51	1	97	1	1600	1	1.4	1	7.6	1	360	1	3000	1
CH-CCR-M-54-52518	5/25/2018	43245.00	0.5	1	96	1	1500	1	1.4	1	7.4	1	350	1	3000	1
CH-CCR-M-54-102618	10/26/2018	43399.62	0.5	1	100	1	1500	1	1.4	1	7.5	1	360	1	2900	1
CH-CCR-M54-40919	4/9/2019	43564.00	0.53	1	98	1	1400	1	1.3	1	7.7	1	340	1	3100	1
7803	12/3/2015	42341.00	0.5	1	87	1	1300	1	1.3	1	7.53	1	340	1	2700	1
CH-M-59-0316	3/10/2016	42439.00	0.48	1	85	1	1400	1	1.3	1	7.57	1	350	1	2700	1
CH-CCR-M59-516	5/20/2016	42510.00	0.49	1	86	1	1400	1	1.4	1	--	--	340	1	2700	1
CH-CCR-M59-816	8/27/2016	42609.00	0.5	1	89	1	1400	1	1.4	1	7.6	1	350	1	2700	1
CH-CCR-M59-916	9/22/2016	42635.00	0.5	1	88	1	1300	1	1.4	1	7.8	1	340	1	2900	1
CH-CCR-M59-217	2/22/2017	42788.00	0.48	1	86	1	1200	1	1.3	1	7.8	1	330	1	2800	1
CH-CCR-M59-41117	4/11/2017	42836.00	0.49	1	90	1	1400	1	1.3	1	8.1	1	350	1	2800	1
CH-CCR-M59-42417	4/24/2017	42849.00	0.52	1	89	1	1300	1	1.4	1	7.7	1	350	1	2800	1
CH-CCR-M59-51917	5/19/2017	42874.00	0.5	1	93	1	1400	1	1.4	1	7.8	1	360	1	2700	1
CH-CCR-M59-52517	5/25/2017	42880.00	0.5	1	88	1	1300	1	1.4	1	7.6	1	350	1	2700	1
CH-CCR-M59-62917	6/29/2017	42915.00	0.49	1	84	1	1400	1	1.5	1	7.8	1	370	1	2500	1
CH-CCR-M59-72917	7/29/2017	42945.00	0.53	1	92	1	1300	1	1.5	1	7.6	1	340	1	2800	1
CH-CCR-M59-90517	9/5/2017	42983.00	0.51	1	90	1	1300	1	1.4	1	7.7	1	360	1	2700	1
CH-CCR-M59-120717	12/7/2017	43076.00	0.49	1	86	1	1400	1	1.4	1	7.7	1	350	1	2700	1
CH-CCR-M-59-52518	5/25/2018	43245.00	0.49	1	85	1	1400	1	1.4	1	7.5	1	350	1	2700	1
CH-CCR-M-59-102618	10/26/2018	43399.53	0.48	1	88	1	1400	1	1.4	1	7.6	1	360	1	2500	1
CH-CCR-M59-40919	4/9/2019	43564.00	0.5	1	86	1	1200	1	1.4	1	7.9	1	330	1	2700	1
7801	12/3/2015	42341.00	0.54	1	88	1	1400	1	1.3	1	7.56	1	350	1	2800	1
CH-M-60A-0316	3/9/2016	42438.00	0.5	1	86	1	1400	1	1.4	1	7.83	1	350	1	2800	1
CH-CCR-M60-516	5/20/2016	42510.00	0.5	1	89	1	1400	1	1.5	1	--	--	350	1	2800	1
CH-CCR-M60-816	8/27/2016	42609.00	0.52	1	90	1	1400	1	1.5	1	7.5	1	360	1	2800	1
CH-CCR-M60-916	9/22/2016	42635.00	0.51	1	88	1	1300	1	1.4	1	7.8	1	350	1	3000	1
CH-CCR-M60-217	2/22/2017	42788.00	0.52	1	91	1	1300	1	1.4	1	7.8	1	340	1	2800	1
CH-CCR-M60-41117	4/11/2017	42836.00	0.48	1	90	1	1400	1	1.4	1	8	1	360	1	2900	1
CH-CCR-M60-42417	4/24/2017	42849.00	0.53	1	86	1	1400	1	1.4	1	7.8	1	350	1	2700	1
CH-CCR-M60-51917	5/19/2017	42874.00	0.53	1	92	1	1400	1	1.4	1	7.7	1	360	1	2800	1

**Appendix A - PROUCL DATA UPLOAD TABLE**

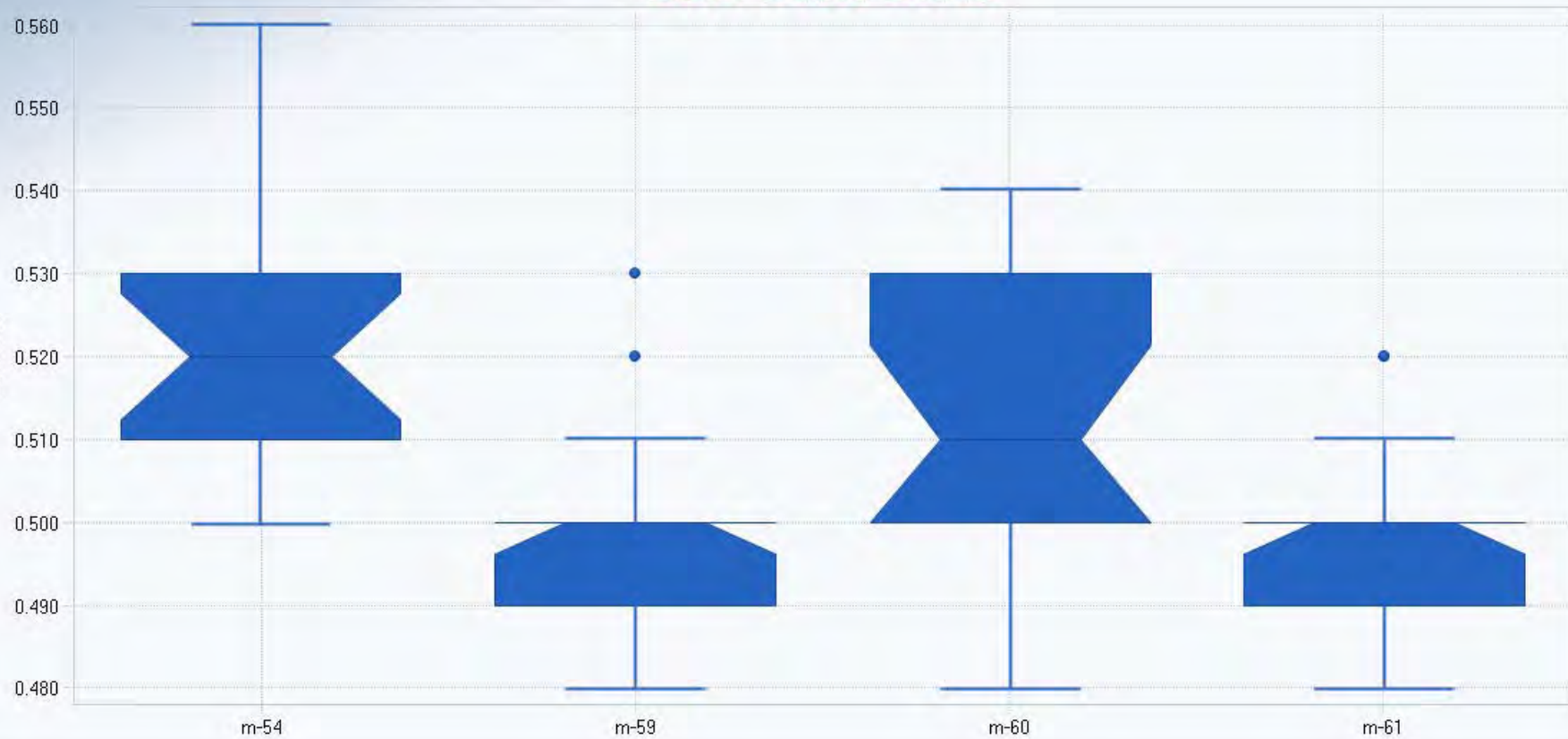
QC_SampleID	SampDate	NumDate	Boron	D_Boron	Calcium	D_Calcium	Chloride	D_Chloride	Fluoride	D_Fluoride	pH	D_pH	Sulfate	D_Sulfate	DissolvedSolids	D_DissolvedSolids
CH-CCR-M60-52517	5/25/2017	42880.00	0.51	1	86	1	1300	1	1.4	1	7.7	1	350	1	2800	1
CH-CCR-M60-62917	6/29/2017	42915.00	0.51	1	84	1	1500	1	1.5	1	7.7	1	440	1	2500	1
CH-CCR-M60-72917	7/29/2017	42945.00	0.53	1	89	1	1400	1	1.5	1	7.6	1	370	1	2800	1
CH-CCR-M60-90517	9/5/2017	42983.00	0.53	1	90	1	1400	1	1.5	1	7.6	1	360	1	2800	1
CH-CCR-M60-120717	12/7/2017	43076.00	0.5	1	85	1	1500	1	1.4	1	7.6	1	360	1	2900	1
CH-CCR-M-60-52518	5/25/2018	43245.00	0.5	1	83	1	1400	1	1.5	1	7.5	1	350	1	2800	1
CH-CCR-M-60-102618	10/26/2018	43399.57	0.49	1	88	1	1400	1	1.4	1	7.7	1	350	1	2600	1
CH-CCR-M60-40919	4/9/2019	43564.00	0.51	1	84	1	1300	1	1.4	1	7.7	1	350	1	2800	1
7802	12/3/2015	42341.00	0.51	1	90	1	1400	1	1.3	1	7.22	1	350	1	2800	1
CH-M-61-0316	3/10/2016	42439.00	0.49	1	90	1	1400	1	1.4	1	7.59	1	340	1	2800	1
CH-CCR-M61-516	5/20/2016	42510.00	0.49	1	89	1	1400	1	1.4	1	--	--	350	1	2800	1
CH-CCR-M61-816	8/27/2016	42609.00	0.5	1	90	1	1400	1	1.5	1	7.5	1	360	1	2900	1
CH-CCR-M61-916	9/22/2016	42635.00	0.5	1	90	1	1300	1	1.4	1	7.9	1	350	1	3000	1
CH-CCR-M61-217	2/22/2017	42788.00	0.5	1	92	1	1100	1	1.4	1	7.8	1	340	1	2700	1
CH-CCR-M61-41117	4/11/2017	42836.00	0.5	1	93	1	1700	1	1.4	1	8	1	420	1	3000	1
CH-CCR-M61-42417	4/24/2017	42849.00	0.52	1	88	1	1400	1	1.4	1	7.7	1	360	1	2700	1
CH-CCR-M61-51917	5/19/2017	42874.00	0.5	1	92	1	1400	1	1.3	1	7.8	1	370	1	2800	1
CH-CCR-M61-52517	5/25/2017	42880.00	0.51	1	92	1	1400	1	1.4	1	7.7	1	370	1	2800	1
CH-CCR-M61-62917	6/29/2017	42915.00	0.5	1	86	1	1500	1	1.5	1	7.8	1	380	1	2700	1
CH-CCR-M61-72917	7/29/2017	42945.00	0.52	1	94	1	1300	1	1.5	1	7.6	1	360	1	2900	1
CH-CCR-M61-90517	9/5/2017	42983.00	0.5	1	91	1	1400	1	1.5	1	7.6	1	360	1	2800	1
CH-CCR-M61-120717	12/7/2017	43076.00	0.49	1	88	1	1500	1	1.4	1	7.6	1	360	1	2900	1
CH-CCR-M-61-52518	5/25/2018	43245.00	0.48	1	87	1	1400	1	1.5	1	7.5	1	390	1	2800	1
CH-CCR-M-61-102618	10/26/2018	43399.55	0.48	1	91	1	1400	1	1.4	1	7.5	1	360	1	2600	1
CH-CCR-M61-40919	4/9/2019	43564.00	0.5	1	88	1	1300	1	1.4	1	7.7	1	340	1	2800	1

**APPENDIX B**

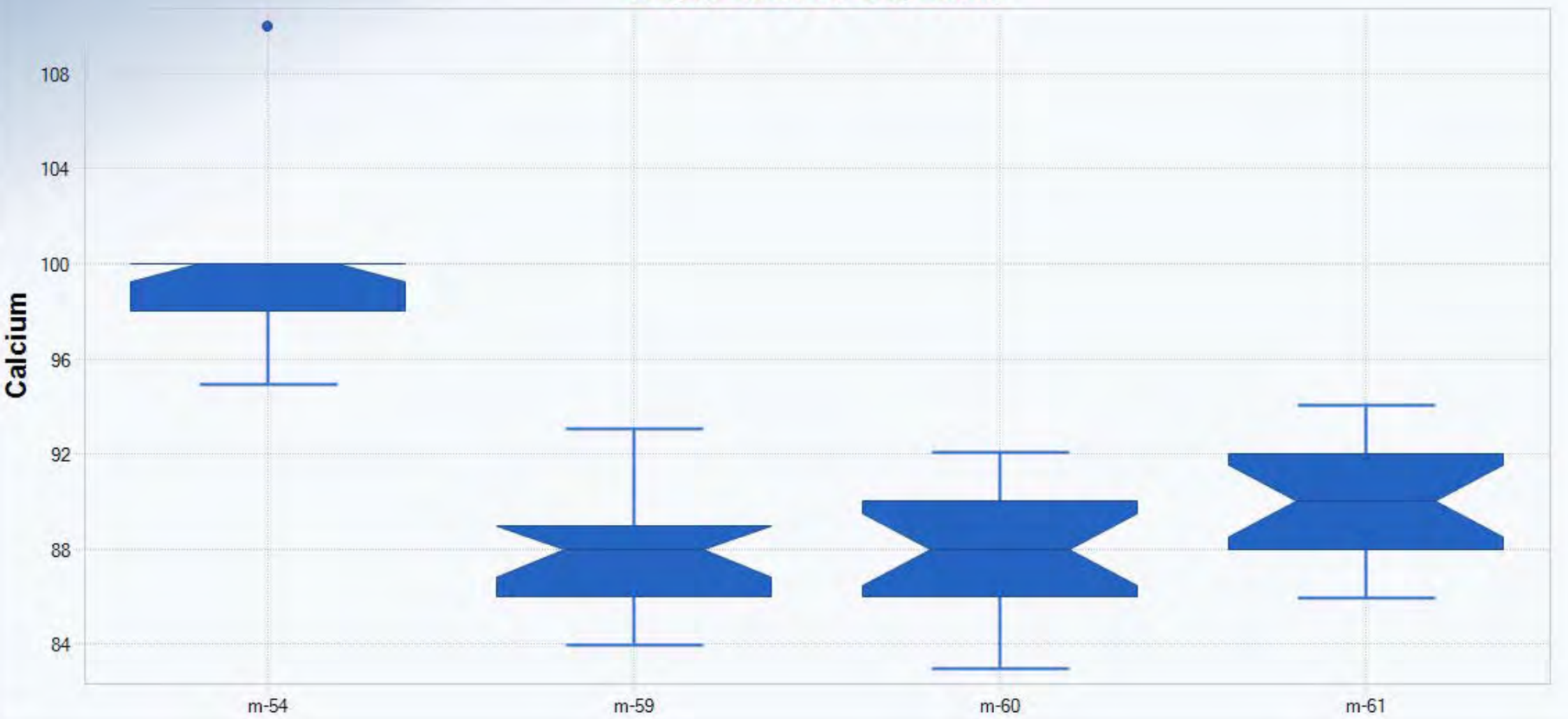
**PROUCL EDA OUTPUT FILES**



## Box Plot for Boron

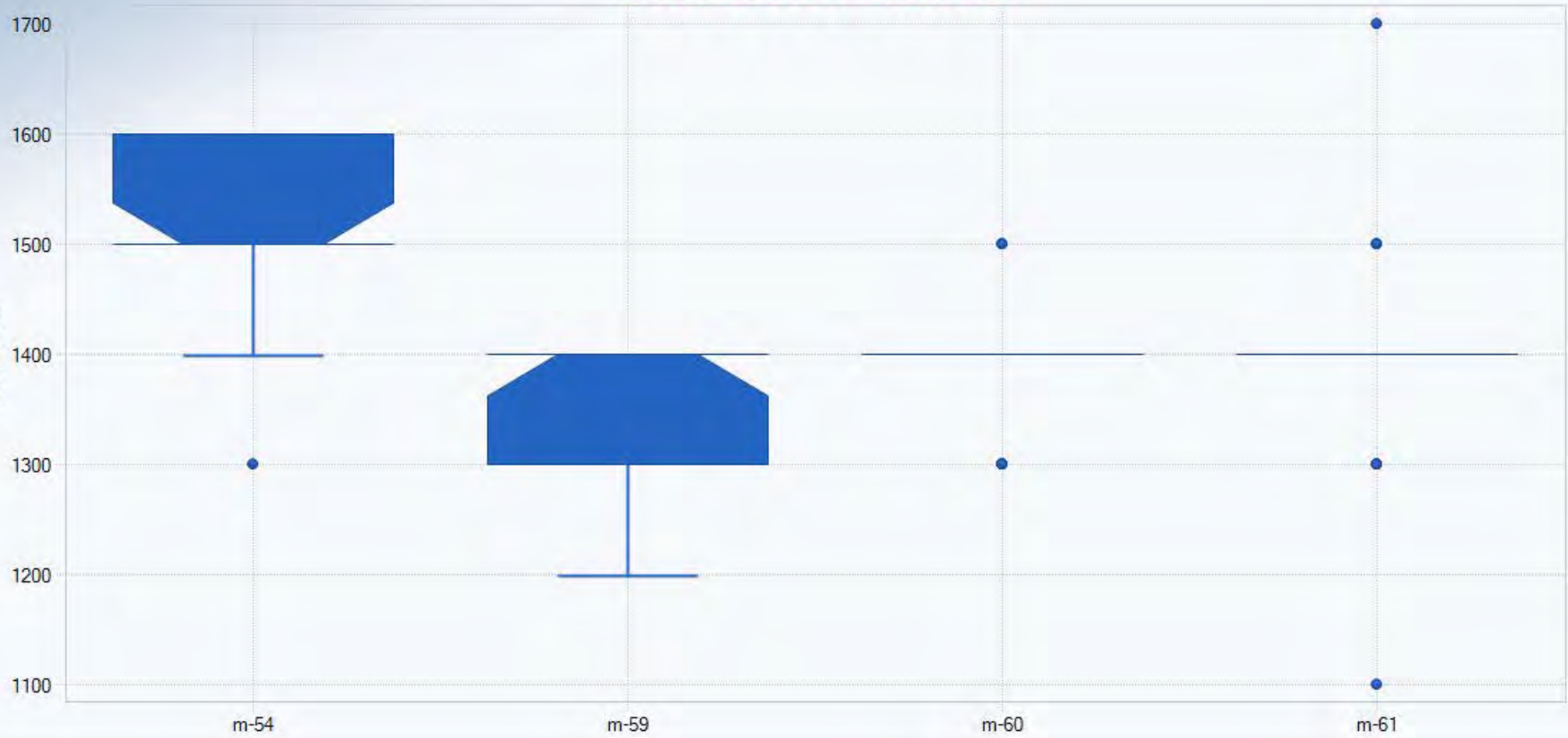


# Box Plot for Calcium

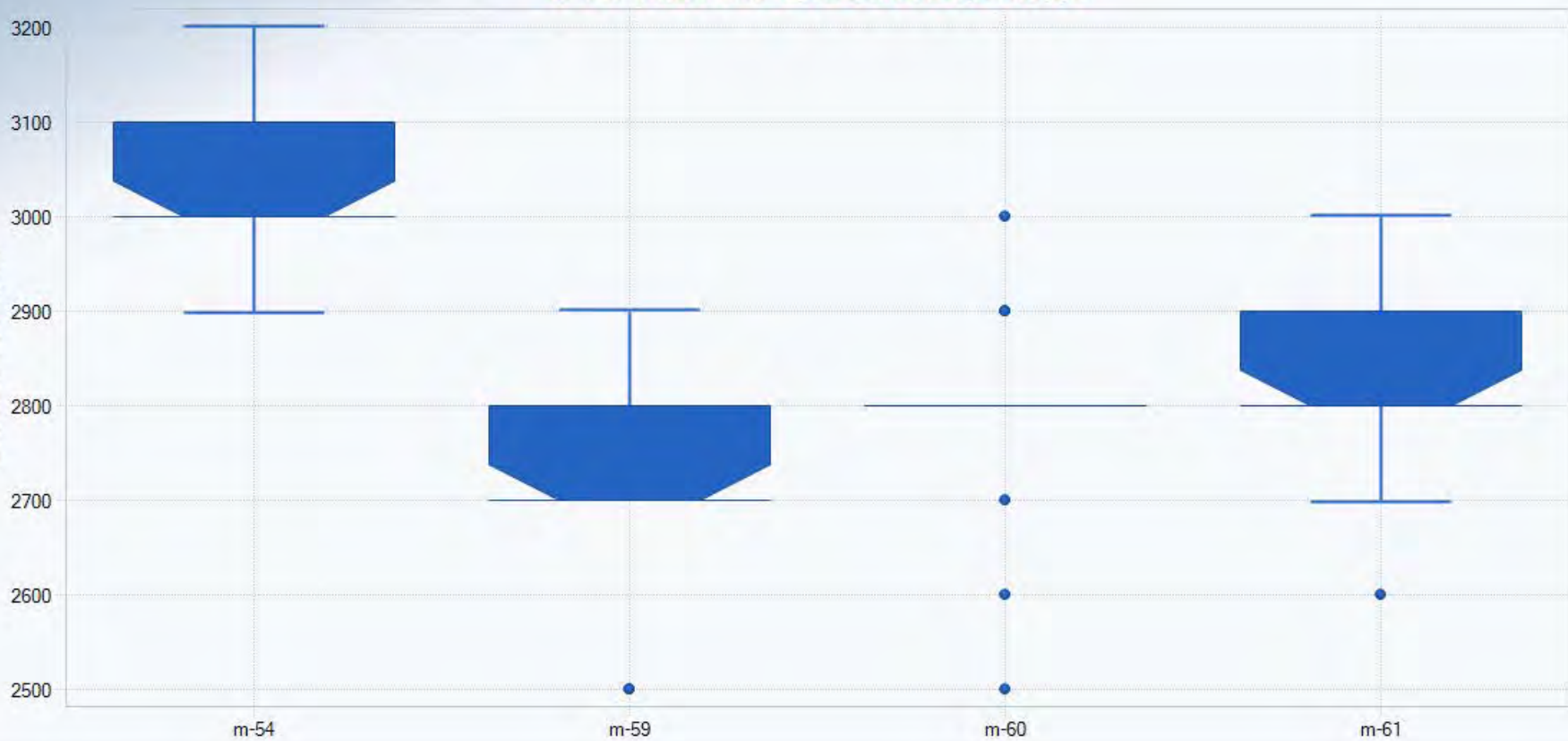




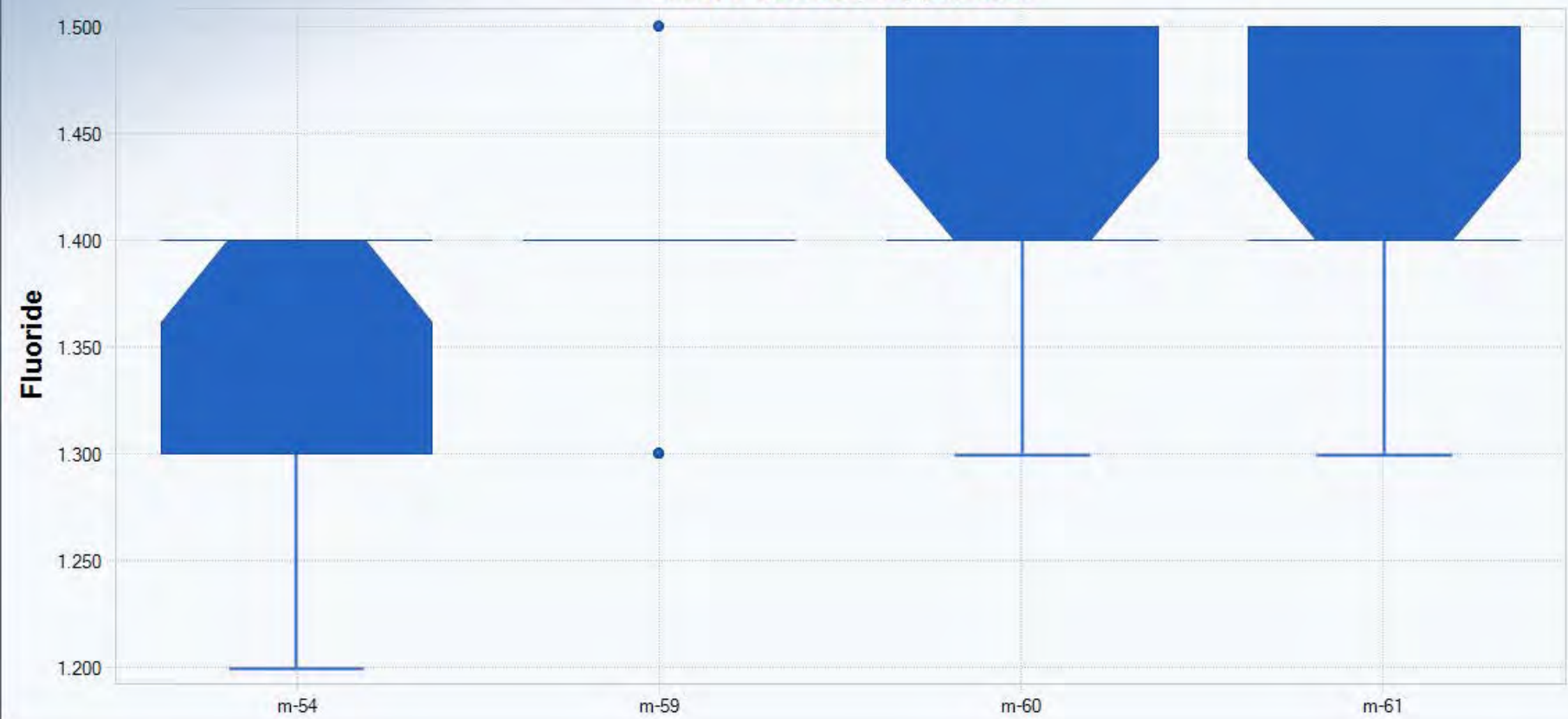
# Box Plot for Chloride



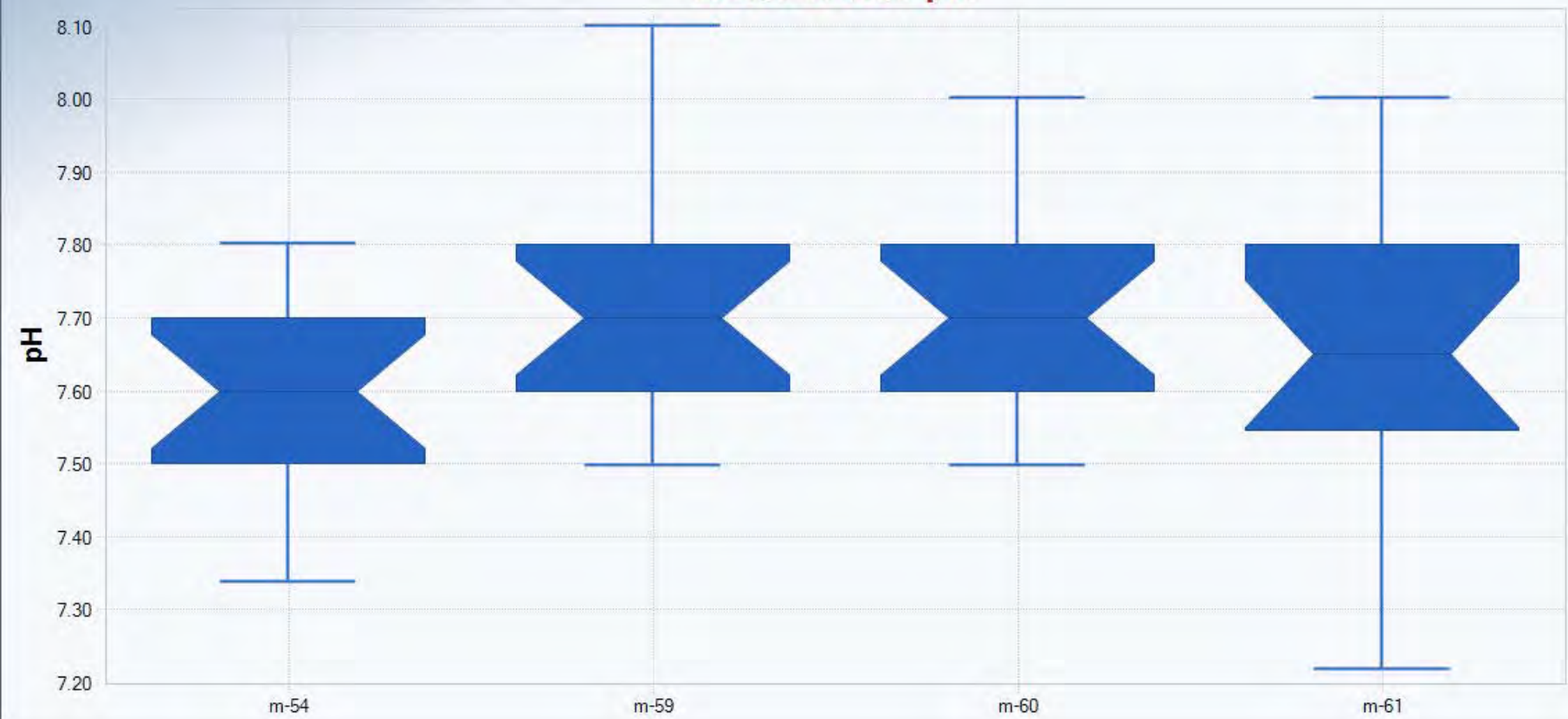
# Box Plot for DissolvedSolids



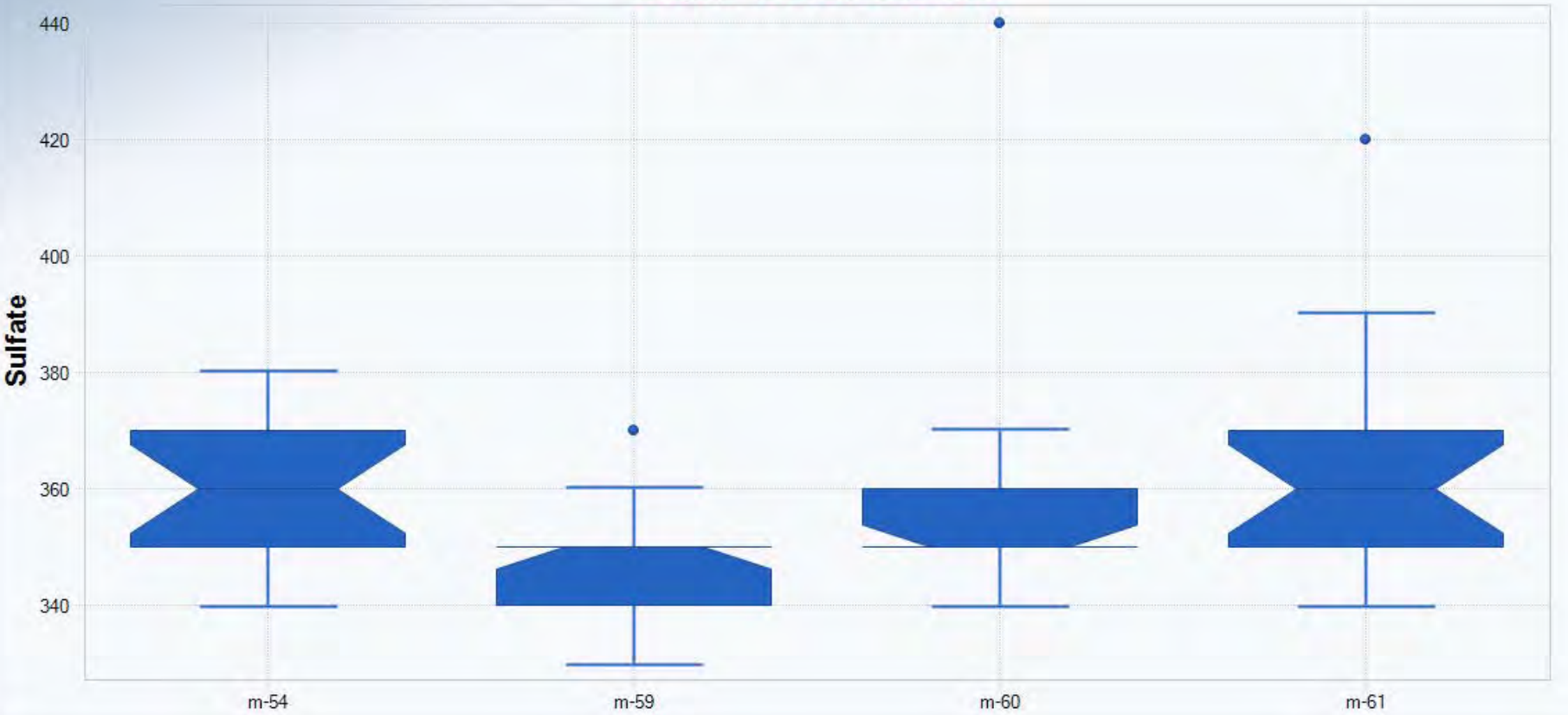
## Box Plot for Fluoride



## Box Plot for pH



# Box Plot for Sulfate



A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Goodness-of-Fit Test Statistics for Uncensored Full Data Sets without Non-Detects</b>										
2	<b>User Selected Options</b>										
3	Date/Time of Computation	ProUCL 5.110/2/2019 1:00:13 PM									
4	From File	Cholla_BAM_AppIIIdatathruApr2019.xls									
5	Full Precision	OFF									
6	Confidence Coefficient	0.95									
7											
8											
9	<b>Boron (m-54)</b>										
10											
11	<b>Raw Statistics</b>										
12	Number of Valid Observations	17									
13	Number of Distinct Observations	6									
14	Minimum	0.5									
15	Maximum	0.56									
16	Mean of Raw Data	0.521									
17	Standard Deviation of Raw Data	0.0168									
18	Khat	1041									
19	Theta hat	4.9994E-4									
20	Kstar	857.6									
21	Theta star	6.0704E-4									
22	Mean of Log Transformed Data	-0.653									
23	Standard Deviation of Log Transformed Data	0.0318									
24											
25	<b>Normal GOF Test Results</b>										
26											
27	Correlation Coefficient R	0.952									
28	Shapiro Wilk Test Statistic	0.905									
29	Shapiro Wilk Critical (0.05) Value	0.892									
30	Approximate Shapiro Wilk P Value	0.0848									
31	Lilliefors Test Statistic	0.17									
32	Lilliefors Critical (0.05) Value	0.207									
33	<b>Data appear Normal at (0.05) Significance Level</b>										
34											
35	<b>Gamma GOF Test Results</b>										
36											
37	Correlation Coefficient R	0.955									
38	A-D Test Statistic	0.58									
39	A-D Critical (0.05) Value	0.736									
40	K-S Test Statistic	0.16									
41	K-S Critical(0.05) Value	0.208									
42	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
43											
44	<b>Lognormal GOF Test Results</b>										
45											
46	Correlation Coefficient R	0.956									
47	Shapiro Wilk Test Statistic	0.911									
48	Shapiro Wilk Critical (0.05) Value	0.892									
49	Approximate Shapiro Wilk P Value	0.109									
50	Lilliefors Test Statistic	0.164									
51	Lilliefors Critical (0.05) Value	0.207									
52	<b>Data appear Lognormal at (0.05) Significance Level</b>										
53											
54	<b>Boron (m-59)</b>										
55											
56	<b>Raw Statistics</b>										
57	Number of Valid Observations	17									
58	Number of Distinct Observations	6									
59	Minimum	0.48									
60	Maximum	0.53									
61	Mean of Raw Data	0.497									
62	Standard Deviation of Raw Data	0.0136									
63	Khat	1443									
64	Theta hat	3.4451E-4									
65	Kstar	1188									
66	Theta star	4.1832E-4									
67	Mean of Log Transformed Data	-0.699									

A	B	C	D	E	F	G	H	I	J	K	L
68	Standard Deviation of Log Transformed Data				0.027						
69											
70	<b>Normal GOF Test Results</b>										
71											
72	Correlation Coefficient R				0.942						
73	Shapiro Wilk Test Statistic				0.89						
74	Shapiro Wilk Critical (0.05) Value				0.892						
75	Approximate Shapiro Wilk P Value				0.045						
76	Lilliefors Test Statistic				0.238						
77	Lilliefors Critical (0.05) Value				0.207						
78	<b>Data not Normal at (0.05) Significance Level</b>										
79											
80	<b>Gamma GOF Test Results</b>										
81											
82	Correlation Coefficient R				0.946						
83	A-D Test Statistic				0.755						
84	A-D Critical (0.05) Value				0.736						
85	K-S Test Statistic				0.231						
86	K-S Critical(0.05) Value				0.208						
87	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
88											
89	<b>Lognormal GOF Test Results</b>										
90											
91	Correlation Coefficient R				0.946						
92	Shapiro Wilk Test Statistic				0.895						
93	Shapiro Wilk Critical (0.05) Value				0.892						
94	Approximate Shapiro Wilk P Value				0.0562						
95	Lilliefors Test Statistic				0.232						
96	Lilliefors Critical (0.05) Value				0.207						
97	<b>Data appear Approximate_Lognormal at (0.05) Significance Level</b>										
98											
99	<b>Boron (m-60)</b>										
100											
101	<b>Raw Statistics</b>										
102	Number of Valid Observations				17						
103	Number of Distinct Observations				7						
104	Minimum				0.48						
105	Maximum				0.54						
106	Mean of Raw Data				0.512						
107	Standard Deviation of Raw Data				0.0164						
108	Khat				1033						
109	Theta hat				4.9610E-4						
110	Kstar				850.5						
111	Theta star				6.0238E-4						
112	Mean of Log Transformed Data				-0.669						
113	Standard Deviation of Log Transformed Data				0.0321						
114											
115	<b>Normal GOF Test Results</b>										
116											
117	Correlation Coefficient R				0.977						
118	Shapiro Wilk Test Statistic				0.951						
119	Shapiro Wilk Critical (0.05) Value				0.892						
120	Approximate Shapiro Wilk P Value				0.499						
121	Lilliefors Test Statistic				0.153						
122	Lilliefors Critical (0.05) Value				0.207						
123	<b>Data appear Normal at (0.05) Significance Level</b>										
124											
125	<b>Gamma GOF Test Results</b>										
126											
127	Correlation Coefficient R				0.976						
128	A-D Test Statistic				0.446						
129	A-D Critical (0.05) Value				0.736						
130	K-S Test Statistic				0.159						
131	K-S Critical(0.05) Value				0.208						
132	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
133											
134	<b>Lognormal GOF Test Results</b>										

A	B	C	D	E	F	G	H	I	J	K	L
135											
136				Correlation Coefficient R	0.977						
137				Shapiro Wilk Test Statistic	0.951						
138				Shapiro Wilk Critical (0.05) Value	0.892						
139				Approximate Shapiro Wilk P Value	0.487						
140				Lilliefors Test Statistic	0.152						
141				Lilliefors Critical (0.05) Value	0.207						
142	<b>Data appear Lognormal at (0.05) Significance Level</b>										
143											
144	<b>Boron (m-61)</b>										
145											
146	<b>Raw Statistics</b>										
147				Number of Valid Observations	17						
148				Number of Distinct Observations	5						
149				Minimum	0.48						
150				Maximum	0.52						
151				Mean of Raw Data	0.499						
152				Standard Deviation of Raw Data	0.0114						
153				Khat	2027						
154				Theta hat	2.4638E-4						
155				Kstar	1669						
156				Theta star	2.9916E-4						
157				Mean of Log Transformed Data	-0.695						
158				Standard Deviation of Log Transformed Data	0.0229						
159											
160	<b>Normal GOF Test Results</b>										
161											
162				Correlation Coefficient R	0.953						
163				Shapiro Wilk Test Statistic	0.905						
164				Shapiro Wilk Critical (0.05) Value	0.892						
165				Approximate Shapiro Wilk P Value	0.0868						
166				Lilliefors Test Statistic	0.244						
167				Lilliefors Critical (0.05) Value	0.207						
168	<b>Data appear Approximate Normal at (0.05) Significance Level</b>										
169											
170	<b>Gamma GOF Test Results</b>										
171											
172				Correlation Coefficient R	0.954						
173				A-D Test Statistic	0.823						
174				A-D Critical (0.05) Value	0.736						
175				K-S Test Statistic	0.241						
176				K-S Critical(0.05) Value	0.208						
177	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
178											
179	<b>Lognormal GOF Test Results</b>										
180											
181				Correlation Coefficient R	0.954						
182				Shapiro Wilk Test Statistic	0.906						
183				Shapiro Wilk Critical (0.05) Value	0.892						
184				Approximate Shapiro Wilk P Value	0.0891						
185				Lilliefors Test Statistic	0.24						
186				Lilliefors Critical (0.05) Value	0.207						
187	<b>Data appear Approximate_Lognormal at (0.05) Significance Level</b>										
188											
189	<b>Calcium (m-54)</b>										
190											
191	<b>Raw Statistics</b>										
192				Number of Valid Observations	17						
193				Number of Distinct Observations	7						
194				Minimum	95						
195				Maximum	110						
196				Mean of Raw Data	99.47						
197				Standard Deviation of Raw Data	3.165						
198				Khat	1092						
199				Theta hat	0.0911						
200				Kstar	899						
201				Theta star	0.111						



A	B	C	D	E	F	G	H	I	J	K	L
202		Mean of Log Transformed Data			4.599						
203		Standard Deviation of Log Transformed Data			0.0309						
204											
205		<b>Normal GOF Test Results</b>									
206											
207		Correlation Coefficient R			0.817						
208		Shapiro Wilk Test Statistic			0.702						
209		Shapiro Wilk Critical (0.05) Value			0.892						
210		Approximate Shapiro Wilk P Value			4.5119E-5						
211		Lilliefors Test Statistic			0.375						
212		Lilliefors Critical (0.05) Value			0.207						
213		<b>Data not Normal at (0.05) Significance Level</b>									
214											
215		<b>Gamma GOF Test Results</b>									
216											
217		Correlation Coefficient R			0.826						
218		A-D Test Statistic			1.809						
219		A-D Critical (0.05) Value			0.736						
220		K-S Test Statistic			0.368						
221		K-S Critical(0.05) Value			0.208						
222		<b>Data not Gamma Distributed at (0.05) Significance Level</b>									
223											
224		<b>Lognormal GOF Test Results</b>									
225											
226		Correlation Coefficient R			0.829						
227		Shapiro Wilk Test Statistic			0.72						
228		Shapiro Wilk Critical (0.05) Value			0.892						
229		Approximate Shapiro Wilk P Value			7.9435E-5						
230		Lilliefors Test Statistic			0.367						
231		Lilliefors Critical (0.05) Value			0.207						
232		<b>Data not Lognormal at (0.05) Significance Level</b>									
233											
234		<b>Non-parametric GOF Test Results</b>									
235											
236		<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>									
237											
238		<b>Calcium (m-59)</b>									
239											
240		<b>Raw Statistics</b>									
241		Number of Valid Observations			17						
242		Number of Distinct Observations			9						
243		Minimum			84						
244		Maximum			93						
245		Mean of Raw Data			87.76						
246		Standard Deviation of Raw Data			2.513						
247		Khat			1307						
248		Theta hat			0.0671						
249		Kstar			1077						
250		Theta star			0.0815						
251		Mean of Log Transformed Data			4.474						
252		Standard Deviation of Log Transformed Data			0.0285						
253											
254		<b>Normal GOF Test Results</b>									
255											
256		Correlation Coefficient R			0.977						
257		Shapiro Wilk Test Statistic			0.95						
258		Shapiro Wilk Critical (0.05) Value			0.892						
259		Approximate Shapiro Wilk P Value			0.481						
260		Lilliefors Test Statistic			0.17						
261		Lilliefors Critical (0.05) Value			0.207						
262		<b>Data appear Normal at (0.05) Significance Level</b>									
263											
264		<b>Gamma GOF Test Results</b>									
265											
266		Correlation Coefficient R			0.979						
267		A-D Test Statistic			0.364						
268		A-D Critical (0.05) Value			0.736						

A	B	C	D	E	F	G	H	I	J	K	L
269			K-S Test Statistic		0.177						
270			K-S Critical(0.05) Value		0.208						
271	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
272											
273	<b>Lognormal GOF Test Results</b>										
274											
275			Correlation Coefficient R		0.979						
276			Shapiro Wilk Test Statistic		0.954						
277			Shapiro Wilk Critical (0.05) Value		0.892						
278			Approximate Shapiro Wilk P Value		0.54						
279			Lilliefors Test Statistic		0.17						
280			Lilliefors Critical (0.05) Value		0.207						
281	<b>Data appear Lognormal at (0.05) Significance Level</b>										
282											
283	<b>Calcium (m-60)</b>										
284											
285	<b>Raw Statistics</b>										
286			Number of Valid Observations		17						
287			Number of Distinct Observations		9						
288			Minimum		83						
289			Maximum		92						
290			Mean of Raw Data		87.59						
291			Standard Deviation of Raw Data		2.671						
292			Khat		1139						
293			Theta hat		0.0769						
294			Kstar		937.8						
295			Theta star		0.0934						
296			Mean of Log Transformed Data		4.472						
297			Standard Deviation of Log Transformed Data		0.0306						
298											
299	<b>Normal GOF Test Results</b>										
300											
301			Correlation Coefficient R		0.983						
302			Shapiro Wilk Test Statistic		0.955						
303			Shapiro Wilk Critical (0.05) Value		0.892						
304			Approximate Shapiro Wilk P Value		0.601						
305			Lilliefors Test Statistic		0.15						
306			Lilliefors Critical (0.05) Value		0.207						
307	<b>Data appear Normal at (0.05) Significance Level</b>										
308											
309	<b>Gamma GOF Test Results</b>										
310											
311			Correlation Coefficient R		0.981						
312			A-D Test Statistic		0.378						
313			A-D Critical (0.05) Value		0.736						
314			K-S Test Statistic		0.155						
315			K-S Critical(0.05) Value		0.208						
316	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
317											
318	<b>Lognormal GOF Test Results</b>										
319											
320			Correlation Coefficient R		0.982						
321			Shapiro Wilk Test Statistic		0.954						
322			Shapiro Wilk Critical (0.05) Value		0.892						
323			Approximate Shapiro Wilk P Value		0.575						
324			Lilliefors Test Statistic		0.155						
325			Lilliefors Critical (0.05) Value		0.207						
326	<b>Data appear Lognormal at (0.05) Significance Level</b>										
327											
328	<b>Calcium (m-61)</b>										
329											
330	<b>Raw Statistics</b>										
331			Number of Valid Observations		17						
332			Number of Distinct Observations		9						
333			Minimum		86						
334			Maximum		94						
335			Mean of Raw Data		90.06						

A	B	C	D	E	F	G	H	I	J	K	L
336		Standard Deviation of Raw Data			2.193						
337		Khat			1789						
338		Theta hat			0.0503						
339		Kstar			1473						
340		Theta star			0.0611						
341		Mean of Log Transformed Data			4.5						
342		Standard Deviation of Log Transformed Data			0.0244						
343											
344		<b>Normal GOF Test Results</b>									
345											
346		Correlation Coefficient R			0.989						
347		Shapiro Wilk Test Statistic			0.973						
348		Shapiro Wilk Critical (0.05) Value			0.892						
349		Approximate Shapiro Wilk P Value			0.875						
350		Lilliefors Test Statistic			0.136						
351		Lilliefors Critical (0.05) Value			0.207						
352		<b>Data appear Normal at (0.05) Significance Level</b>									
353											
354		<b>Gamma GOF Test Results</b>									
355											
356		Correlation Coefficient R			0.988						
357		A-D Test Statistic			0.271						
358		A-D Critical (0.05) Value			0.736						
359		K-S Test Statistic			0.131						
360		K-S Critical(0.05) Value			0.208						
361		<b>Data appear Gamma Distributed at (0.05) Significance Level</b>									
362											
363		<b>Lognormal GOF Test Results</b>									
364											
365		Correlation Coefficient R			0.988						
366		Shapiro Wilk Test Statistic			0.972						
367		Shapiro Wilk Critical (0.05) Value			0.892						
368		Approximate Shapiro Wilk P Value			0.865						
369		Lilliefors Test Statistic			0.141						
370		Lilliefors Critical (0.05) Value			0.207						
371		<b>Data appear Lognormal at (0.05) Significance Level</b>									
372											
373		<b>Chloride (m-54)</b>									
374											
375		<b>Raw Statistics</b>									
376		Number of Valid Observations			17						
377		Number of Distinct Observations			4						
378		Minimum			1300						
379		Maximum			1600						
380		Mean of Raw Data			1506						
381		Standard Deviation of Raw Data			82.69						
382		Khat			341.1						
383		Theta hat			4.415						
384		Kstar			281						
385		Theta star			5.36						
386		Mean of Log Transformed Data			7.316						
387		Standard Deviation of Log Transformed Data			0.0563						
388											
389		<b>Normal GOF Test Results</b>									
390											
391		Correlation Coefficient R			0.906						
392		Shapiro Wilk Test Statistic			0.825						
393		Shapiro Wilk Critical (0.05) Value			0.892						
394		Approximate Shapiro Wilk P Value			0.00376						
395		Lilliefors Test Statistic			0.295						
396		Lilliefors Critical (0.05) Value			0.207						
397		<b>Data not Normal at (0.05) Significance Level</b>									
398											
399		<b>Gamma GOF Test Results</b>									
400											
401		Correlation Coefficient R			0.902						
402		A-D Test Statistic			1.388						

A	B	C	D	E	F	G	H	I	J	K	L
403		A-D Critical (0.05) Value			0.736						
404		K-S Test Statistic			0.302						
405		K-S Critical(0.05) Value			0.208						
406	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
407											
408	<b>Lognormal GOF Test Results</b>										
409											
410		Correlation Coefficient R			0.9						
411		Shapiro Wilk Test Statistic			0.816						
412		Shapiro Wilk Critical (0.05) Value			0.892						
413		Approximate Shapiro Wilk P Value			0.00266						
414		Lilliefors Test Statistic			0.306						
415		Lilliefors Critical (0.05) Value			0.207						
416	<b>Data not Lognormal at (0.05) Significance Level</b>										
417											
418	<b>Non-parametric GOF Test Results</b>										
419											
420	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
421											
422	<b>Chloride (m-59)</b>										
423											
424	<b>Raw Statistics</b>										
425		Number of Valid Observations			17						
426		Number of Distinct Observations			3						
427		Minimum			1200						
428		Maximum			1400						
429		Mean of Raw Data			1341						
430		Standard Deviation of Raw Data			71.23						
431		Khat			366.2						
432		Theta hat			3.663						
433		Kstar			301.6						
434		Theta star			4.447						
435		Mean of Log Transformed Data			7.2						
436		Standard Deviation of Log Transformed Data			0.0543						
437											
438	<b>Normal GOF Test Results</b>										
439											
440		Correlation Coefficient R			0.875						
441		Shapiro Wilk Test Statistic			0.753						
442		Shapiro Wilk Critical (0.05) Value			0.892						
443		Approximate Shapiro Wilk P Value			3.6244E-4						
444		Lilliefors Test Statistic			0.325						
445		Lilliefors Critical (0.05) Value			0.207						
446	<b>Data not Normal at (0.05) Significance Level</b>										
447											
448	<b>Gamma GOF Test Results</b>										
449											
450		Correlation Coefficient R			0.867						
451		A-D Test Statistic			1.906						
452		A-D Critical (0.05) Value			0.736						
453		K-S Test Statistic			0.33						
454		K-S Critical(0.05) Value			0.208						
455	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
456											
457	<b>Lognormal GOF Test Results</b>										
458											
459		Correlation Coefficient R			0.874						
460		Shapiro Wilk Test Statistic			0.751						
461		Shapiro Wilk Critical (0.05) Value			0.892						
462		Approximate Shapiro Wilk P Value			3.3346E-4						
463		Lilliefors Test Statistic			0.322						
464		Lilliefors Critical (0.05) Value			0.207						
465	<b>Data not Lognormal at (0.05) Significance Level</b>										
466											
467	<b>Non-parametric GOF Test Results</b>										
468											
469	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										

A	B	C	D	E	F	G	H	I	J	K	L
470											
471	<b>Chloride (m-60)</b>										
472											
473	<b>Raw Statistics</b>										
474	Number of Valid Observations			17							
475	Number of Distinct Observations			3							
476	Minimum			1300							
477	Maximum			1500							
478	Mean of Raw Data			1388							
479	Standard Deviation of Raw Data			60.02							
480	Khat			567.4							
481	Theta hat			2.447							
482	Kstar			467.3							
483	Theta star			2.971							
484	Mean of Log Transformed Data			7.235							
485	Standard Deviation of Log Transformed Data			0.0433							
486											
487	<b>Normal GOF Test Results</b>										
488											
489	Correlation Coefficient R			0.875							
490	Shapiro Wilk Test Statistic			0.766							
491	Shapiro Wilk Critical (0.05) Value			0.892							
492	Approximate Shapiro Wilk P Value			4.6796E-4							
493	Lilliefors Test Statistic			0.342							
494	Lilliefors Critical (0.05) Value			0.207							
495	<b>Data not Normal at (0.05) Significance Level</b>										
496											
497	<b>Gamma GOF Test Results</b>										
498											
499	Correlation Coefficient R			0.876							
500	A-D Test Statistic			2.132							
501	A-D Critical (0.05) Value			0.736							
502	K-S Test Statistic			0.35							
503	K-S Critical(0.05) Value			0.208							
504	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
505											
506	<b>Lognormal GOF Test Results</b>										
507											
508	Correlation Coefficient R			0.875							
509	Shapiro Wilk Test Statistic			0.765							
510	Shapiro Wilk Critical (0.05) Value			0.892							
511	Approximate Shapiro Wilk P Value			4.5433E-4							
512	Lilliefors Test Statistic			0.35							
513	Lilliefors Critical (0.05) Value			0.207							
514	<b>Data not Lognormal at (0.05) Significance Level</b>										
515											
516	<b>Non-parametric GOF Test Results</b>										
517											
518	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
519											
520	<b>Chloride (m-61)</b>										
521											
522	<b>Raw Statistics</b>										
523	Number of Valid Observations			17							
524	Number of Distinct Observations			5							
525	Minimum			1100							
526	Maximum			1700							
527	Mean of Raw Data			1394							
528	Standard Deviation of Raw Data			119.7							
529	Khat			142.4							
530	Theta hat			9.791							
531	Kstar			117.3							
532	Theta star			11.88							
533	Mean of Log Transformed Data			7.237							
534	Standard Deviation of Log Transformed Data			0.0869							
535											
536	<b>Normal GOF Test Results</b>										

A	B	C	D	E	F	G	H	I	J	K	L
537											
538		Correlation Coefficient R			0.886						
539		Shapiro Wilk Test Statistic			0.822						
540		Shapiro Wilk Critical (0.05) Value			0.892						
541		Approximate Shapiro Wilk P Value			0.00235						
542		Lilliefors Test Statistic			0.304						
543		Lilliefors Critical (0.05) Value			0.207						
544	<b>Data not Normal at (0.05) Significance Level</b>										
545											
546	<b>Gamma GOF Test Results</b>										
547											
548		Correlation Coefficient R			0.891						
549		A-D Test Statistic			1.574						
550		A-D Critical (0.05) Value			0.736						
551		K-S Test Statistic			0.296						
552		K-S Critical(0.05) Value			0.208						
553	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
554											
555	<b>Lognormal GOF Test Results</b>										
556											
557		Correlation Coefficient R			0.883						
558		Shapiro Wilk Test Statistic			0.817						
559		Shapiro Wilk Critical (0.05) Value			0.892						
560		Approximate Shapiro Wilk P Value			0.00196						
561		Lilliefors Test Statistic			0.3						
562		Lilliefors Critical (0.05) Value			0.207						
563	<b>Data not Lognormal at (0.05) Significance Level</b>										
564											
565	<b>Non-parametric GOF Test Results</b>										
566											
567	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
568											
569	<b>Fluoride (m-54)</b>										
570											
571	<b>Raw Statistics</b>										
572		Number of Valid Observations			17						
573		Number of Distinct Observations			3						
574		Minimum			1.2						
575		Maximum			1.4						
576		Mean of Raw Data			1.347						
577		Standard Deviation of Raw Data			0.0624						
578		Khat			483.7						
579		Theta hat			0.00278						
580		Kstar			398.4						
581		Theta star			0.00338						
582		Mean of Log Transformed Data			0.297						
583		Standard Deviation of Log Transformed Data			0.0472						
584											
585	<b>Normal GOF Test Results</b>										
586											
587		Correlation Coefficient R			0.862						
588		Shapiro Wilk Test Statistic			0.738						
589		Shapiro Wilk Critical (0.05) Value			0.892						
590		Approximate Shapiro Wilk P Value			2.0713E-4						
591		Lilliefors Test Statistic			0.331						
592		Lilliefors Critical (0.05) Value			0.207						
593	<b>Data not Normal at (0.05) Significance Level</b>										
594											
595	<b>Gamma GOF Test Results</b>										
596											
597		Correlation Coefficient R			0.855						
598		A-D Test Statistic			2.147						
599		A-D Critical (0.05) Value			0.736						
600		K-S Test Statistic			0.337						
601		K-S Critical(0.05) Value			0.208						
602	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
603											

A	B	C	D	E	F	G	H	I	J	K	L
604	<b>Lognormal GOF Test Results</b>										
605											
606	Correlation Coefficient R				0.86						
607	Shapiro Wilk Test Statistic				0.737						
608	Shapiro Wilk Critical (0.05) Value				0.892						
609	Approximate Shapiro Wilk P Value				1.9776E-4						
610	Lilliefors Test Statistic				0.329						
611	Lilliefors Critical (0.05) Value				0.207						
612	<b>Data not Lognormal at (0.05) Significance Level</b>										
613											
614	<b>Non-parametric GOF Test Results</b>										
615											
616	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
617											
618	<b>Fluoride (m-59)</b>										
619											
620	<b>Raw Statistics</b>										
621	Number of Valid Observations				17						
622	Number of Distinct Observations				3						
623	Minimum				1.3						
624	Maximum				1.5						
625	Mean of Raw Data				1.388						
626	Standard Deviation of Raw Data				0.06						
627	Khat				567.4						
628	Theta hat				0.00245						
629	Kstar				467.3						
630	Theta star				0.00297						
631	Mean of Log Transformed Data				0.327						
632	Standard Deviation of Log Transformed Data				0.0433						
633											
634	<b>Normal GOF Test Results</b>										
635											
636	Correlation Coefficient R				0.875						
637	Shapiro Wilk Test Statistic				0.766						
638	Shapiro Wilk Critical (0.05) Value				0.892						
639	Approximate Shapiro Wilk P Value				4.6796E-4						
640	Lilliefors Test Statistic				0.342						
641	Lilliefors Critical (0.05) Value				0.207						
642	<b>Data not Normal at (0.05) Significance Level</b>										
643											
644	<b>Gamma GOF Test Results</b>										
645											
646	Correlation Coefficient R				0.876						
647	A-D Test Statistic				2.132						
648	A-D Critical (0.05) Value				0.736						
649	K-S Test Statistic				0.35						
650	K-S Critical(0.05) Value				0.208						
651	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
652											
653	<b>Lognormal GOF Test Results</b>										
654											
655	Correlation Coefficient R				0.875						
656	Shapiro Wilk Test Statistic				0.765						
657	Shapiro Wilk Critical (0.05) Value				0.892						
658	Approximate Shapiro Wilk P Value				4.5433E-4						
659	Lilliefors Test Statistic				0.35						
660	Lilliefors Critical (0.05) Value				0.207						
661	<b>Data not Lognormal at (0.05) Significance Level</b>										
662											
663	<b>Non-parametric GOF Test Results</b>										
664											
665	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
666											
667	<b>Fluoride (m-60)</b>										
668											
669	<b>Raw Statistics</b>										
670	Number of Valid Observations				17						

A	B	C	D	E	F	G	H	I	J	K	L
671	Number of Distinct Observations				3						
672	Minimum				1.3						
673	Maximum				1.5						
674	Mean of Raw Data				1.429						
675	Standard Deviation of Raw Data				0.0588						
676	Khat				625.5						
677	Theta hat				0.00229						
678	Kstar				515.1						
679	Theta star				0.00277						
680	Mean of Log Transformed Data				0.356						
681	Standard Deviation of Log Transformed Data				0.0413						
682											
683	<b>Normal GOF Test Results</b>										
684											
685	Correlation Coefficient R				0.866						
686	Shapiro Wilk Test Statistic				0.75						
687	Shapiro Wilk Critical (0.05) Value				0.892						
688	Approximate Shapiro Wilk P Value				2.9471E-4						
689	Lilliefors Test Statistic				0.339						
690	Lilliefors Critical (0.05) Value				0.207						
691	<b>Data not Normal at (0.05) Significance Level</b>										
692											
693	<b>Gamma GOF Test Results</b>										
694											
695	Correlation Coefficient R				0.865						
696	A-D Test Statistic				2.201						
697	A-D Critical (0.05) Value				0.736						
698	K-S Test Statistic				0.34						
699	K-S Critical(0.05) Value				0.208						
700	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
701											
702	<b>Lognormal GOF Test Results</b>										
703											
704	Correlation Coefficient R				0.865						
705	Shapiro Wilk Test Statistic				0.751						
706	Shapiro Wilk Critical (0.05) Value				0.892						
707	Approximate Shapiro Wilk P Value				2.9644E-4						
708	Lilliefors Test Statistic				0.333						
709	Lilliefors Critical (0.05) Value				0.207						
710	<b>Data not Lognormal at (0.05) Significance Level</b>										
711											
712	<b>Non-parametric GOF Test Results</b>										
713											
714	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
715											
716	<b>Fluoride (m-61)</b>										
717											
718	<b>Raw Statistics</b>										
719	Number of Valid Observations				17						
720	Number of Distinct Observations				3						
721	Minimum				1.3						
722	Maximum				1.5						
723	Mean of Raw Data				1.418						
724	Standard Deviation of Raw Data				0.0636						
725	Khat				524.9						
726	Theta hat				0.0027						
727	Kstar				432.3						
728	Theta star				0.00328						
729	Mean of Log Transformed Data				0.348						
730	Standard Deviation of Log Transformed Data				0.0451						
731											
732	<b>Normal GOF Test Results</b>										
733											
734	Correlation Coefficient R				0.889						
735	Shapiro Wilk Test Statistic				0.785						
736	Shapiro Wilk Critical (0.05) Value				0.892						
737	Approximate Shapiro Wilk P Value				9.7172E-4						



A	B	C	D	E	F	G	H	I	J	K	L
738			Lilliefors Test Statistic		0.315						
739			Lilliefors Critical (0.05) Value		0.207						
740	<b>Data not Normal at (0.05) Significance Level</b>										
741											
742	<b>Gamma GOF Test Results</b>										
743											
744			Correlation Coefficient R		0.888						
745			A-D Test Statistic		1.846						
746			A-D Critical (0.05) Value		0.736						
747			K-S Test Statistic		0.313						
748			K-S Critical(0.05) Value		0.208						
749	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
750											
751	<b>Lognormal GOF Test Results</b>										
752											
753			Correlation Coefficient R		0.889						
754			Shapiro Wilk Test Statistic		0.784						
755			Shapiro Wilk Critical (0.05) Value		0.892						
756			Approximate Shapiro Wilk P Value		9.5136E-4						
757			Lilliefors Test Statistic		0.307						
758			Lilliefors Critical (0.05) Value		0.207						
759	<b>Data not Lognormal at (0.05) Significance Level</b>										
760											
761	<b>Non-parametric GOF Test Results</b>										
762											
763	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
764											
765	<b>pH (m-54)</b>										
766											
767	<b>Raw Statistics</b>										
768			Number of Valid Observations		16						
769			Number of Missing Observations		1						
770			Number of Distinct Observations		7						
771			Minimum		7.34						
772			Maximum		7.8						
773			Mean of Raw Data		7.581						
774			Standard Deviation of Raw Data		0.133						
775			Khat		3478						
776			Theta hat		0.00218						
777			Kstar		2826						
778			Theta star		0.00268						
779			Mean of Log Transformed Data		2.026						
780			Standard Deviation of Log Transformed Data		0.0175						
781											
782	<b>Normal GOF Test Results</b>										
783											
784			Correlation Coefficient R		0.972						
785			Shapiro Wilk Test Statistic		0.938						
786			Shapiro Wilk Critical (0.05) Value		0.887						
787			Approximate Shapiro Wilk P Value		0.357						
788			Lilliefors Test Statistic		0.19						
789			Lilliefors Critical (0.05) Value		0.213						
790	<b>Data appear Normal at (0.05) Significance Level</b>										
791											
792	<b>Gamma GOF Test Results</b>										
793											
794			Correlation Coefficient R		0.97						
795			A-D Test Statistic		0.514						
796			A-D Critical (0.05) Value		0.736						
797			K-S Test Statistic		0.197						
798			K-S Critical(0.05) Value		0.214						
799	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
800											
801	<b>Lognormal GOF Test Results</b>										
802											
803			Correlation Coefficient R		0.971						
804			Shapiro Wilk Test Statistic		0.937						

A	B	C	D	E	F	G	H	I	J	K	L
805		Shapiro Wilk Critical (0.05) Value		0.887							
806		Approximate Shapiro Wilk P Value		0.345							
807		Lilliefors Test Statistic		0.19							
808		Lilliefors Critical (0.05) Value		0.213							
809	<b>Data appear Lognormal at (0.05) Significance Level</b>										
810											
811	<b>pH (m-59)</b>										
812											
813	<b>Raw Statistics</b>										
814		Number of Valid Observations		16							
815		Number of Missing Observations		1							
816		Number of Distinct Observations		8							
817		Minimum		7.5							
818		Maximum		8.1							
819		Mean of Raw Data		7.706							
820		Standard Deviation of Raw Data		0.156							
821		Khat		2632							
822		Theta hat		0.00293							
823		Kstar		2138							
824		Theta star		0.0036							
825		Mean of Log Transformed Data		2.042							
826		Standard Deviation of Log Transformed Data		0.0201							
827											
828	<b>Normal GOF Test Results</b>										
829											
830		Correlation Coefficient R		0.952							
831		Shapiro Wilk Test Statistic		0.911							
832		Shapiro Wilk Critical (0.05) Value		0.887							
833		Approximate Shapiro Wilk P Value		0.118							
834		Lilliefors Test Statistic		0.19							
835		Lilliefors Critical (0.05) Value		0.213							
836	<b>Data appear Normal at (0.05) Significance Level</b>										
837											
838	<b>Gamma GOF Test Results</b>										
839											
840		Correlation Coefficient R		0.954							
841		A-D Test Statistic		0.583							
842		A-D Critical (0.05) Value		0.736							
843		K-S Test Statistic		0.201							
844		K-S Critical(0.05) Value		0.214							
845	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
846											
847	<b>Lognormal GOF Test Results</b>										
848											
849		Correlation Coefficient R		0.954							
850		Shapiro Wilk Test Statistic		0.916							
851		Shapiro Wilk Critical (0.05) Value		0.887							
852		Approximate Shapiro Wilk P Value		0.142							
853		Lilliefors Test Statistic		0.19							
854		Lilliefors Critical (0.05) Value		0.213							
855	<b>Data appear Lognormal at (0.05) Significance Level</b>										
856											
857	<b>pH (m-60)</b>										
858											
859	<b>Raw Statistics</b>										
860		Number of Valid Observations		16							
861		Number of Missing Observations		1							
862		Number of Distinct Observations		7							
863		Minimum		7.5							
864		Maximum		8							
865		Mean of Raw Data		7.693							
866		Standard Deviation of Raw Data		0.133							
867		Khat		3581							
868		Theta hat		0.00215							
869		Kstar		2909							
870		Theta star		0.00264							
871		Mean of Log Transformed Data		2.04							

A	B	C	D	E	F	G	H	I	J	K	L
872	Standard Deviation of Log Transformed Data				0.0172						
873											
874	<b>Normal GOF Test Results</b>										
875											
876	Correlation Coefficient R				0.968						
877	Shapiro Wilk Test Statistic				0.939						
878	Shapiro Wilk Critical (0.05) Value				0.887						
879	Approximate Shapiro Wilk P Value				0.34						
880	Lilliefors Test Statistic				0.167						
881	Lilliefors Critical (0.05) Value				0.213						
882	<b>Data appear Normal at (0.05) Significance Level</b>										
883											
884	<b>Gamma GOF Test Results</b>										
885											
886	Correlation Coefficient R				0.97						
887	A-D Test Statistic				0.441						
888	A-D Critical (0.05) Value				0.736						
889	K-S Test Statistic				0.164						
890	K-S Critical(0.05) Value				0.214						
891	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
892											
893	<b>Lognormal GOF Test Results</b>										
894											
895	Correlation Coefficient R				0.97						
896	Shapiro Wilk Test Statistic				0.941						
897	Shapiro Wilk Critical (0.05) Value				0.887						
898	Approximate Shapiro Wilk P Value				0.366						
899	Lilliefors Test Statistic				0.164						
900	Lilliefors Critical (0.05) Value				0.213						
901	<b>Data appear Lognormal at (0.05) Significance Level</b>										
902											
903	<b>pH (m-61)</b>										
904											
905	<b>Raw Statistics</b>										
906	Number of Valid Observations				16						
907	Number of Missing Observations				1						
908	Number of Distinct Observations				8						
909	Minimum				7.22						
910	Maximum				8						
911	Mean of Raw Data				7.657						
912	Standard Deviation of Raw Data				0.187						
913	Khat				1783						
914	Theta hat				0.00429						
915	Kstar				1449						
916	Theta star				0.00528						
917	Mean of Log Transformed Data				2.035						
918	Standard Deviation of Log Transformed Data				0.0245						
919											
920	<b>Normal GOF Test Results</b>										
921											
922	Correlation Coefficient R				0.973						
923	Shapiro Wilk Test Statistic				0.959						
924	Shapiro Wilk Critical (0.05) Value				0.887						
925	Approximate Shapiro Wilk P Value				0.568						
926	Lilliefors Test Statistic				0.138						
927	Lilliefors Critical (0.05) Value				0.213						
928	<b>Data appear Normal at (0.05) Significance Level</b>										
929											
930	<b>Gamma GOF Test Results</b>										
931											
932	Correlation Coefficient R				0.974						
933	A-D Test Statistic				0.334						
934	A-D Critical (0.05) Value				0.736						
935	K-S Test Statistic				0.131						
936	K-S Critical(0.05) Value				0.214						
937	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>										
938											

	A	B	C	D	E	F	G	H	I	J	K	L	
939	<b>Lognormal GOF Test Results</b>												
940													
941	Correlation Coefficient R					0.971							
942	Shapiro Wilk Test Statistic					0.956							
943	Shapiro Wilk Critical (0.05) Value					0.887							
944	Approximate Shapiro Wilk P Value					0.509							
945	Lilliefors Test Statistic					0.14							
946	Lilliefors Critical (0.05) Value					0.213							
947	<b>Data appear Lognormal at (0.05) Significance Level</b>												
948													
949	<b>Sulfate (m-54)</b>												
950													
951	<b>Raw Statistics</b>												
952	Number of Valid Observations					17							
953	Number of Distinct Observations					5							
954	Minimum					340							
955	Maximum					380							
956	Mean of Raw Data					361.8							
957	Standard Deviation of Raw Data					12.37							
958	Khat					909.7							
959	Theta hat					0.398							
960	Kstar					749.2							
961	Theta star					0.483							
962	Mean of Log Transformed Data					5.89							
963	Standard Deviation of Log Transformed Data					0.0342							
964													
965	<b>Normal GOF Test Results</b>												
966													
967	Correlation Coefficient R					0.962							
968	Shapiro Wilk Test Statistic					0.913							
969	Shapiro Wilk Critical (0.05) Value					0.892							
970	Approximate Shapiro Wilk P Value					0.139							
971	Lilliefors Test Statistic					0.182							
972	Lilliefors Critical (0.05) Value					0.207							
973	<b>Data appear Normal at (0.05) Significance Level</b>												
974													
975	<b>Gamma GOF Test Results</b>												
976													
977	Correlation Coefficient R					0.961							
978	A-D Test Statistic					0.664							
979	A-D Critical (0.05) Value					0.736							
980	K-S Test Statistic					0.19							
981	K-S Critical(0.05) Value					0.208							
982	<b>Data appear Gamma Distributed at (0.05) Significance Level</b>												
983													
984	<b>Lognormal GOF Test Results</b>												
985													
986	Correlation Coefficient R					0.963							
987	Shapiro Wilk Test Statistic					0.914							
988	Shapiro Wilk Critical (0.05) Value					0.892							
989	Approximate Shapiro Wilk P Value					0.144							
990	Lilliefors Test Statistic					0.182							
991	Lilliefors Critical (0.05) Value					0.207							
992	<b>Data appear Lognormal at (0.05) Significance Level</b>												
993													
994	<b>Sulfate (m-59)</b>												
995													
996	<b>Raw Statistics</b>												
997	Number of Valid Observations					17							
998	Number of Distinct Observations					5							
999	Minimum					330							
1000	Maximum					370							
1001	Mean of Raw Data					348.2							
1002	Standard Deviation of Raw Data					10.74							
1003	Khat					1116							
1004	Theta hat					0.312							
1005	Kstar					919.1							

A	B	C	D	E	F	G	H	I	J	K	L
1006				Theta star	0.379						
1007				Mean of Log Transformed Data	5.852						
1008				Standard Deviation of Log Transformed Data	0.0309						
1009											
1010				<b>Normal GOF Test Results</b>							
1011											
1012				Correlation Coefficient R	0.963						
1013				Shapiro Wilk Test Statistic	0.927						
1014				Shapiro Wilk Critical (0.05) Value	0.892						
1015				Approximate Shapiro Wilk P Value	0.198						
1016				Lilliefors Test Statistic	0.212						
1017				Lilliefors Critical (0.05) Value	0.207						
1018				<b>Data appear Approximate Normal at (0.05) Significance Level</b>							
1019											
1020				<b>Gamma GOF Test Results</b>							
1021											
1022				Correlation Coefficient R	0.963						
1023				A-D Test Statistic	0.682						
1024				A-D Critical (0.05) Value	0.736						
1025				K-S Test Statistic	0.218						
1026				K-S Critical(0.05) Value	0.208						
1027				<b>Data follow Appr. Gamma Distribution at (0.05) Significance Lev</b>							
1028											
1029				<b>Lognormal GOF Test Results</b>							
1030											
1031				Correlation Coefficient R	0.963						
1032				Shapiro Wilk Test Statistic	0.927						
1033				Shapiro Wilk Critical (0.05) Value	0.892						
1034				Approximate Shapiro Wilk P Value	0.195						
1035				Lilliefors Test Statistic	0.218						
1036				Lilliefors Critical (0.05) Value	0.207						
1037				<b>Data appear Approximate_Lognormal at (0.05) Significance Lev</b>							
1038											
1039				<b>Sulfate (m-60)</b>							
1040											
1041				<b>Raw Statistics</b>							
1042				Number of Valid Observations	17						
1043				Number of Distinct Observations	5						
1044				Minimum	340						
1045				Maximum	440						
1046				Mean of Raw Data	358.8						
1047				Standard Deviation of Raw Data	22.05						
1048				Khat	315.2						
1049				Theta hat	1.138						
1050				Kstar	259.6						
1051				Theta star	1.382						
1052				Mean of Log Transformed Data	5.881						
1053				Standard Deviation of Log Transformed Data	0.0565						
1054											
1055				<b>Normal GOF Test Results</b>							
1056											
1057				Correlation Coefficient R	0.703						
1058				Shapiro Wilk Test Statistic	0.529						
1059				Shapiro Wilk Critical (0.05) Value	0.892						
1060				Approximate Shapiro Wilk P Value	3.3435E-7						
1061				Lilliefors Test Statistic	0.361						
1062				Lilliefors Critical (0.05) Value	0.207						
1063				<b>Data not Normal at (0.05) Significance Level</b>							
1064											
1065				<b>Gamma GOF Test Results</b>							
1066											
1067				Correlation Coefficient R	0.722						
1068				A-D Test Statistic	2.866						
1069				A-D Critical (0.05) Value	0.736						
1070				K-S Test Statistic	0.352						
1071				K-S Critical(0.05) Value	0.208						
1072				<b>Data not Gamma Distributed at (0.05) Significance Level</b>							

A	B	C	D	E	F	G	H	I	J	K	L
1073											
1074	<b>Lognormal GOF Test Results</b>										
1075											
1076		Correlation Coefficient R		0.723							
1077		Shapiro Wilk Test Statistic		0.556							
1078		Shapiro Wilk Critical (0.05) Value		0.892							
1079		Approximate Shapiro Wilk P Value		6.9265E-7							
1080		Lilliefors Test Statistic		0.348							
1081		Lilliefors Critical (0.05) Value		0.207							
1082	<b>Data not Lognormal at (0.05) Significance Level</b>										
1083											
1084	<b>Non-parametric GOF Test Results</b>										
1085											
1086	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
1087											
1088	<b>Sulfate (m-61)</b>										
1089											
1090	<b>Raw Statistics</b>										
1091		Number of Valid Observations		17							
1092		Number of Distinct Observations		7							
1093		Minimum		340							
1094		Maximum		420							
1095		Mean of Raw Data		362.4							
1096		Standard Deviation of Raw Data		20.16							
1097		Khat		359.1							
1098		Theta hat		1.009							
1099		Kstar		295.8							
1100		Theta star		1.225							
1101		Mean of Log Transformed Data		5.891							
1102		Standard Deviation of Log Transformed Data		0.0538							
1103											
1104	<b>Normal GOF Test Results</b>										
1105											
1106		Correlation Coefficient R		0.917							
1107		Shapiro Wilk Test Statistic		0.851							
1108		Shapiro Wilk Critical (0.05) Value		0.892							
1109		Approximate Shapiro Wilk P Value		0.00914							
1110		Lilliefors Test Statistic		0.252							
1111		Lilliefors Critical (0.05) Value		0.207							
1112	<b>Data not Normal at (0.05) Significance Level</b>										
1113											
1114	<b>Gamma GOF Test Results</b>										
1115											
1116		Correlation Coefficient R		0.926							
1117		A-D Test Statistic		0.805							
1118		A-D Critical (0.05) Value		0.736							
1119		K-S Test Statistic		0.248							
1120		K-S Critical(0.05) Value		0.208							
1121	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
1122											
1123	<b>Lognormal GOF Test Results</b>										
1124											
1125		Correlation Coefficient R		0.928							
1126		Shapiro Wilk Test Statistic		0.87							
1127		Shapiro Wilk Critical (0.05) Value		0.892							
1128		Approximate Shapiro Wilk P Value		0.0194							
1129		Lilliefors Test Statistic		0.244							
1130		Lilliefors Critical (0.05) Value		0.207							
1131	<b>Data not Lognormal at (0.05) Significance Level</b>										
1132											
1133	<b>Non-parametric GOF Test Results</b>										
1134											
1135	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
1136											
1137	<b>DissolvedSolids (m-54)</b>										
1138											
1139	<b>Raw Statistics</b>										

A	B	C	D	E	F	G	H	I	J	K	L
1140	Number of Valid Observations				17						
1141	Number of Distinct Observations				4						
1142	Minimum				2900						
1143	Maximum				3200						
1144	Mean of Raw Data				3041						
1145	Standard Deviation of Raw Data				106.4						
1146	Khat				868.6						
1147	Theta hat				3.501						
1148	Kstar				715.3						
1149	Theta star				4.251						
1150	Mean of Log Transformed Data				8.019						
1151	Standard Deviation of Log Transformed Data				0.035						
1152											
1153	<b>Normal GOF Test Results</b>										
1154											
1155	Correlation Coefficient R				0.952						
1156	Shapiro Wilk Test Statistic				0.885						
1157	Shapiro Wilk Critical (0.05) Value				0.892						
1158	Approximate Shapiro Wilk P Value				0.0488						
1159	Lilliefors Test Statistic				0.18						
1160	Lilliefors Critical (0.05) Value				0.207						
1161	<b>Data appear Approximate Normal at (0.05) Significance Level</b>										
1162											
1163	<b>Gamma GOF Test Results</b>										
1164											
1165	Correlation Coefficient R				0.95						
1166	A-D Test Statistic				0.782						
1167	A-D Critical (0.05) Value				0.736						
1168	K-S Test Statistic				0.189						
1169	K-S Critical(0.05) Value				0.208						
1170	<b>Data follow Appr. Gamma Distribution at (0.05) Significance Lev</b>										
1171											
1172	<b>Lognormal GOF Test Results</b>										
1173											
1174	Correlation Coefficient R				0.952						
1175	Shapiro Wilk Test Statistic				0.885						
1176	Shapiro Wilk Critical (0.05) Value				0.892						
1177	Approximate Shapiro Wilk P Value				0.0486						
1178	Lilliefors Test Statistic				0.184						
1179	Lilliefors Critical (0.05) Value				0.207						
1180	<b>Data appear Approximate_Lognormal at (0.05) Significance Lev</b>										
1181											
1182	<b>DissolvedSolids (m-59)</b>										
1183											
1184	<b>Raw Statistics</b>										
1185	Number of Valid Observations				17						
1186	Number of Distinct Observations				4						
1187	Minimum				2500						
1188	Maximum				2900						
1189	Mean of Raw Data				2712						
1190	Standard Deviation of Raw Data				99.26						
1191	Khat				779.6						
1192	Theta hat				3.479						
1193	Kstar				642						
1194	Theta star				4.224						
1195	Mean of Log Transformed Data				7.905						
1196	Standard Deviation of Log Transformed Data				0.0371						
1197											
1198	<b>Normal GOF Test Results</b>										
1199											
1200	Correlation Coefficient R				0.892						
1201	Shapiro Wilk Test Statistic				0.81						
1202	Shapiro Wilk Critical (0.05) Value				0.892						
1203	Approximate Shapiro Wilk P Value				0.00193						
1204	Lilliefors Test Statistic				0.335						
1205	Lilliefors Critical (0.05) Value				0.207						
1206	<b>Data not Normal at (0.05) Significance Level</b>										

A	B	C	D	E	F	G	H	I	J	K	L
1207											
1208	<b>Gamma GOF Test Results</b>										
1209											
1210		Correlation Coefficient R			0.893						
1211		A-D Test Statistic			1.696						
1212		A-D Critical (0.05) Value			0.736						
1213		K-S Test Statistic			0.339						
1214		K-S Critical(0.05) Value			0.208						
1215	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
1216											
1217	<b>Lognormal GOF Test Results</b>										
1218											
1219		Correlation Coefficient R			0.887						
1220		Shapiro Wilk Test Statistic			0.802						
1221		Shapiro Wilk Critical (0.05) Value			0.892						
1222		Approximate Shapiro Wilk P Value			0.00142						
1223		Lilliefors Test Statistic			0.343						
1224		Lilliefors Critical (0.05) Value			0.207						
1225	<b>Data not Lognormal at (0.05) Significance Level</b>										
1226											
1227	<b>Non-parametric GOF Test Results</b>										
1228											
1229	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>										
1230											
1231	<b>DissolvedSolids (m-60)</b>										
1232											
1233	<b>Raw Statistics</b>										
1234		Number of Valid Observations			17						
1235		Number of Distinct Observations			6						
1236		Minimum			2500						
1237		Maximum			3000						
1238		Mean of Raw Data			2788						
1239		Standard Deviation of Raw Data			111.1						
1240		Khat			651.5						
1241		Theta hat			4.28						
1242		Kstar			536.6						
1243		Theta star			5.196						
1244		Mean of Log Transformed Data			7.932						
1245		Standard Deviation of Log Transformed Data			0.0407						
1246											
1247	<b>Normal GOF Test Results</b>										
1248											
1249		Correlation Coefficient R			0.879						
1250		Shapiro Wilk Test Statistic			0.799						
1251		Shapiro Wilk Critical (0.05) Value			0.892						
1252		Approximate Shapiro Wilk P Value			0.00113						
1253		Lilliefors Test Statistic			0.366						
1254		Lilliefors Critical (0.05) Value			0.207						
1255	<b>Data not Normal at (0.05) Significance Level</b>										
1256											
1257	<b>Gamma GOF Test Results</b>										
1258											
1259		Correlation Coefficient R			0.88						
1260		A-D Test Statistic			1.934						
1261		A-D Critical (0.05) Value			0.736						
1262		K-S Test Statistic			0.372						
1263		K-S Critical(0.05) Value			0.208						
1264	<b>Data not Gamma Distributed at (0.05) Significance Level</b>										
1265											
1266	<b>Lognormal GOF Test Results</b>										
1267											
1268		Correlation Coefficient R			0.873						
1269		Shapiro Wilk Test Statistic			0.789						
1270		Shapiro Wilk Critical (0.05) Value			0.892						
1271		Approximate Shapiro Wilk P Value			7.9304E-4						
1272		Lilliefors Test Statistic			0.372						
1273		Lilliefors Critical (0.05) Value			0.207						



	A	B	C	D	E	F	G	H	I	J	K	L	
1274	<b>Data not Lognormal at (0.05) Significance Level</b>												
1275													
1276	<b>Non-parametric GOF Test Results</b>												
1277													
1278	<b>Data do not follow a discernible distribution at (0.05) Level of Sig</b>												
1279													
1280	<b>DissolvedSolids (m-61)</b>												
1281													
1282	<b>Raw Statistics</b>												
1283	Number of Valid Observations				17								
1284	Number of Distinct Observations				5								
1285	Minimum				2600								
1286	Maximum				3000								
1287	Mean of Raw Data				2812								
1288	Standard Deviation of Raw Data				105.4								
1289	Khat				757.1								
1290	Theta hat				3.714								
1291	Kstar				623.5								
1292	Theta star				4.51								
1293	Mean of Log Transformed Data				7.941								
1294	Standard Deviation of Log Transformed Data				0.0375								
1295													
1296	<b>Normal GOF Test Results</b>												
1297													
1298	Correlation Coefficient R				0.954								
1299	Shapiro Wilk Test Statistic				0.913								
1300	Shapiro Wilk Critical (0.05) Value				0.892								
1301	Approximate Shapiro Wilk P Value				0.11								
1302	Lilliefors Test Statistic				0.25								
1303	Lilliefors Critical (0.05) Value				0.207								
1304	<b>Data appear Approximate Normal at (0.05) Significance Level</b>												
1305													
1306	<b>Gamma GOF Test Results</b>												
1307													
1308	Correlation Coefficient R				0.955								
1309	A-D Test Statistic				0.825								
1310	A-D Critical (0.05) Value				0.736								
1311	K-S Test Statistic				0.247								
1312	K-S Critical(0.05) Value				0.208								
1313	<b>Data not Gamma Distributed at (0.05) Significance Level</b>												
1314													
1315	<b>Lognormal GOF Test Results</b>												
1316													
1317	Correlation Coefficient R				0.954								
1318	Shapiro Wilk Test Statistic				0.914								
1319	Shapiro Wilk Critical (0.05) Value				0.892								
1320	Approximate Shapiro Wilk P Value				0.114								
1321	Lilliefors Test Statistic				0.243								
1322	Lilliefors Critical (0.05) Value				0.207								
1323	<b>Data appear Approximate_Lognormal at (0.05) Significance Lev</b>												

A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Mann-Kendall Trend Test Analysis</b>										
2	User Selected Options										
3	Date/Time of Computation		ProUCL 5.110/2/2019 12:54:02 PM								
4	From File		Cholla_BAM_ApplIldatathruApr2019.xls								
5	Full Precision		OFF								
6	Confidence Coefficient		0.95								
7	Level of Significance		0.05								
8											
9	<b>Boron-m-54</b>										
10											
11	<b>General Statistics</b>										
12	Number of Events Reported (m)		17								
13	Number of Missing Events		0								
14	Number or Reported Events Used		17								
15	Number Values Reported (n)		17								
16	Minimum		0.5								
17	Maximum		0.56								
18	Mean		0.521								
19	Geometric Mean		0.52								
20	Median		0.52								
21	Standard Deviation		0.0168								
22	Coefficient of Variation		0.0322								
23											
24	<b>Mann-Kendall Test</b>										
25	M-K Test Value (S)		-19								
26	Tabulated p-value		0.245								
27	Standard Deviation of S		23.66								
28	Standardized Value of S		-0.761								
29	Approximate p-value		0.223								
30											
31	<b>Insufficient evidence to identify a significant</b>										
32	<b>trend at the specified level of significance.</b>										
33	<b>Boron-m-59</b>										
34											
35	<b>General Statistics</b>										
36	Number of Events Reported (m)		17								
37	Number of Missing Events		0								
38	Number or Reported Events Used		17								
39	Number Values Reported (n)		17								
40	Minimum		0.48								
41	Maximum		0.53								
42	Mean		0.497								
43	Geometric Mean		0.497								
44	Median		0.5								
45	Standard Deviation		0.0136								
46	Coefficient of Variation		0.0273								
47											
48	<b>Mann-Kendall Test</b>										
49	M-K Test Value (S)		6								
50	Tabulated p-value		0.42								
51	Standard Deviation of S		23.25								
52	Standardized Value of S		0.215								
53	Approximate p-value		0.415								
54											
55	<b>Insufficient evidence to identify a significant</b>										
56	<b>trend at the specified level of significance.</b>										
57	<b>Boron-m-60</b>										
58											
59	<b>General Statistics</b>										
60	Number of Events Reported (m)		17								
61	Number of Missing Events		0								
62	Number or Reported Events Used		17								
63	Number Values Reported (n)		17								
64	Minimum		0.48								
65	Maximum		0.54								
66	Mean		0.512								
67	Geometric Mean		0.512								

	A	B	C	D	E	F	G	H	I	J	K	L
68				Median	0.51							
69				Standard Deviation	0.0164							
70				Coefficient of Variation	0.032							
71												
72				<b>Mann-Kendall Test</b>								
73				M-K Test Value (S)	-17							
74				Tabulated p-value	0.271							
75				Standard Deviation of S	23.71							
76				Standardized Value of S	-0.675							
77				Approximate p-value	0.25							
78												
79				<b>Insufficient evidence to identify a significant</b>								
80				<b>trend at the specified level of significance.</b>								
81				<b>Boron-m-61</b>								
82												
83				<b>General Statistics</b>								
84				Number of Events Reported (m)	17							
85				Number of Missing Events	0							
86				Number of Reported Events Used	17							
87				Number Values Reported (n)	17							
88				Minimum	0.48							
89				Maximum	0.52							
90				Mean	0.499							
91				Geometric Mean	0.499							
92				Median	0.5							
93				Standard Deviation	0.0114							
94				Coefficient of Variation	0.0229							
95												
96				<b>Mann-Kendall Test</b>								
97				M-K Test Value (S)	-16							
98				Tabulated p-value	0.271							
99				Standard Deviation of S	22.74							
100				Standardized Value of S	-0.659							
101				Approximate p-value	0.255							
102												
103				<b>Insufficient evidence to identify a significant</b>								
104				<b>trend at the specified level of significance.</b>								

A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Mann-Kendall Trend Test Analysis</b>										
2	User Selected Options										
3	Date/Time of Computation		ProUCL 5.110/2/2019 12:55:07 PM								
4	From File		Cholla_BAM_ApplIldatathruApr2019.xls								
5	Full Precision		OFF								
6	Confidence Coefficient		0.95								
7	Level of Significance		0.05								
8											
9	<b>Calcium-m-54</b>										
10											
11	<b>General Statistics</b>										
12	Number of Events Reported (m)		17								
13	Number of Missing Events		0								
14	Number or Reported Events Used		17								
15	Number Values Reported (n)		17								
16	Minimum		95								
17	Maximum		110								
18	Mean		99.47								
19	Geometric Mean		99.43								
20	Median		100								
21	Standard Deviation		3.165								
22	Coefficient of Variation		0.0318								
23											
24	<b>Mann-Kendall Test</b>										
25	M-K Test Value (S)		-38								
26	Tabulated p-value		0.064								
27	Standard Deviation of S		22.26								
28	Standardized Value of S		-1.662								
29	Approximate p-value		0.0482								
30											
31	<b>Insufficient evidence to identify a significant</b>										
32	<b>trend at the specified level of significance.</b>										
33	<b>Calcium-m-59</b>										
34											
35	<b>General Statistics</b>										
36	Number of Events Reported (m)		17								
37	Number of Missing Events		0								
38	Number or Reported Events Used		17								
39	Number Values Reported (n)		17								
40	Minimum		84								
41	Maximum		93								
42	Mean		87.76								
43	Geometric Mean		87.73								
44	Median		88								
45	Standard Deviation		2.513								
46	Coefficient of Variation		0.0286								
47											
48	<b>Mann-Kendall Test</b>										
49	M-K Test Value (S)		2								
50	Tabulated p-value		0.484								
51	Standard Deviation of S		23.96								
52	Standardized Value of S		0.0417								
53	Approximate p-value		0.483								
54											
55	<b>Insufficient evidence to identify a significant</b>										
56	<b>trend at the specified level of significance.</b>										
57	<b>Calcium-m-60</b>										
58											
59	<b>General Statistics</b>										
60	Number of Events Reported (m)		17								
61	Number of Missing Events		0								
62	Number or Reported Events Used		17								
63	Number Values Reported (n)		17								
64	Minimum		83								
65	Maximum		92								
66	Mean		87.59								
67	Geometric Mean		87.55								

	A	B	C	D	E	F	G	H	I	J	K	L
68				Median	88							
69				Standard Deviation	2.671							
70				Coefficient of Variation	0.0305							
71												
72				<b>Mann-Kendall Test</b>								
73				M-K Test Value (S)	-35							
74				Tabulated p-value	0.088							
75				Standard Deviation of S	24.01							
76				Standardized Value of S	-1.416							
77				Approximate p-value	0.0784							
78												
79				<b>Insufficient evidence to identify a significant</b>								
80				<b>trend at the specified level of significance.</b>								
81				<b>Calcium-m-61</b>								
82												
83				<b>General Statistics</b>								
84				Number of Events Reported (m)	17							
85				Number of Missing Events	0							
86				Number of Reported Events Used	17							
87				Number Values Reported (n)	17							
88				Minimum	86							
89				Maximum	94							
90				Mean	90.06							
91				Geometric Mean	90.03							
92				Median	90							
93				Standard Deviation	2.193							
94				Coefficient of Variation	0.0243							
95												
96				<b>Mann-Kendall Test</b>								
97				M-K Test Value (S)	-11							
98				Tabulated p-value	0.358							
99				Standard Deviation of S	23.92							
100				Standardized Value of S	-0.418							
101				Approximate p-value	0.338							
102												
103				<b>Insufficient evidence to identify a significant</b>								
104				<b>trend at the specified level of significance.</b>								

A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Mann-Kendall Trend Test Analysis</b>										
2	User Selected Options										
3	Date/Time of Computation		ProUCL 5.110/2/2019 12:55:45 PM								
4	From File		Cholla_BAM_ApplIldatathruApr2019.xls								
5	Full Precision		OFF								
6	Confidence Coefficient		0.95								
7	Level of Significance		0.05								
8											
9	<b>Chloride-m-54</b>										
10											
11	<b>General Statistics</b>										
12	Number of Events Reported (m)		17								
13	Number of Missing Events		0								
14	Number or Reported Events Used		17								
15	Number Values Reported (n)		17								
16	Minimum		1300								
17	Maximum		1600								
18	Mean		1506								
19	Geometric Mean		1504								
20	Median		1500								
21	Standard Deviation		82.69								
22	Coefficient of Variation		0.0549								
23											
24	<b>Mann-Kendall Test</b>										
25	M-K Test Value (S)		-9								
26	Tabulated p-value		0.388								
27	Standard Deviation of S		21.9								
28	Standardized Value of S		-0.365								
29	Approximate p-value		0.357								
30											
31	<b>Insufficient evidence to identify a significant</b>										
32	<b>trend at the specified level of significance.</b>										
33	<b>Chloride-m-59</b>										
34											
35	<b>General Statistics</b>										
36	Number of Events Reported (m)		17								
37	Number of Missing Events		0								
38	Number or Reported Events Used		17								
39	Number Values Reported (n)		17								
40	Minimum		1200								
41	Maximum		1400								
42	Mean		1341								
43	Geometric Mean		1339								
44	Median		1400								
45	Standard Deviation		71.23								
46	Coefficient of Variation		0.0531								
47											
48	<b>Mann-Kendall Test</b>										
49	M-K Test Value (S)		-4								
50	Tabulated p-value		0.452								
51	Standard Deviation of S		21.63								
52	Standardized Value of S		-0.139								
53	Approximate p-value		0.445								
54											
55	<b>Insufficient evidence to identify a significant</b>										
56	<b>trend at the specified level of significance.</b>										
57	<b>Chloride-m-60</b>										
58											
59	<b>General Statistics</b>										
60	Number of Events Reported (m)		17								
61	Number of Missing Events		0								
62	Number or Reported Events Used		17								
63	Number Values Reported (n)		17								
64	Minimum		1300								
65	Maximum		1500								
66	Mean		1388								
67	Geometric Mean		1387								

	A	B	C	D	E	F	G	H	I	J	K	L
68				Median	1400							
69				Standard Deviation	60.02							
70				Coefficient of Variation	0.0432							
71												
72				<b>Mann-Kendall Test</b>								
73				M-K Test Value (S)	6							
74				Tabulated p-value	0.42							
75				Standard Deviation of S	20.36							
76				Standardized Value of S	0.246							
77				Approximate p-value	0.403							
78												
79				<b>Insufficient evidence to identify a significant</b>								
80				<b>trend at the specified level of significance.</b>								
81				<b>Chloride-m-61</b>								
82												
83				<b>General Statistics</b>								
84				Number of Events Reported (m)	17							
85				Number of Missing Events	0							
86				Number of Reported Events Used	17							
87				Number Values Reported (n)	17							
88				Minimum	1100							
89				Maximum	1700							
90				Mean	1394							
91				Geometric Mean	1389							
92				Median	1400							
93				Standard Deviation	119.7							
94				Coefficient of Variation	0.0859							
95												
96				<b>Mann-Kendall Test</b>								
97				M-K Test Value (S)	-1							
98				Tabulated p-value	0.516							
99				Standard Deviation of S	21.44							
100				Standardized Value of S	0							
101				Approximate p-value	0.5							
102												
103				<b>Insufficient evidence to identify a significant</b>								
104				<b>trend at the specified level of significance.</b>								

A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Mann-Kendall Trend Test Analysis</b>										
2	User Selected Options										
3	Date/Time of Computation		ProUCL 5.110/2/2019 12:56:23 PM								
4	From File		Cholla_BAM_ApplIldatathruApr2019.xls								
5	Full Precision		OFF								
6	Confidence Coefficient		0.95								
7	Level of Significance		0.05								
8											
9	<b>Fluoride-m-54</b>										
10											
11	<b>General Statistics</b>										
12	Number of Events Reported (m)		17								
13	Number of Missing Events		0								
14	Number or Reported Events Used		17								
15	Number Values Reported (n)		17								
16	Minimum		1.2								
17	Maximum		1.4								
18	Mean		1.347								
19	Geometric Mean		1.346								
20	Median		1.4								
21	Standard Deviation		0.0624								
22	Coefficient of Variation		0.0463								
23											
24	<b>Mann-Kendall Test</b>										
25	M-K Test Value (S)		41								
26	Tabulated p-value		0.054								
27	Standard Deviation of S		21.28								
28	Standardized Value of S		1.879								
29	Approximate p-value		0.0301								
30											
31	<b>Insufficient evidence to identify a significant</b>										
32	<b>trend at the specified level of significance.</b>										
33	<b>Fluoride-m-59</b>										
34											
35	<b>General Statistics</b>										
36	Number of Events Reported (m)		17								
37	Number of Missing Events		0								
38	Number or Reported Events Used		17								
39	Number Values Reported (n)		17								
40	Minimum		1.3								
41	Maximum		1.5								
42	Mean		1.388								
43	Geometric Mean		1.387								
44	Median		1.4								
45	Standard Deviation		0.06								
46	Coefficient of Variation		0.0432								
47											
48	<b>Mann-Kendall Test</b>										
49	M-K Test Value (S)		42								
50	Tabulated p-value		0.046								
51	Standard Deviation of S		20.36								
52	Standardized Value of S		2.013								
53	Approximate p-value		0.022								
54											
55	<b>Statistically significant evidence of an increasing</b>										
56	<b>trend at the specified level of significance.</b>										
57	<b>Fluoride-m-60</b>										
58											
59	<b>General Statistics</b>										
60	Number of Events Reported (m)		17								
61	Number of Missing Events		0								
62	Number or Reported Events Used		17								
63	Number Values Reported (n)		17								
64	Minimum		1.3								
65	Maximum		1.5								
66	Mean		1.429								
67	Geometric Mean		1.428								



	A	B	C	D	E	F	G	H	I	J	K	L
68				Median	1.4							
69				Standard Deviation	0.0588							
70				Coefficient of Variation	0.0411							
71												
72				<b>Mann-Kendall Test</b>								
73				M-K Test Value (S)	18							
74				Tabulated p-value	0.245							
75				Standard Deviation of S	20.88							
76				Standardized Value of S	0.814							
77				Approximate p-value	0.208							
78												
79				<b>Insufficient evidence to identify a significant</b>								
80				<b>trend at the specified level of significance.</b>								
81				<b>Fluoride-m-61</b>								
82												
83				<b>General Statistics</b>								
84				Number of Events Reported (m)	17							
85				Number of Missing Events	0							
86				Number of Reported Events Used	17							
87				Number Values Reported (n)	17							
88				Minimum	1.3							
89				Maximum	1.5							
90				Mean	1.418							
91				Geometric Mean	1.416							
92				Median	1.4							
93				Standard Deviation	0.0636							
94				Coefficient of Variation	0.0449							
95												
96				<b>Mann-Kendall Test</b>								
97				M-K Test Value (S)	28							
98				Tabulated p-value	0.135							
99				Standard Deviation of S	21.13							
100				Standardized Value of S	1.278							
101				Approximate p-value	0.101							
102												
103				<b>Insufficient evidence to identify a significant</b>								
104				<b>trend at the specified level of significance.</b>								

A	B	C	D	E	F	G	H	I	J	K	L
1			<b>Mann-Kendall Trend Test Analysis</b>								
2	User Selected Options										
3	Date/Time of Computation		ProUCL 5.110/2/2019 12:56:59 PM								
4	From File		Cholla_BAM_ApplIldatathruApr2019.xls								
5	Full Precision		OFF								
6	Confidence Coefficient		0.95								
7	Level of Significance		0.05								
8											
9	<b>pH-m-54</b>										
10											
11	<b>General Statistics</b>										
12	Number of Events Reported (m)		17								
13	Number of Missing Events		1								
14	Number or Reported Events Used		16								
15	Number Values Reported (n)		17								
16	Number Values Missing		1								
17	Number Values Used		16								
18	Minimum		7.34								
19	Maximum		7.8								
20	Mean		7.581								
21	Geometric Mean		7.58								
22	Median		7.6								
23	Standard Deviation		0.133								
24	Coefficient of Variation		0.0175								
25											
26	<b>Mann-Kendall Test</b>										
27	M-K Test Value (S)		-3								
28	Tabulated p-value		0.482								
29	Standard Deviation of S		21.64								
30	Standardized Value of S		-0.0924								
31	Approximate p-value		0.463								
32											
33	<b>Insufficient evidence to identify a significant</b>										
34	<b>trend at the specified level of significance.</b>										
35	<b>pH-m-59</b>										
36											
37	<b>General Statistics</b>										
38	Number of Events Reported (m)		17								
39	Number of Missing Events		1								
40	Number or Reported Events Used		16								
41	Number Values Reported (n)		17								
42	Number Values Missing		1								
43	Number Values Used		16								
44	Minimum		7.5								
45	Maximum		8.1								
46	Mean		7.706								
47	Geometric Mean		7.705								
48	Median		7.7								
49	Standard Deviation		0.156								
50	Coefficient of Variation		0.0202								
51											
52	<b>Mann-Kendall Test</b>										
53	M-K Test Value (S)		9								
54	Tabulated p-value		0.378								
55	Standard Deviation of S		21.73								
56	Standardized Value of S		0.368								
57	Approximate p-value		0.356								
58											
59	<b>Insufficient evidence to identify a significant</b>										
60	<b>trend at the specified level of significance.</b>										
61	<b>pH-m-60</b>										
62											
63	<b>General Statistics</b>										
64	Number of Events Reported (m)		17								
65	Number of Missing Events		1								
66	Number or Reported Events Used		16								
67	Number Values Reported (n)		17								

	A	B	C	D	E	F	G	H	I	J	K	L
68				Number Values Missing	1							
69				Number Values Used	16							
70				Minimum	7.5							
71				Maximum	8							
72				Mean	7.693							
73				Geometric Mean	7.692							
74				Median	7.7							
75				Standard Deviation	0.133							
76				Coefficient of Variation	0.0173							
77												
78				<b>Mann-Kendall Test</b>								
79				M-K Test Value (S)	-31							
80				Tabulated p-value	0.097							
81				Standard Deviation of S	21.64							
82				Standardized Value of S	-1.386							
83				Approximate p-value	0.0828							
84												
85				<b>Insufficient evidence to identify a significant</b>								
86				<b>trend at the specified level of significance.</b>								
87				<b>pH-m-61</b>								
88												
89				<b>General Statistics</b>								
90				Number of Events Reported (m)	17							
91				Number of Missing Events	1							
92				Number of Reported Events Used	16							
93				Number Values Reported (n)	17							
94				Number Values Missing	1							
95				Number Values Used	16							
96				Minimum	7.22							
97				Maximum	8							
98				Mean	7.657							
99				Geometric Mean	7.655							
100				Median	7.65							
101				Standard Deviation	0.187							
102				Coefficient of Variation	0.0244							
103												
104				<b>Mann-Kendall Test</b>								
105				M-K Test Value (S)	-14							
106				Tabulated p-value	0.282							
107				Standard Deviation of S	21.88							
108				Standardized Value of S	-0.594							
109				Approximate p-value	0.276							
110												
111				<b>Insufficient evidence to identify a significant</b>								
112				<b>trend at the specified level of significance.</b>								

A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Mann-Kendall Trend Test Analysis</b>										
2	User Selected Options										
3	Date/Time of Computation		ProUCL 5.110/2/2019 12:57:35 PM								
4	From File		Cholla_BAM_ApplIldatathruApr2019.xls								
5	Full Precision		OFF								
6	Confidence Coefficient		0.95								
7	Level of Significance		0.05								
8											
9	<b>Sulfate-m-54</b>										
10											
11	<b>General Statistics</b>										
12	Number of Events Reported (m)		17								
13	Number of Missing Events		0								
14	Number or Reported Events Used		17								
15	Number Values Reported (n)		17								
16	Minimum		340								
17	Maximum		380								
18	Mean		361.8								
19	Geometric Mean		361.6								
20	Median		360								
21	Standard Deviation		12.37								
22	Coefficient of Variation		0.0342								
23											
24	<b>Mann-Kendall Test</b>										
25	M-K Test Value (S)		-21								
26	Tabulated p-value		0.22								
27	Standard Deviation of S		23.49								
28	Standardized Value of S		-0.852								
29	Approximate p-value		0.197								
30											
31	<b>Insufficient evidence to identify a significant</b>										
32	<b>trend at the specified level of significance.</b>										
33	<b>Sulfate-m-59</b>										
34											
35	<b>General Statistics</b>										
36	Number of Events Reported (m)		17								
37	Number of Missing Events		0								
38	Number or Reported Events Used		17								
39	Number Values Reported (n)		17								
40	Minimum		330								
41	Maximum		370								
42	Mean		348.2								
43	Geometric Mean		348.1								
44	Median		350								
45	Standard Deviation		10.74								
46	Coefficient of Variation		0.0309								
47											
48	<b>Mann-Kendall Test</b>										
49	M-K Test Value (S)		27								
50	Tabulated p-value		0.154								
51	Standard Deviation of S		23.06								
52	Standardized Value of S		1.128								
53	Approximate p-value		0.13								
54											
55	<b>Insufficient evidence to identify a significant</b>										
56	<b>trend at the specified level of significance.</b>										
57	<b>Sulfate-m-60</b>										
58											
59	<b>General Statistics</b>										
60	Number of Events Reported (m)		17								
61	Number of Missing Events		0								
62	Number or Reported Events Used		17								
63	Number Values Reported (n)		17								
64	Minimum		340								
65	Maximum		440								
66	Mean		358.8								
67	Geometric Mean		358.3								

	A	B	C	D	E	F	G	H	I	J	K	L
68				Median	350							
69				Standard Deviation	22.05							
70				Coefficient of Variation	0.0614							
71												
72				<b>Mann-Kendall Test</b>								
73				M-K Test Value (S)	16							
74				Tabulated p-value	0.271							
75				Standard Deviation of S	21.92							
76				Standardized Value of S	0.684							
77				Approximate p-value	0.247							
78												
79				<b>Insufficient evidence to identify a significant</b>								
80				<b>trend at the specified level of significance.</b>								
81				<b>Sulfate-m-61</b>								
82												
83				<b>General Statistics</b>								
84				Number of Events Reported (m)	17							
85				Number of Missing Events	0							
86				Number of Reported Events Used	17							
87				Number Values Reported (n)	17							
88				Minimum	340							
89				Maximum	420							
90				Mean	362.4							
91				Geometric Mean	361.8							
92				Median	360							
93				Standard Deviation	20.16							
94				Coefficient of Variation	0.0556							
95												
96				<b>Mann-Kendall Test</b>								
97				M-K Test Value (S)	30							
98				Tabulated p-value	0.118							
99				Standard Deviation of S	23.51							
100				Standardized Value of S	1.234							
101				Approximate p-value	0.109							
102												
103				<b>Insufficient evidence to identify a significant</b>								
104				<b>trend at the specified level of significance.</b>								

	A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Mann-Kendall Trend Test Analysis</b>											
2	User Selected Options											
3	Date/Time of Computation		ProUCL 5.110/2/2019 12:58:05 PM									
4	From File		Cholla_BAM_ApplIldatathruApr2019.xls									
5	Full Precision		OFF									
6	Confidence Coefficient		0.95									
7	Level of Significance		0.05									
8												
9	<b>DissolvedSolids-m-54</b>											
10												
11	<b>General Statistics</b>											
12	Number of Events Reported (m)		17									
13	Number of Missing Events		0									
14	Number or Reported Events Used		17									
15	Number Values Reported (n)		17									
16	Minimum		2900									
17	Maximum		3200									
18	Mean		3041									
19	Geometric Mean		3039									
20	Median		3000									
21	Standard Deviation		106.4									
22	Coefficient of Variation		0.035									
23												
24	<b>Mann-Kendall Test</b>											
25	M-K Test Value (S)		3									
26	Tabulated p-value		0.484									
27	Standard Deviation of S		23.32									
28	Standardized Value of S		0.0858									
29	Approximate p-value		0.466									
30												
31	<b>Insufficient evidence to identify a significant</b>											
32	<b>trend at the specified level of significance.</b>											
33	<b>DissolvedSolids-m-59</b>											
34												
35	<b>General Statistics</b>											
36	Number of Events Reported (m)		17									
37	Number of Missing Events		0									
38	Number or Reported Events Used		17									
39	Number Values Reported (n)		17									
40	Minimum		2500									
41	Maximum		2900									
42	Mean		2712									
43	Geometric Mean		2710									
44	Median		2700									
45	Standard Deviation		99.26									
46	Coefficient of Variation		0.0366									
47												
48	<b>Mann-Kendall Test</b>											
49	M-K Test Value (S)		-28									
50	Tabulated p-value		0.135									
51	Standard Deviation of S		21.32									
52	Standardized Value of S		-1.266									
53	Approximate p-value		0.103									
54												
55	<b>Insufficient evidence to identify a significant</b>											
56	<b>trend at the specified level of significance.</b>											
57	<b>DissolvedSolids-m-60</b>											
58												
59	<b>General Statistics</b>											
60	Number of Events Reported (m)		17									
61	Number of Missing Events		0									
62	Number or Reported Events Used		17									
63	Number Values Reported (n)		17									
64	Minimum		2500									
65	Maximum		3000									
66	Mean		2788									
67	Geometric Mean		2786									

	A	B	C	D	E	F	G	H	I	J	K	L
68				Median	2800							
69				Standard Deviation	111.1							
70				Coefficient of Variation	0.0399							
71												
72				<b>Mann-Kendall Test</b>								
73				M-K Test Value (S)	-16							
74				Tabulated p-value	0.271							
75				Standard Deviation of S	20.58							
76				Standardized Value of S	-0.729							
77				Approximate p-value	0.233							
78												
79				<b>Insufficient evidence to identify a significant</b>								
80				<b>trend at the specified level of significance.</b>								
81				<b>DissolvedSolids-m-61</b>								
82												
83				<b>General Statistics</b>								
84				Number of Events Reported (m)	17							
85				Number of Missing Events	0							
86				Number or Reported Events Used	17							
87				Number Values Reported (n)	17							
88				Minimum	2600							
89				Maximum	3000							
90				Mean	2812							
91				Geometric Mean	2810							
92				Median	2800							
93				Standard Deviation	105.4							
94				Coefficient of Variation	0.0375							
95												
96				<b>Mann-Kendall Test</b>								
97				M-K Test Value (S)	-15							
98				Tabulated p-value	0.299							
99				Standard Deviation of S	22.71							
100				Standardized Value of S	-0.617							
101				Approximate p-value	0.269							
102												
103				<b>Insufficient evidence to identify a significant</b>								
104				<b>trend at the specified level of significance.</b>								

A	B	C	D	E	F	G	H	I	J	K	L
1				<b>Outlier Tests for Selected Uncensored Variables</b>							
2	<b>User Selected Options</b>										
3	Date/Time of Computation	ProUCL 5.110/2/2019 1:01:15 PM									
4		From File	Cholla_BAM_ApplIldatathruApr2019.xls								
5		Full Precision	OFF								
6											
7											
8	<b>Dixon's Outlier Test for Boron (m-54)</b>										
9											
10	Number of Observations = 17										
11	10% critical value: 0.438										
12	5% critical value: 0.49										
13	1% critical value: 0.577										
14											
15	<b>1. Observation Value 0.56 is a Potential Outlier (Upper)</b>										
16											
17	Test Statistic: 0.500										
18											
19	For 10% significance level, 0.56 is an outlier.										
20	For 5% significance level, 0.56 is an outlier.										
21	For 1% significance level, 0.56 is not an outlier.										
22											
23	<b>2. Observation Value 0.5 is a Potential Outlier (Lower)</b>										
24											
25	Test Statistic: 0.000										
26											
27	For 10% significance level, 0.5 is not an outlier.										
28	For 5% significance level, 0.5 is not an outlier.										
29	For 1% significance level, 0.5 is not an outlier.										
30											
31											
32	<b>Dixon's Outlier Test for Boron (m-59)</b>										
33											
34	Number of Observations = 17										
35	10% critical value: 0.438										
36	5% critical value: 0.49										
37	1% critical value: 0.577										
38											
39	<b>1. Observation Value 0.53 is a Potential Outlier (Upper)</b>										
40											
41	Test Statistic: 0.400										
42											
43	For 10% significance level, 0.53 is not an outlier.										
44	For 5% significance level, 0.53 is not an outlier.										
45	For 1% significance level, 0.53 is not an outlier.										
46											
47	<b>2. Observation Value 0.48 is a Potential Outlier (Lower)</b>										
48											
49	Test Statistic: 0.000										
50											
51	For 10% significance level, 0.48 is not an outlier.										
52	For 5% significance level, 0.48 is not an outlier.										
53	For 1% significance level, 0.48 is not an outlier.										
54											
55											
56	<b>Dixon's Outlier Test for Boron (m-60)</b>										
57											
58	Number of Observations = 17										
59	10% critical value: 0.438										
60	5% critical value: 0.49										
61	1% critical value: 0.577										
62											
63	<b>1. Observation Value 0.54 is a Potential Outlier (Upper)</b>										
64											
65	Test Statistic: 0.250										
66											
67	For 10% significance level, 0.54 is not an outlier.										



A	B	C	D	E	F	G	H	I	J	K	L
68	For 5% significance level, 0.54 is not an outlier.										
69	For 1% significance level, 0.54 is not an outlier.										
70											
71	<b>2. Observation Value 0.48 is a Potential Outlier (Lower)</b>										
72											
73	Test Statistic: 0.400										
74											
75	For 10% significance level, 0.48 is not an outlier.										
76	For 5% significance level, 0.48 is not an outlier.										
77	For 1% significance level, 0.48 is not an outlier.										
78											
79											
80	<b>Dixon's Outlier Test for Boron (m-61)</b>										
81											
82	Number of Observations = 17										
83	10% critical value: 0.438										
84	5% critical value: 0.49										
85	1% critical value: 0.577										
86											
87	<b>1. Observation Value 0.52 is a Potential Outlier (Upper)</b>										
88											
89	Test Statistic: 0.333										
90											
91	For 10% significance level, 0.52 is not an outlier.										
92	For 5% significance level, 0.52 is not an outlier.										
93	For 1% significance level, 0.52 is not an outlier.										
94											
95	<b>2. Observation Value 0.48 is a Potential Outlier (Lower)</b>										
96											
97	Test Statistic: 0.333										
98											
99	For 10% significance level, 0.48 is not an outlier.										
100	For 5% significance level, 0.48 is not an outlier.										
101	For 1% significance level, 0.48 is not an outlier.										
102											
103											
104	<b>Dixon's Outlier Test for Calcium (m-54)</b>										
105											
106	Number of Observations = 17										
107	10% critical value: 0.438										
108	5% critical value: 0.49										
109	1% critical value: 0.577										
110											
111	<b>1. Observation Value 110 is a Potential Outlier (Upper)</b>										
112											
113	Test Statistic: 0.769										
114											
115	For 10% significance level, 110 is an outlier.										
116	For 5% significance level, 110 is an outlier.										
117	For 1% significance level, 110 is an outlier.										
118											
119	<b>2. Observation Value 95 is a Potential Outlier (Lower)</b>										
120											
121	Test Statistic: 0.400										
122											
123	For 10% significance level, 95 is not an outlier.										
124	For 5% significance level, 95 is not an outlier.										
125	For 1% significance level, 95 is not an outlier.										
126											
127											
128	<b>Dixon's Outlier Test for Calcium (m-59)</b>										
129											
130	Number of Observations = 17										
131	10% critical value: 0.438										
132	5% critical value: 0.49										
133	1% critical value: 0.577										
134											

A	B	C	D	E	F	G	H	I	J	K	L
135	<b>1. Observation Value 93 is a Potential Outlier (Upper</b>										
136											
137	Test Statistic: 0.375										
138											
139	For 10% significance level, 93 is not an outlier.										
140	For 5% significance level, 93 is not an outlier.										
141	For 1% significance level, 93 is not an outlier.										
142											
143	<b>2. Observation Value 84 is a Potential Outlier (Lower</b>										
144											
145	Test Statistic: 0.167										
146											
147	For 10% significance level, 84 is not an outlier.										
148	For 5% significance level, 84 is not an outlier.										
149	For 1% significance level, 84 is not an outlier.										
150											
151											
152	<b>Dixon's Outlier Test for Calcium (m-60)</b>										
153											
154	Number of Observations = 17										
155	10% critical value: 0.438										
156	5% critical value: 0.49										
157	1% critical value: 0.577										
158											
159	<b>1. Observation Value 92 is a Potential Outlier (Upper</b>										
160											
161	Test Statistic: 0.250										
162											
163	For 10% significance level, 92 is not an outlier.										
164	For 5% significance level, 92 is not an outlier.										
165	For 1% significance level, 92 is not an outlier.										
166											
167	<b>2. Observation Value 83 is a Potential Outlier (Lower</b>										
168											
169	Test Statistic: 0.143										
170											
171	For 10% significance level, 83 is not an outlier.										
172	For 5% significance level, 83 is not an outlier.										
173	For 1% significance level, 83 is not an outlier.										
174											
175											
176	<b>Dixon's Outlier Test for Calcium (m-61)</b>										
177											
178	Number of Observations = 17										
179	10% critical value: 0.438										
180	5% critical value: 0.49										
181	1% critical value: 0.577										
182											
183	<b>1. Observation Value 94 is a Potential Outlier (Upper</b>										
184											
185	Test Statistic: 0.333										
186											
187	For 10% significance level, 94 is not an outlier.										
188	For 5% significance level, 94 is not an outlier.										
189	For 1% significance level, 94 is not an outlier.										
190											
191	<b>2. Observation Value 86 is a Potential Outlier (Lower</b>										
192											
193	Test Statistic: 0.333										
194											
195	For 10% significance level, 86 is not an outlier.										
196	For 5% significance level, 86 is not an outlier.										
197	For 1% significance level, 86 is not an outlier.										
198											
199											
200	<b>Dixon's Outlier Test for Chloride (m-54)</b>										
201											

A	B	C	D	E	F	G	H	I	J	K	L
202	Number of Observations = 17										
203	10% critical value: 0.438										
204	5% critical value: 0.49										
205	1% critical value: 0.577										
206											
207	<b>1. Observation Value 1600 is a Potential Outlier (Upper)</b>										
208											
209	Test Statistic: 0.000										
210											
211	For 10% significance level, 1600 is not an outlier.										
212	For 5% significance level, 1600 is not an outlier.										
213	For 1% significance level, 1600 is not an outlier.										
214											
215	<b>2. Observation Value 1300 is a Potential Outlier (Lower)</b>										
216											
217	Test Statistic: 0.333										
218											
219	For 10% significance level, 1300 is not an outlier.										
220	For 5% significance level, 1300 is not an outlier.										
221	For 1% significance level, 1300 is not an outlier.										
222											
223											
224	<b>Dixon's Outlier Test for Chloride (m-59)</b>										
225											
226	Number of Observations = 17										
227	10% critical value: 0.438										
228	5% critical value: 0.49										
229	1% critical value: 0.577										
230											
231	<b>1. Observation Value 1400 is a Potential Outlier (Upper)</b>										
232											
233	Test Statistic: 0.000										
234											
235	For 10% significance level, 1400 is not an outlier.										
236	For 5% significance level, 1400 is not an outlier.										
237	For 1% significance level, 1400 is not an outlier.										
238											
239	<b>2. Observation Value 1200 is a Potential Outlier (Lower)</b>										
240											
241	Test Statistic: 0.500										
242											
243	For 10% significance level, 1200 is an outlier.										
244	For 5% significance level, 1200 is an outlier.										
245	For 1% significance level, 1200 is not an outlier.										
246											
247											
248	<b>Dixon's Outlier Test for Chloride (m-60)</b>										
249											
250	Number of Observations = 17										
251	10% critical value: 0.438										
252	5% critical value: 0.49										
253	1% critical value: 0.577										
254											
255	<b>1. Observation Value 1500 is a Potential Outlier (Upper)</b>										
256											
257	Test Statistic: 0.500										
258											
259	For 10% significance level, 1500 is an outlier.										
260	For 5% significance level, 1500 is an outlier.										
261	For 1% significance level, 1500 is not an outlier.										
262											
263	<b>2. Observation Value 1300 is a Potential Outlier (Lower)</b>										
264											
265	Test Statistic: 0.000										
266											
267	For 10% significance level, 1300 is not an outlier.										
268	For 5% significance level, 1300 is not an outlier.										

A	B	C	D	E	F	G	H	I	J	K	L
269	For 1% significance level, 1300 is not an outlier.										
270											
271											
272	<b>Dixon's Outlier Test for Chloride (m-61)</b>										
273											
274	Number of Observations = 17										
275	10% critical value: 0.438										
276	5% critical value: 0.49										
277	1% critical value: 0.577										
278											
279	<b>1. Observation Value 1700 is a Potential Outlier (Upper)</b>										
280											
281	Test Statistic: 0.500										
282											
283	For 10% significance level, 1700 is an outlier.										
284	For 5% significance level, 1700 is an outlier.										
285	For 1% significance level, 1700 is not an outlier.										
286											
287	<b>2. Observation Value 1100 is a Potential Outlier (Lower)</b>										
288											
289	Test Statistic: 0.500										
290											
291	For 10% significance level, 1100 is an outlier.										
292	For 5% significance level, 1100 is an outlier.										
293	For 1% significance level, 1100 is not an outlier.										
294											
295											
296	<b>Dixon's Outlier Test for Fluoride (m-54)</b>										
297											
298	Number of Observations = 17										
299	10% critical value: 0.438										
300	5% critical value: 0.49										
301	1% critical value: 0.577										
302											
303	<b>1. Observation Value 1.4 is a Potential Outlier (Upper)</b>										
304											
305	Test Statistic: 0.000										
306											
307	For 10% significance level, 1.4 is not an outlier.										
308	For 5% significance level, 1.4 is not an outlier.										
309	For 1% significance level, 1.4 is not an outlier.										
310											
311	<b>2. Observation Value 1.2 is a Potential Outlier (Lower)</b>										
312											
313	Test Statistic: 0.500										
314											
315	For 10% significance level, 1.2 is an outlier.										
316	For 5% significance level, 1.2 is an outlier.										
317	For 1% significance level, 1.2 is not an outlier.										
318											
319											
320	<b>Dixon's Outlier Test for Fluoride (m-59)</b>										
321											
322	Number of Observations = 17										
323	10% critical value: 0.438										
324	5% critical value: 0.49										
325	1% critical value: 0.577										
326											
327	<b>1. Observation Value 1.5 is a Potential Outlier (Upper)</b>										
328											
329	Test Statistic: 0.500										
330											
331	For 10% significance level, 1.5 is an outlier.										
332	For 5% significance level, 1.5 is an outlier.										
333	For 1% significance level, 1.5 is not an outlier.										
334											
335	<b>2. Observation Value 1.3 is a Potential Outlier (Lower)</b>										

A	B	C	D	E	F	G	H	I	J	K	L
336											
337	Test Statistic: 0.000										
338											
339	For 10% significance level, 1.3 is not an outlier.										
340	For 5% significance level, 1.3 is not an outlier.										
341	For 1% significance level, 1.3 is not an outlier.										
342											
343											
344	<b>Dixon's Outlier Test for Fluoride (m-60)</b>										
345											
346	Number of Observations = 17										
347	10% critical value: 0.438										
348	5% critical value: 0.49										
349	1% critical value: 0.577										
350											
351	<b>1. Observation Value 1.5 is a Potential Outlier (Upper)</b>										
352											
353	Test Statistic: 0.000										
354											
355	For 10% significance level, 1.5 is not an outlier.										
356	For 5% significance level, 1.5 is not an outlier.										
357	For 1% significance level, 1.5 is not an outlier.										
358											
359	<b>2. Observation Value 1.3 is a Potential Outlier (Lower)</b>										
360											
361	Test Statistic: 0.500										
362											
363	For 10% significance level, 1.3 is an outlier.										
364	For 5% significance level, 1.3 is an outlier.										
365	For 1% significance level, 1.3 is not an outlier.										
366											
367											
368	<b>Dixon's Outlier Test for Fluoride (m-61)</b>										
369											
370	Number of Observations = 17										
371	10% critical value: 0.438										
372	5% critical value: 0.49										
373	1% critical value: 0.577										
374											
375	<b>1. Observation Value 1.5 is a Potential Outlier (Upper)</b>										
376											
377	Test Statistic: 0.000										
378											
379	For 10% significance level, 1.5 is not an outlier.										
380	For 5% significance level, 1.5 is not an outlier.										
381	For 1% significance level, 1.5 is not an outlier.										
382											
383	<b>2. Observation Value 1.3 is a Potential Outlier (Lower)</b>										
384											
385	Test Statistic: 0.500										
386											
387	For 10% significance level, 1.3 is an outlier.										
388	For 5% significance level, 1.3 is an outlier.										
389	For 1% significance level, 1.3 is not an outlier.										
390											
391											
392	<b>Dixon's Outlier Test for pH (m-54)</b>										
393											
394	Number of Observations = 16										
395	10% critical value: 0.454										
396	5% critical value: 0.507										
397	1% critical value: 0.595										
398											
399	<b>1. Observation Value 7.8 is a Potential Outlier (Upper)</b>										
400											
401	Test Statistic: 0.250										
402											

A	B	C	D	E	F	G	H	I	J	K	L
403	For 10% significance level, 7.8 is not an outlier.										
404	For 5% significance level, 7.8 is not an outlier.										
405	For 1% significance level, 7.8 is not an outlier.										
406											
407	<b>2. Observation Value 7.34 is a Potential Outlier (Lower)</b>										
408											
409	Test Statistic: 0.167										
410											
411	For 10% significance level, 7.34 is not an outlier.										
412	For 5% significance level, 7.34 is not an outlier.										
413	For 1% significance level, 7.34 is not an outlier.										
414											
415											
416	<b>Dixon's Outlier Test for pH (m-59)</b>										
417											
418	Number of Observations = 16										
419	10% critical value: 0.454										
420	5% critical value: 0.507										
421	1% critical value: 0.595										
422											
423	<b>1. Observation Value 8.1 is a Potential Outlier (Upper)</b>										
424											
425	Test Statistic: 0.566										
426											
427	For 10% significance level, 8.1 is an outlier.										
428	For 5% significance level, 8.1 is an outlier.										
429	For 1% significance level, 8.1 is not an outlier.										
430											
431	<b>2. Observation Value 7.5 is a Potential Outlier (Lower)</b>										
432											
433	Test Statistic: 0.233										
434											
435	For 10% significance level, 7.5 is not an outlier.										
436	For 5% significance level, 7.5 is not an outlier.										
437	For 1% significance level, 7.5 is not an outlier.										
438											
439											
440	<b>Dixon's Outlier Test for pH (m-60)</b>										
441											
442	Number of Observations = 16										
443	10% critical value: 0.454										
444	5% critical value: 0.507										
445	1% critical value: 0.595										
446											
447	<b>1. Observation Value 8 is a Potential Outlier (Upper)</b>										
448											
449	Test Statistic: 0.455										
450											
451	For 10% significance level, 8 is an outlier.										
452	For 5% significance level, 8 is not an outlier.										
453	For 1% significance level, 8 is not an outlier.										
454											
455	<b>2. Observation Value 7.5 is a Potential Outlier (Lower)</b>										
456											
457	Test Statistic: 0.200										
458											
459	For 10% significance level, 7.5 is not an outlier.										
460	For 5% significance level, 7.5 is not an outlier.										
461	For 1% significance level, 7.5 is not an outlier.										
462											
463											
464	<b>Dixon's Outlier Test for pH (m-61)</b>										
465											
466	Number of Observations = 16										
467	10% critical value: 0.454										
468	5% critical value: 0.507										
469	1% critical value: 0.595										

A	B	C	D	E	F	G	H	I	J	K	L
470											
471	<b>1. Observation Value 8 is a Potential Outlier (Upper T</b>										
472											
473	Test Statistic: 0.400										
474											
475	For 10% significance level, 8 is not an outlier.										
476	For 5% significance level, 8 is not an outlier.										
477	For 1% significance level, 8 is not an outlier.										
478											
479	<b>2. Observation Value 7.22 is a Potential Outlier (Lower</b>										
480											
481	Test Statistic: 0.483										
482											
483	For 10% significance level, 7.22 is an outlier.										
484	For 5% significance level, 7.22 is not an outlier.										
485	For 1% significance level, 7.22 is not an outlier.										
486											
487											
488	<b>Dixon's Outlier Test for Sulfate (m-54)</b>										
489											
490	Number of Observations = 17										
491	10% critical value: 0.438										
492	5% critical value: 0.49										
493	1% critical value: 0.577										
494											
495	<b>1. Observation Value 380 is a Potential Outlier (Upper</b>										
496											
497	Test Statistic: 0.000										
498											
499	For 10% significance level, 380 is not an outlier.										
500	For 5% significance level, 380 is not an outlier.										
501	For 1% significance level, 380 is not an outlier.										
502											
503	<b>2. Observation Value 340 is a Potential Outlier (Lower</b>										
504											
505	Test Statistic: 0.250										
506											
507	For 10% significance level, 340 is not an outlier.										
508	For 5% significance level, 340 is not an outlier.										
509	For 1% significance level, 340 is not an outlier.										
510											
511											
512	<b>Dixon's Outlier Test for Sulfate (m-59)</b>										
513											
514	Number of Observations = 17										
515	10% critical value: 0.438										
516	5% critical value: 0.49										
517	1% critical value: 0.577										
518											
519	<b>1. Observation Value 370 is a Potential Outlier (Upper</b>										
520											
521	Test Statistic: 0.333										
522											
523	For 10% significance level, 370 is not an outlier.										
524	For 5% significance level, 370 is not an outlier.										
525	For 1% significance level, 370 is not an outlier.										
526											
527	<b>2. Observation Value 330 is a Potential Outlier (Lower</b>										
528											
529	Test Statistic: 0.333										
530											
531	For 10% significance level, 330 is not an outlier.										
532	For 5% significance level, 330 is not an outlier.										
533	For 1% significance level, 330 is not an outlier.										
534											
535											
536	<b>Dixon's Outlier Test for Sulfate (m-60)</b>										

A	B	C	D	E	F	G	H	I	J	K	L
537											
538	Number of Observations = 17										
539	10% critical value: 0.438										
540	5% critical value: 0.49										
541	1% critical value: 0.577										
542											
543	<b>1. Observation Value 440 is a Potential Outlier (Upper)</b>										
544											
545	Test Statistic: 0.889										
546											
547	For 10% significance level, 440 is an outlier.										
548	For 5% significance level, 440 is an outlier.										
549	For 1% significance level, 440 is an outlier.										
550											
551	<b>2. Observation Value 340 is a Potential Outlier (Lower)</b>										
552											
553	Test Statistic: 0.500										
554											
555	For 10% significance level, 340 is an outlier.										
556	For 5% significance level, 340 is an outlier.										
557	For 1% significance level, 340 is not an outlier.										
558											
559											
560	<b>Dixon's Outlier Test for Sulfate (m-61)</b>										
561											
562	Number of Observations = 17										
563	10% critical value: 0.438										
564	5% critical value: 0.49										
565	1% critical value: 0.577										
566											
567	<b>1. Observation Value 420 is a Potential Outlier (Upper)</b>										
568											
569	Test Statistic: 0.500										
570											
571	For 10% significance level, 420 is an outlier.										
572	For 5% significance level, 420 is an outlier.										
573	For 1% significance level, 420 is not an outlier.										
574											
575	<b>2. Observation Value 340 is a Potential Outlier (Lower)</b>										
576											
577	Test Statistic: 0.000										
578											
579	For 10% significance level, 340 is not an outlier.										
580	For 5% significance level, 340 is not an outlier.										
581	For 1% significance level, 340 is not an outlier.										
582											
583											
584	<b>Dixon's Outlier Test for DissolvedSolids (m-54)</b>										
585											
586	Number of Observations = 17										
587	10% critical value: 0.438										
588	5% critical value: 0.49										
589	1% critical value: 0.577										
590											
591	<b>1. Observation Value 3200 is a Potential Outlier (Upper)</b>										
592											
593	Test Statistic: 0.000										
594											
595	For 10% significance level, 3200 is not an outlier.										
596	For 5% significance level, 3200 is not an outlier.										
597	For 1% significance level, 3200 is not an outlier.										
598											
599	<b>2. Observation Value 2900 is a Potential Outlier (Lower)</b>										
600											
601	Test Statistic: 0.000										
602											
603	For 10% significance level, 2900 is not an outlier.										



A	B	C	D	E	F	G	H	I	J	K	L
604	For 5% significance level, 2900 is not an outlier.										
605	For 1% significance level, 2900 is not an outlier.										
606											
607											
608	<b>Dixon's Outlier Test for DissolvedSolids (m-59)</b>										
609											
610	Number of Observations = 17										
611	10% critical value: 0.438										
612	5% critical value: 0.49										
613	1% critical value: 0.577										
614											
615	<b>1. Observation Value 2900 is a Potential Outlier (Upper)</b>										
616											
617	Test Statistic: 0.500										
618											
619	For 10% significance level, 2900 is an outlier.										
620	For 5% significance level, 2900 is an outlier.										
621	For 1% significance level, 2900 is not an outlier.										
622											
623	<b>2. Observation Value 2500 is a Potential Outlier (Lower)</b>										
624											
625	Test Statistic: 0.667										
626											
627	For 10% significance level, 2500 is an outlier.										
628	For 5% significance level, 2500 is an outlier.										
629	For 1% significance level, 2500 is an outlier.										
630											
631											
632	<b>Dixon's Outlier Test for DissolvedSolids (m-60)</b>										
633											
634	Number of Observations = 17										
635	10% critical value: 0.438										
636	5% critical value: 0.49										
637	1% critical value: 0.577										
638											
639	<b>1. Observation Value 3000 is a Potential Outlier (Upper)</b>										
640											
641	Test Statistic: 0.333										
642											
643	For 10% significance level, 3000 is not an outlier.										
644	For 5% significance level, 3000 is not an outlier.										
645	For 1% significance level, 3000 is not an outlier.										
646											
647	<b>2. Observation Value 2500 is a Potential Outlier (Lower)</b>										
648											
649	Test Statistic: 0.500										
650											
651	For 10% significance level, 2500 is an outlier.										
652	For 5% significance level, 2500 is an outlier.										
653	For 1% significance level, 2500 is not an outlier.										
654											
655											
656	<b>Dixon's Outlier Test for DissolvedSolids (m-61)</b>										
657											
658	Number of Observations = 17										
659	10% critical value: 0.438										
660	5% critical value: 0.49										
661	1% critical value: 0.577										
662											
663	<b>1. Observation Value 3000 is a Potential Outlier (Upper)</b>										
664											
665	Test Statistic: 0.333										
666											
667	For 10% significance level, 3000 is not an outlier.										
668	For 5% significance level, 3000 is not an outlier.										
669	For 1% significance level, 3000 is not an outlier.										
670											

	A	B	C	D	E	F	G	H	I	J	K	L
671	<b>2. Observation Value 2600 is a Potential Outlier (Low</b>											
672												
673	Test Statistic: 0.333											
674												
675	For 10% significance level, 2600 is not an outlier.											
676	For 5% significance level, 2600 is not an outlier.											
677	For 1% significance level, 2600 is not an outlier.											
678												

**APPENDIX I**

**WOOD TECHNICAL MEMORANDUM DOCUMENTING THE STATISTICAL ANALYSIS  
OF APPENDIX IV CONSTITUENT DATA COLLECTED FROM THE SEDI IN FEBRUARY  
AND APRIL 2019**



# Technical Memorandum

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<b>To:</b>	Michele Robertson, RG Pamela Norris	<b>File No:</b>	1420162024.4.4
<b>From:</b>	Carla Landrum, PhD	<b>Reviewed by:</b>	Natalie Chrisman Lazarr, PE Tim Glover
<b>Date:</b>	August 6, 2019		

**Subject: CCR GROUNDWATER ASSESSMENT MONITORING  
STATISTICAL EVALUATION OF FEBRUARY AND APRIL 2019 DATA  
COLLECTED FROM THE SEDIMENTATION POND  
Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

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## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents the routine statistical evaluation of assessment monitoring groundwater data collected in February and April 2019 from the Sedimentation Pond (SEDI) located at the Arizona Public Service (APS) Cholla Power Plant (Cholla) in Navajo County, Arizona.

Table 1 presents the concentrations of Appendix III and IV constituents in samples collected from SEDI background (i.e., M-62A) and compliance monitoring wells (i.e., M-56A, M-57A and M-58A) in February and April 2019. APS recognizes these sampling events as the first Semiannual Assessment and Annual Assessment Monitoring Events of 2019, respectively.

## 2.0 STATISTICAL EVALUATION APPROACH

Appendix A contains the contents of the ProUCL data upload tables for the subject analysis which includes SEDI compliance well data collected from November 2015 through April 2019. The Appendix IV analytes are listed by name as column headers in the ProUCL data upload table. Each analyte has a corresponding data column (indicated with a "D\_" prefix) that indicates if the analyte was detected or not at a concentration that exceeds the analytical reporting limit, where detectable concentrations are symbolized by a "1" and non-detectable concentrations are symbolized by a "0". The non-detectable concentration corresponds to the analyte's reporting limit value for the corresponding sample date. Field and split sample duplicates were retracted from the analysis.

Appendix B presents the results of the EDA of SEDI Appendix IV groundwater data incorporating February and April 2019 sampling events.

## 3.0 EXCEEDANCE ASSESSMENT

Table 2 summarizes the GWPS for each Appendix IV constituent (Wood, 2019). GWPS selection is documented in the January 2019 Tech Memo and constitutes either the statistically calculated Background Threshold Value (BTV), the US EPA's promulgated Maximum Contaminant Level (MCL) for Drinking Water, or the risk-based alternative GWPS identified for constituents without MCLs, whichever value is higher. For



all Appendix IV constituents except antimony and lithium, the US EPA's promulgated MCL, or the risk-based alternative GWPS, is higher than the BTVs (Wood, 2019).

Table 2 summarizes: 1) compliance well comparisons to their respective GWPS for Appendix IV constituents, 2) which compliance wells exhibit statistically significant temporal trends, and 3) the type of LCL test applied.

This statistical analysis indicates there is insufficient evidence to declare a GWPS exceedance for SEDI monitoring wells M-56A, M-57A, and M-58A at the current time.

Several compliance monitoring wells exhibit statistically significant ( $p < 0.05$ ) temporal trends with no SSI declaration, including statistically significant ( $p < 0.05$ ) decreasing trends in: M-56A for barium, cobalt and molybdenum and M-57A for arsenic, barium and cobalt.

#### **4.0 RECOMMENDATION**

On the basis that one or more Appendix III and IV constituents exceed current BTVs (Table 1) and the statistical assessment documented herein indicates that Appendix IV constituent concentrations do not exceed applicable GWPSs, Wood recommends continuing Assessment Monitoring at the SEDI in accordance with 40 Code of Federal Regulations Section 257.95(f) (Federal Register, 2018).

#### **5.0 REFERENCES**

Federal Register, 2018. *40 Code of Federal Regulations Part 257 – Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule promulgated April 17, 2015 with Amendments to the National Minimum Criteria (Phase One, Part One) effective August 29, 2018.*

US Environmental Protection Agency, 2015. *ProUCL (Version 5.1.1) User Guide, Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations.* EPA/600/R-07/041. Washington D.C. October 2015.

Wood Environment & Infrastructure Solutions, Inc. (Wood), 2019. *CCR Groundwater Assessment Monitoring Statistical Analysis and Results for the Sedimentation Pond.* Arizona Public Service Cholla Power Plant, Navajo County, Arizona. Technical Memorandum dated. January 14, 2019.

Wood, 2018. *Statistical Data Analysis Work Plan.* Coal Combustion Residual Rule Groundwater Monitoring System Compliance, Cholla Power Plant, Navajo County, Arizona. Prepared for Arizona Public Service. October 2018.

**TABLES**



**Table 1**  
**Assessment Monitoring Data Collected from the Sedimentation Pond During the First Half of 2019**

Constituent List	Analyte	Units	BTV	Analyte Concentration by Location and Date							
				M-56A (Compliance)		M-57A (Compliance)		M-58A (Compliance)		M-62A (Background)	
				2/15/19	4/18/19	2/15/19	4/17/19	2/15/19	4/18/19	2/15/19	4/18/19
Appendix III	Boron	mg/L	0.23	<b>0.30</b>	---	0.63	---	0.23	---	0.23	---
Appendix III	Calcium	mg/L	600	300	---	490	---	310	---	490	---
Appendix III	Chloride	mg/L	3700	2000	---	2100	---	2100	---	2900	---
Appendix III	pH	SU	7.5	7.3	---	7.1	---	7.5	---	7.3	---
Appendix III	Sulfate	mg/L	630	<b>850</b>	---	<b>1300</b>	---	540	---	560	---
Appendix III	TDS	mg/L	7800	---	---	---	---	---	---	---	---
Appendix IV	Antimony	mg/L	0.05	---	<0.0010	---	---	---	<0.0010	---	<0.0010
Appendix IV	Arsenic	mg/L	0.004	<b>0.0082</b>	0.0011	0.0017	0.0026	<b>0.0043</b>	0.0039	0.0030	0.0033
Appendix IV	Barium	mg/L	0.08	0.067	0.055	0.041	0.041	0.063	0.059	0.068	0.068
Appendix IV	Beryllium	mg/L	0.001	---	<0.0010	---	<0.0010	---	<0.0010	---	<0.0010
Appendix IV	Cadmium	mg/L	0.002	---	<0.00010	---	<0.00010	---	<0.00010	---	<0.00010
Appendix IV	Chromium	mg/L	0.004	<b>0.0052</b>	<b>0.076</b>	<b>0.0074</b>	<b>0.045</b>	<0.0010	<0.0010	<0.0010	<0.0010
Appendix IV	Cobalt	mg/L	0.002	0.00073	0.0013	<b>0.0049</b>	<b>0.005</b>	<0.00050	<0.00050	<0.00050	<0.00050
Appendix IV	Fluoride	mg/L	0.8	<0.40	<0.40	<0.4	0.53	<0.40	<0.40	<0.40	0.47
Appendix IV	Lead	mg/L	0.01	---	<0.00050	---	<0.00050	---	<0.00050	---	<0.00050
Appendix IV	Lithium	mg/L	0.2	---	<0.20	---	<0.20	---	<0.20	---	<0.20
Appendix IV	Mercury	mg/L	0.0002	---	<0.00020	---	<0.00020	---	<0.00020	---	<0.00020
Appendix IV	Molybdenum	mg/L	0.011	0.0074	<b>0.014</b>	0.0029	0.0078	0.0018	0.0018	0.0024	0.0026
Appendix IV	Total Radium	pCi/L	1.1	0.9±0.3	NA	<0.7	NA	<0.7	NA	<0.7	NA
Appendix IV	Selenium	mg/L	0.01	---	0.00062	---	0.00069	---	<0.00050	---	<0.00050
Appendix IV	Thallium	mg/L	0.0004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

**Notes:**

Constituent concentrations that exceed BTVs are presented in bolded text.

**Acronyms:**

--- = not applicable or evaluated  
 BTV = Background Threshold Value  
 mg/L = milligrams per liter  
 NA = not available at the time of assessment  
 NS = no standard  
 pCi/L = picocuries per liter  
 SU = standard units  
 SEDI = Sedimentation Pond  
 TDS = total dissolved solids

**Table 2**  
**GWPS Exceedance Summary for Data Collected from the Sedimentation Pond thru April 2019**

Lower Confidence Limit (LCL) Results - Appendix IV Constituents									
Analyte	Units	GWPS	M-56A		M-57A		M-58A		Exceedance
			LCL	Test	LCL	Test	LCL	Test	
Antimony	mg/L	0.05	0.0025	NP-LCL	0.0030	NP-LCL	0.0030	NP-LCL	No
Arsenic	mg/L	0.01	0.0020	NP-LCL	0.0050	P-LCLT	0.0040	P-LCL	No
Barium	mg/L	2	0.0522	P-LCLT	0.0550	NP-LCL	0.0371	P-LCL	No
Beryllium	mg/L	0.004	0.0010	NP-LCL	0.0010	NP-LCL	0.0010	NP-LCL	No
Cadmium	mg/L	0.005	0.0002	NP-LCL	0.0002	NP-LCL	0.0002	NP-LCL	No
Chromium	mg/L	0.1	0.0003	P-LCL	0.0000	P-LCL	0.0030	NP-LCL	No
Cobalt	mg/L	0.006	0.0000	P-LCLT	0.0050	P-LCLT	0.0010	NP-LCL	No
Fluoride	mg/L	4	0.4700	NP-LCL	0.4000	NP-LCL	0.4000	NP-LCL	No
Lead	mg/L	0.015	0.0010	NP-LCL	0.0010	NP-LCL	0.0010	NP-LCL	No
Lithium	mg/L	0.2	0.2000	NP-LCL	0.2000	NP-LCL	0.2000	NP-LCL	No
Mercury	mg/L	0.002	0.0002	NP-LCL	0.0002	NP-LCL	0.0002	NP-LCL	No
Molybdenum	mg/L	0.1	0.0001	P-LCLT	0.0020	P-LCL	0.0025	NP-LCL	No
Total Radium	pCi/L	5	0.0500	P-LCL	0.9000	NP-LCL	0.2100	P-LCL	No
Selenium	mg/L	0.05	0.0010	NP-LCL	0.0010	NP-LCL	0.0010	NP-LCL	No
Thallium	mg/L	0.002	0.0002	NP-LCL	0.0002	NP-LCL	0.0002	NP-LCL	No

**Notes:**

Statistically significant temporal trend (p<0.05)

**Acronyms:**

GWPS = Groundwater Protection Standard  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

P-LCL = Parametric Lower Confidence Limit  
 NP-LCL = Non-Parametric Lower Confidence Limit  
 P-LCLT = Parametric Lower Confidence Limit with a Trend



**APPENDIX A**

**PROUCL DATA UPLOAD TABLE**



**Appendix A  
ProUCL Data Upload Table**

StationName	QC_SampleID	SampDate	NumDate	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium
M-56A	7873_O	11/30/2015 12:08	42338.51	0.0025	0	0.0019	1	0.081	1	0.001	0	0.0001	0	0.00051
M-56A	CH-M-56A-0316_O	3/8/2016 13:40	42437.57	0.05	0	0.01	0	0.084	1	0.001	0	0.002	0	0.01
M-56A	CH-CCR-M56A-05102016_O	5/10/2016 14:11	42500.59	0.0001	0	0.00093	1	0.075	1	0.001	0	0.0001	0	0.0005
M-56A	CH-CCR-M56A-816_O	8/29/2016 9:01	42611.38	0.00013	1	0.00082	1	0.082	1	0.001	0	0.0001	0	0.0005
M-56A	CH-CCR-M56A-916_O	9/21/2016 10:52	42634.45	0.0005	0	0.00083	1	0.076	1	0.001	0	0.0001	0	0.0012
M-56A	CH-CCR-M56A-217_O	2/20/2017 11:21	42786.47	0.001	0	0.00068	1	0.071	1	0.001	0	0.0001	0	0.0093
M-56A	CH-CCR-M56A-41317_O	4/13/2017 7:45	42838.32	0.001	0	0.00076	1	0.07	1	0.001	0	0.0001	0	0.0091
M-56A	CH-CCR-M56A-42517_O	4/25/2017 9:11	42850.38	0.001	0	0.00075	1	0.086	1	0.001	0	0.0001	0	0.0067
M-56A	CH-CCR-M56A-51817_O	5/18/2017 9:21	42873.39	0.001	0	0.0006	1	0.062	1	0.001	0	0.0001	0	0.0063
M-56A	CH-CCR-M56A-52517_O	5/25/2017 10:17	42880.43	0.001	0	0.0007	1	0.073	1	0.001	0	0.0001	0	0.02
M-56A	CH-CCR-M56A-70117_O	7/1/2017 14:43	42917.61	0.001	0	0.00065	1	0.068	1	0.001	0	0.0001	0	0.0034
M-56A	CH-CCR-M56A-72617_O	7/26/2017 14:40	42942.61	0.002	0	0.001	0	0.066	1	0.001	0	0.0002	0	0.0028
M-56A	CH-CCR-M56A-90817_O	9/8/2017 8:35	42986.36	0.004	0	0.002	0	0.07	1	0.001	0	0.0004	0	0.004
M-56A	CH-CCR-M56A-120817_O	12/8/2017 11:15	43077.47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-56A	CH-CCR-M-56A-52118_O	5/21/2018 12:01	43241.50	0.001	0	0.00081	1	0.061	1	0.001	0	0.0001	0	0.0046
M-56A	CH-CCR-M56A-082818_O	8/28/2018 14:07	43340.59	NA	NA	0.0013	1	0.065	1	NA	NA	NA	NA	0.0042
M-56A	CH-CCR-M56A-21519	2/15/2019 22:14	43511.93	NA	NA	0.0082	1	0.067	1	NA	NA	NA	NA	0.0052
M-56A	CH-CCR-M56A-41819	4/18/2019 9:58	43573.42	0.001	0	0.0011	1	0.055	1	0.001	0	0.0001	0	0.076
M-57A	7874_O	11/30/2015 13:05	42338.55	0.0025	0	0.0048	1	0.072	1	0.001	0	0.0001	0	0.00074
M-57A	CH-M-57A-0316_O	3/8/2016 14:40	42437.61	0.05	0	0.0064	1	0.063	1	0.001	0	0.002	0	0.01
M-57A	CH-CCR-M57A-05112016_O	5/11/2016 8:53	42501.37	0.0001	0	0.0027	1	0.047	1	0.001	0	0.0001	0	0.0005
M-57A	CH-CCR-M57A-816_O	8/25/2016 13:23	42607.56	0.00012	1	0.0042	1	0.055	1	0.001	0	0.0001	0	0.00066
M-57A	CH-CCR-M57A-916_O	9/21/2016 13:59	42634.58	0.0005	0	0.0019	1	0.051	1	0.001	0	0.0001	0	0.016
M-57A	CH-CCR-M57A-217_O	2/20/2017 10:30	42786.44	0.001	0	0.0051	1	0.041	1	0.001	0	0.0001	0	0.042
M-57A	CH-CCR-M57A-41217_O	4/12/2017 18:28	42837.77	0.001	0	0.0042	1	0.042	1	0.001	0	0.0001	0	0.031
M-57A	CH-CCR-M57A-42517_O	4/25/2017 8:39	42850.36	0.001	0	0.0039	1	0.042	1	0.001	0	0.0001	0	0.019
M-57A	CH-CCR-M57A-51817_O	5/18/2017 10:10	42873.42	0.001	0	0.0098	1	0.038	1	0.001	0	0.0001	0	0.024
M-57A	CH-CCR-M57A-52517_O	5/25/2017 8:30	42880.35	0.001	0	0.0066	1	0.044	1	0.001	0	0.0001	0	0.035
M-57A	CH-CCR-M57A-70117_O	7/1/2017 14:11	42917.59	0.001	0	0.0038	1	0.043	1	0.001	0	0.0001	0	0.012
M-57A	CH-CCR-M57A-72617_O	7/26/2017 13:53	42942.58	0.002	0	0.0027	1	0.042	1	0.001	0	0.0002	0	0.028
M-57A	CH-CCR-M57A-90817_O	9/8/2017 8:01	42986.33	0.004	0	0.0027	1	0.045	1	0.001	0	0.0004	0	0.015
M-57A	CH-CCR-M57A-120817_O	12/8/2017 10:54	43077.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-57A	CH-CCR-M-57A-52118_O	5/21/2018 12:33	43241.52	0.002	0	0.0022	1	0.043	1	0.001	0	0.0002	0	0.0023
M-57A	CH-CCR-M57A-082818_O	8/28/2018 13:07	43340.55	NA	NA	0.0021	1	0.045	1	NA	NA	NA	NA	0.0067
M-57A	CH-CCR-M57A-21519	2/15/2019 21:41	43511.90	NA	NA	0.0017	1	0.041	1	NA	NA	NA	NA	0.0074
M-57A	CH-CCR-M57A-41719	4/17/2019 15:28	43572.64	0.001	0	0.0026	1	0.041	1	0.001	0	0.0001	0	0.045
M-58A	7876_O	11/30/2015 14:30	42338.60	0.0025	0	0.0032	1	0.1	1	0.001	0	0.0001	0	0.0005
M-58A	CH-M-58A-0316_O	3/8/2016 14:50	42437.62	0.05	0	0.01	0	0.081	1	0.001	0	0.002	0	0.01
M-58A	CH-CCR-M58A-05112016_O	5/11/2016 10:20	42501.43	0.0001	0	0.0025	1	0.055	1	0.001	0	0.0001	0	0.0005
M-58A	CH-CCR-M58A-816_O	8/25/2016 14:11	42607.59	0.0001	0	0.0045	1	0.097	1	0.001	0	0.0001	0	0.00097
M-58A	CH-CCR-M58A-916_O	9/21/2016 13:16	42634.55	0.0005	0	0.0039	1	0.076	1	0.001	0	0.0001	0	0.0018
M-58A	CH-CCR-M58A-217_O	2/20/2017 9:49	42786.41	0.001	0	0.0027	1	0.064	1	0.001	0	0.0001	0	0.0033
M-58A	CH-CCR-M58A-41217_O	4/12/2017 17:41	42837.74	0.001	0	0.0037	1	0.048	1	0.001	0	0.0001	0	0.00091
M-58A	CH-CCR-M58A-42517_O	4/25/2017 8:08	42850.34	0.001	0	0.004	1	0.049	1	0.001	0	0.0001	0	0.001
M-58A	CH-CCR-M58A-51817_O	5/18/2017 10:40	42873.44	0.001	0	0.003	1	0.043	1	0.001	0	0.0001	0	0.00052
M-58A	CH-CCR-M58A-52517_O	5/25/2017 7:48	42880.33	0.001	0	0.0051	1	0.055	1	0.001	0	0.0001	0	0.00055
M-58A	CH-CCR-M58A-70117_O	7/1/2017 13:41	42917.57	0.001	0	0.0047	1	0.063	1	0.001	0	0.0001	0	0.0005

**Appendix A  
ProUCL Data Upload Table**

StationName	QC_SampleID	SampDate	NumDate	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium
M-58A	CH-CCR-M58A-72617_O	7/26/2017 11:10	42942.47	0.002	0	0.0057	1	0.11	1	0.001	0	0.0002	0	0.003
M-58A	CH-CCR-M58A-90817_O	9/8/2017 7:29	42986.31	0.004	0	0.0048	1	0.08	1	0.001	0	0.0004	0	0.004
M-58A	CH-CCR-M58A-120817_O	12/8/2017 10:22	43077.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-58A	CH-CCR-M-58A-52118_O	5/21/2018 13:18	43241.55	0.002	0	0.0042	1	0.071	1	0.001	0	0.0002	0	0.002
M-58A	CH-CCR-M58A-082818_O	8/28/2018 9:35	43340.40	NA	NA	0.0037	1	0.075	1	NA	NA	NA	NA	0.001
M-58A	CH-CCR-M58A-21519	2/15/2019 21:04	43511.88	NA	NA	0.0043	1	0.063	1	NA	NA	NA	NA	0.001
M-58A	CH-CCR-M58A-41719	4/17/2019 14:59	43572.62	0.001	0	0.0039	1	0.059	1	0.001	0	0.0001	0	0.001
M-62A	7872_O	11/30/2015 10:56	42338.46	0.0025	0	0.002	1	0.082	1	0.001	0	0.0001	0	0.00078
M-62A	CH-M-62A-0316_O	3/8/2016 11:54	42437.50	0.05	0	0.01	0	0.16	1	0.001	0	0.002	0	0.01
M-62A	CH-CCR-MW62A-50516_O	5/5/2016 14:06	42495.59	0.0001	0	0.003	1	0.084	1	0.001	0	0.0001	0	0.0014
M-62A	CH-CCR-M62A-816_O	8/29/2016 10:55	42611.45	0.0001	0	0.0031	1	0.082	1	0.001	0	0.0001	0	0.0005
M-62A	CH-CCR-M62A-916_O	9/21/2016 15:02	42634.63	0.0005	0	0.0028	1	0.075	1	0.001	0	0.0001	0	0.00099
M-62A	CH-CCR-M62A-217_O	2/20/2017 12:04	42786.50	0.001	0	0.0029	1	0.064	1	0.001	0	0.0001	0	0.002
M-62A	CH-CCR-M62A-41317_O	4/13/2017 8:50	42838.37	0.001	0	0.0021	1	0.074	1	0.001	0	0.0001	0	0.0015
M-62A	CH-CCR-M62A-42517_O	4/25/2017 9:58	42850.42	0.001	0	0.0017	1	0.079	1	0.001	0	0.0001	0	0.0017
M-62A	CH-CCR-M62A-51817_O	5/18/2017 11:17	42873.47	0.001	0	0.0016	1	0.072	1	0.001	0	0.0001	0	0.00063
M-62A	CH-CCR-M62A-52517_O	5/25/2017 10:52	42880.45	0.001	0	0.0019	1	0.077	1	0.001	0	0.0001	0	0.00096
M-62A	CH-CCR-M62A-70117_O	7/1/2017 15:13	42917.63	0.001	0	0.0026	1	0.076	1	0.001	0	0.0001	0	0.0011
M-62A	CH-CCR-M62A-72617_O	7/26/2017 15:19	42942.64	0.002	0	0.0024	1	0.075	1	0.001	0	0.0002	0	0.001
M-62A	CH-CCR-M62A-90717_O	9/7/2017 18:34	42985.77	0.004	0	0.0031	1	0.079	1	0.001	0	0.0004	0	0.004
M-62A	CH-CCR-M62A-120817_O	12/8/2017 11:39	43077.49	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-62A	CH-CCR-M-62A-52118_O	5/21/2018 13:50	43241.58	0.002	0	0.0029	1	0.072	1	0.001	0	0.0002	0	0.002
M-62A	CH-CCR-M62A-082818_O	8/28/2018 14:36	43340.61	NA	NA	0.0029	1	0.074	1	NA	NA	NA	NA	0.001
M-62A	CH-CCR-M62A-21519	2/15/2019 20:13	43511.84236	NA	NA	0.003	1	0.068	1	NA	NA	NA	NA	0.001
M-62A	CH-CCR-M62A-41819	4/18/2019 9:10	43573.38194	0.001	0	0.0033	1	0.068	1	0.001	0	0.0001	0	0.001

**Appendix A**  
**ProUCL Data Upload Table**

StationName	QC_SampleID	SampDate	NumDate	D_Chromium	Cobalt	D_Cobalt	Fluoride	D_Fluoride	Lead	D_Lead	Lithium	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum
M-56A	7873_O	11/30/2015 12:08	42338.51	1	0.0012	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0096	1
M-56A	CH-M-56A-0316_O	3/8/2016 13:40	42437.57	0	0.002	1	0.43	1	0.01	0	0.2	0	0.0002	0	0.029	1
M-56A	CH-CCR-M56A-05102016_O	5/10/2016 14:11	42500.59	0	0.0013	1	0.42	1	0.0005	0	0.2	0	0.0002	0	0.023	1
M-56A	CH-CCR-M56A-816_O	8/29/2016 9:01	42611.38	0	0.0013	1	0.46	1	0.0005	0	0.2	0	0.0002	0	0.021	1
M-56A	CH-CCR-M56A-916_O	9/21/2016 10:52	42634.45	1	0.0012	1	0.4	1	0.0001	0	0.2	0	0.0002	0	0.016	1
M-56A	CH-CCR-M56A-217_O	2/20/2017 11:21	42786.47	1	0.00077	1	0.4	1	0.0005	0	0.2	0	0.0002	0	0.013	1
M-56A	CH-CCR-M56A-41317_O	4/13/2017 7:45	42838.32	1	0.00065	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.011	1
M-56A	CH-CCR-M56A-42517_O	4/25/2017 9:11	42850.38	1	0.00061	1	0.8	0	0.0005	0	0.2	0	0.0002	0	0.013	1
M-56A	CH-CCR-M56A-51817_O	5/18/2017 9:21	42873.39	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0095	1
M-56A	CH-CCR-M56A-52517_O	5/25/2017 10:17	42880.43	1	0.00075	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.011	1
M-56A	CH-CCR-M56A-70117_O	7/1/2017 14:43	42917.61	1	0.0005	0	0.41	1	0.0005	0	0.2	0	0.0002	0	0.0098	1
M-56A	CH-CCR-M56A-72617_O	7/26/2017 14:40	42942.61	1	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.009	1
M-56A	CH-CCR-M56A-90817_O	9/8/2017 8:35	42986.36	0	0.002	0	0.47	1	0.002	0	0.2	0	0.0002	0	0.0093	1
M-56A	CH-CCR-M56A-120817_O	12/8/2017 11:15	43077.47	NA	NA	NA	0.49	1	NA	NA	NA	NA	NA	NA	NA	NA
M-56A	CH-CCR-M-56A-52118_O	5/21/2018 12:01	43241.50	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0079	1
M-56A	CH-CCR-M56A-082818_O	8/28/2018 14:07	43340.59	1	0.0005	0	NA	NA	NA	NA	NA	NA	NA	NA	0.0057	1
M-56A	CH-CCR-M56A-21519	2/15/2019 22:14	43511.93	1	0.00073	1	0.4	0	NA	NA	NA	NA	NA	NA	0.0074	1
M-56A	CH-CCR-M56A-41819	4/18/2019 9:58	43573.42	1	0.0013	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.014	1
M-57A	7874_O	11/30/2015 13:05	42338.55	1	0.0077	1	0.4	0	0.00086	1	0.2	0	0.0002	0	0.008	1
M-57A	CH-M-57A-0316_O	3/8/2016 14:40	42437.61	0	0.0082	1	0.4	0	0.01	0	0.2	0	0.0002	0	0.004	1
M-57A	CH-CCR-M57A-05112016_O	5/11/2016 8:53	42501.37	0	0.0065	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0011	1
M-57A	CH-CCR-M57A-816_O	8/25/2016 13:23	42607.56	1	0.0078	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.022	1
M-57A	CH-CCR-M57A-916_O	9/21/2016 13:59	42634.58	1	0.0067	1	0.4	0	0.00021	1	0.2	0	0.0002	0	0.0029	1
M-57A	CH-CCR-M57A-217_O	2/20/2017 10:30	42786.44	1	0.0086	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0048	1
M-57A	CH-CCR-M57A-41217_O	4/12/2017 18:28	42837.77	1	0.0087	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0047	1
M-57A	CH-CCR-M57A-42517_O	4/25/2017 8:39	42850.36	1	0.0077	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0042	1
M-57A	CH-CCR-M57A-51817_O	5/18/2017 10:10	42873.42	1	0.0076	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0041	1
M-57A	CH-CCR-M57A-52517_O	5/25/2017 8:30	42880.35	1	0.0083	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0063	1
M-57A	CH-CCR-M57A-70117_O	7/1/2017 14:11	42917.59	1	0.0075	1	0.42	1	0.0005	0	0.2	0	0.0002	0	0.0037	1
M-57A	CH-CCR-M57A-72617_O	7/26/2017 13:53	42942.58	1	0.0088	1	0.4	0	0.001	0	0.2	0	0.0002	0	0.0058	1
M-57A	CH-CCR-M57A-90817_O	9/8/2017 8:01	42986.33	1	0.0082	1	0.4	0	0.002	0	0.2	0	0.0002	0	0.0046	1
M-57A	CH-CCR-M57A-120817_O	12/8/2017 10:54	43077.45	NA	NA	NA	0.4	0	NA	NA	NA	NA	NA	NA	NA	NA
M-57A	CH-CCR-M-57A-52118_O	5/21/2018 12:33	43241.52	1	0.0058	1	0.4	0	0.001	0	0.2	0	0.0002	0	0.0026	1
M-57A	CH-CCR-M57A-082818_O	8/28/2018 13:07	43340.55	1	0.0057	1	NA	NA	NA	NA	NA	NA	NA	NA	0.003	1
M-57A	CH-CCR-M57A-21519	2/15/2019 21:41	43511.90	1	0.0049	1	0.4	0	NA	NA	NA	NA	NA	NA	0.0029	1
M-57A	CH-CCR-M57A-41719	4/17/2019 15:28	43572.64	1	0.005	1	0.53	1	0.0005	0	0.2	0	0.0002	0	0.0078	1
M-58A	7876_O	11/30/2015 14:30	42338.60	0	0.0011	1	0.43	1	0.00056	1	0.2	0	0.0002	0	0.0047	1
M-58A	CH-M-58A-0316_O	3/8/2016 14:50	42437.62	0	0.01	0	0.4	0	0.01	0	0.2	0	0.0002	0	0.01	0
M-58A	CH-CCR-M58A-05112016_O	5/11/2016 10:20	42501.43	0	0.00051	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0018	1
M-58A	CH-CCR-M58A-816_O	8/25/2016 14:11	42607.59	1	0.00079	1	0.4	0	0.00059	1	0.2	0	0.0002	0	0.02	1
M-58A	CH-CCR-M58A-916_O	9/21/2016 13:16	42634.55	1	0.00057	1	0.4	0	0.0001	0	0.2	0	0.0002	0	0.0025	1
M-58A	CH-CCR-M58A-217_O	2/20/2017 9:49	42786.41	1	0.00097	1	0.4	0	0.00078	1	0.2	0	0.0002	0	0.0022	1
M-58A	CH-CCR-M58A-41217_O	4/12/2017 17:41	42837.74	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0017	1
M-58A	CH-CCR-M58A-42517_O	4/25/2017 8:08	42850.34	1	0.0005	0	0.8	0	0.0005	0	0.2	0	0.0002	0	0.0015	1
M-58A	CH-CCR-M58A-51817_O	5/18/2017 10:40	42873.44	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0014	1
M-58A	CH-CCR-M58A-52517_O	5/25/2017 7:48	42880.33	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0016	1
M-58A	CH-CCR-M58A-70117_O	7/1/2017 13:41	42917.57	0	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0018	1

**Appendix A  
ProUCL Data Upload Table**

StationName	QC_SampleID	SampDate	NumDate	D_Chromium	Cobalt	D_Cobalt	Fluoride	D_Fluoride	Lead	D_Lead	Lithium	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum
M-58A	CH-CCR-M58A-72617_O	7/26/2017 11:10	42942.47	1	0.001	1	0.4	0	0.0011	1	0.2	0	0.0002	0	0.0021	1
M-58A	CH-CCR-M58A-90817_O	9/8/2017 7:29	42986.31	0	0.002	0	0.4	0	0.002	0	0.2	0	0.0002	0	0.0022	1
M-58A	CH-CCR-M58A-120817_O	12/8/2017 10:22	43077.43	NA	NA	NA	0.4	0	NA	NA	NA	NA	NA	NA	NA	NA
M-58A	CH-CCR-M-58A-52118_O	5/21/2018 13:18	43241.55	0	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.0018	1
M-58A	CH-CCR-M58A-082818_O	8/28/2018 9:35	43340.40	0	0.0005	0	NA	NA	NA	NA	NA	NA	NA	NA	0.0017	1
M-58A	CH-CCR-M58A-21519	2/15/2019 21:04	43511.88	0	0.0005	0	0.4	0	NA	NA	NA	NA	NA	NA	0.0018	NA
M-58A	CH-CCR-M58A-41719	4/17/2019 14:59	43572.62	0	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0018	1
M-62A	7872_O	11/30/2015 10:56	42338.46	1	0.00054	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.011	1
M-62A	CH-M-62A-0316_O	3/8/2016 11:54	42437.50	0	0.0022	1	0.8	0	0.01	0	0.2	0	0.0002	0	0.0044	1
M-62A	CH-CCR-MW62A-50516_O	5/5/2016 14:06	42495.59	1	0.0012	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0026	1
M-62A	CH-CCR-M62A-816_O	8/29/2016 10:55	42611.45	0	0.0005	0	0.8	0	0.0005	0	0.2	0	0.0002	0	0.0023	1
M-62A	CH-CCR-M62A-916_O	9/21/2016 15:02	42634.63	1	0.00046	1	0.8	0	0.0001	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-217_O	2/20/2017 12:04	42786.50	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0019	1
M-62A	CH-CCR-M62A-41317_O	4/13/2017 8:50	42838.37	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0023	1
M-62A	CH-CCR-M62A-42517_O	4/25/2017 9:58	42850.42	1	0.0005	0	0.8	0	0.0005	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-51817_O	5/18/2017 11:17	42873.47	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.002	1
M-62A	CH-CCR-M62A-52517_O	5/25/2017 10:52	42880.45	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-70117_O	7/1/2017 15:13	42917.63	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-72617_O	7/26/2017 15:19	42942.64	0	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.0021	1
M-62A	CH-CCR-M62A-90717_O	9/7/2017 18:34	42985.77	0	0.002	0	0.4	0	0.002	0	0.2	0	0.0002	0	0.003	1
M-62A	CH-CCR-M62A-120817_O	12/8/2017 11:39	43077.49	NA	NA	NA	0.4	0	NA	NA	NA	NA	NA	NA	NA	NA
M-62A	CH-CCR-M-62A-52118_O	5/21/2018 13:50	43241.58	0	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.0024	1
M-62A	CH-CCR-M62A-082818_O	8/28/2018 14:36	43340.61	0	0.0005	0	NA	NA	NA	NA	NA	NA	NA	NA	0.0023	1
M-62A	CH-CCR-M62A-21519	2/15/2019 20:13	43511.84236	0	0.0005	0	0.4	0	NA	NA	NA	NA	NA	NA	0.0024	1
M-62A	CH-CCR-M62A-41819	4/18/2019 9:10	43573.38194	0	0.0005	0	0.47	1	0.0005	0	0.2	0	0.0002	0	0.0026	1

**Appendix A  
ProUCL Data Upload Table**

StationName	QC_SampleID	SampDate	NumDate	Radium	D_Radium	Selenium	D_Selenium	Thallium	D_Thallium
M-56A	7873_O	11/30/2015 12:08	42338.51	0.9	0	0.00033	1	0.0001	0
M-56A	CH-M-56A-0316_O	3/8/2016 13:40	42437.57	0.4	0	0.01	0	0.002	0
M-56A	CH-CCR-M56A-05102016_O	5/10/2016 14:11	42500.59	0.6	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-816_O	8/29/2016 9:01	42611.38	1.6	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-916_O	9/21/2016 10:52	42634.45	0.6	1	0.0006	0	0.0001	0
M-56A	CH-CCR-M56A-217_O	2/20/2017 11:21	42786.47	1.8	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-41317_O	4/13/2017 7:45	42838.32	1.2	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-42517_O	4/25/2017 9:11	42850.38	1.9	1	0.00056	1	0.0001	0
M-56A	CH-CCR-M56A-51817_O	5/18/2017 9:21	42873.39	1.2	0	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-52517_O	5/25/2017 10:17	42880.43	1.5	1	0.00057	1	0.0001	0
M-56A	CH-CCR-M56A-70117_O	7/1/2017 14:43	42917.61	0.7	0	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-72617_O	7/26/2017 14:40	42942.61	1.7	1	0.001	0	0.0002	0
M-56A	CH-CCR-M56A-90817_O	9/8/2017 8:35	42986.36	0.5	1	0.002	0	0.0004	0
M-56A	CH-CCR-M56A-120817_O	12/8/2017 11:15	43077.47	NA	NA	NA	NA	NA	NA
M-56A	CH-CCR-M-56A-52118_O	5/21/2018 12:01	43241.50	1.4	1	0.0005	0	0.00012	1
M-56A	CH-CCR-M56A-082818_O	8/28/2018 14:07	43340.59	0.5	1	NA	NA	0.0001	0
M-56A	CH-CCR-M56A-21519	2/15/2019 22:14	43511.93	NA	NA	NA	NA	0.0001	0
M-56A	CH-CCR-M56A-41819	4/18/2019 9:58	43573.42	NA	NA	0.00062	1	0.0001	0
M-57A	7874_O	11/30/2015 13:05	42338.55	0.9	0	0.00029	1	0.0001	0
M-57A	CH-M-57A-0316_O	3/8/2016 14:40	42437.61	0.4	0	0.01	0	0.002	0
M-57A	CH-CCR-M57A-05112016_O	5/11/2016 8:53	42501.37	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-816_O	8/25/2016 13:23	42607.56	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-916_O	9/21/2016 13:59	42634.58	0.7	0	0.0006	0	0.0001	0
M-57A	CH-CCR-M57A-217_O	2/20/2017 10:30	42786.44	1.1	1	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-41217_O	4/12/2017 18:28	42837.77	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-42517_O	4/25/2017 8:39	42850.36	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-51817_O	5/18/2017 10:10	42873.42	1.5	1	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-52517_O	5/25/2017 8:30	42880.35	0.5	1	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-70117_O	7/1/2017 14:11	42917.59	0.7	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-72617_O	7/26/2017 13:53	42942.58	0.7	0	0.001	0	0.0002	0
M-57A	CH-CCR-M57A-90817_O	9/8/2017 8:01	42986.33	0.6	1	0.002	0	0.0004	0
M-57A	CH-CCR-M57A-120817_O	12/8/2017 10:54	43077.45	NA	NA	NA	NA	NA	NA
M-57A	CH-CCR-M-57A-52118_O	5/21/2018 12:33	43241.52	0.7	0	0.001	0	0.0002	0
M-57A	CH-CCR-M57A-082818_O	8/28/2018 13:07	43340.55	0.7	1	NA	NA	0.0001	0
M-57A	CH-CCR-M57A-21519	2/15/2019 21:41	43511.90	NA	NA	NA	NA	0.0001	0
M-57A	CH-CCR-M57A-41719	4/17/2019 15:28	43572.64	NA	NA	0.00069	1	0.0001	0
M-58A	7876_O	11/30/2015 14:30	42338.60	0.9	0	0.00024	1	0.0001	0
M-58A	CH-M-58A-0316_O	3/8/2016 14:50	42437.62	0.6	0	0.01	0	0.002	0
M-58A	CH-CCR-M58A-05112016_O	5/11/2016 10:20	42501.43	0.9	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-816_O	8/25/2016 14:11	42607.59	2.6	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-916_O	9/21/2016 13:16	42634.55	1.2	1	0.0006	0	0.0001	0
M-58A	CH-CCR-M58A-217_O	2/20/2017 9:49	42786.41	0.8	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-41217_O	4/12/2017 17:41	42837.74	1.9	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-42517_O	4/25/2017 8:08	42850.34	0.9	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-51817_O	5/18/2017 10:40	42873.44	0.6	0	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-52517_O	5/25/2017 7:48	42880.33	2.2	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-70117_O	7/1/2017 13:41	42917.57	0.7	0	0.0005	0	0.0001	0

**Appendix A  
ProUCL Data Upload Table**

StationName	QC_SampleID	SampDate	NumDate	Radium	D_Radium	Selenium	D_Selenium	Thallium	D_Thallium
M-58A	CH-CCR-M58A-72617_O	7/26/2017 11:10	42942.47	0.7	0	0.001	0	0.0002	0
M-58A	CH-CCR-M58A-90817_O	9/8/2017 7:29	42986.31	0.7	0	0.002	0	0.0004	0
M-58A	CH-CCR-M58A-120817_O	12/8/2017 10:22	43077.43	NA	NA	NA	NA	NA	NA
M-58A	CH-CCR-M-58A-52118_O	5/21/2018 13:18	43241.55	0.7	1	0.001	0	0.0002	0
M-58A	CH-CCR-M58A-082818_O	8/28/2018 9:35	43340.40	0.6	0	NA	NA	0.0001	0
M-58A	CH-CCR-M58A-21519	2/15/2019 21:04	43511.88	NA	NA	NA	NA	0.0001	0
M-58A	CH-CCR-M58A-41719	4/17/2019 14:59	43572.62	NA	NA	0.0005	0	0.0001	0
M-62A	7872_O	11/30/2015 10:56	42338.46	0.7	0	0.00071	1	0.0001	0
M-62A	CH-M-62A-0316_O	3/8/2016 11:54	42437.50	1	1	0.01	0	0.0005	1
M-62A	CH-CCR-MW62A-50516_O	5/5/2016 14:06	42495.59	0.5	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-816_O	8/29/2016 10:55	42611.45	0.9	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-916_O	9/21/2016 15:02	42634.63	2	1	0.00078	1	0.0001	0
M-62A	CH-CCR-M62A-217_O	2/20/2017 12:04	42786.50	1.4	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-41317_O	4/13/2017 8:50	42838.37	1.2	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-42517_O	4/25/2017 9:58	42850.42	0.9	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-51817_O	5/18/2017 11:17	42873.47	1.2	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-52517_O	5/25/2017 10:52	42880.45	1.5	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-70117_O	7/1/2017 15:13	42917.63	0.7	0	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-72617_O	7/26/2017 15:19	42942.64	1.3	1	0.001	0	0.0002	0
M-62A	CH-CCR-M62A-90717_O	9/7/2017 18:34	42985.77	0.9	1	0.002	0	0.0004	0
M-62A	CH-CCR-M62A-120817_O	12/8/2017 11:39	43077.49	NA	NA	NA	NA	NA	NA
M-62A	CH-CCR-M-62A-52118_O	5/21/2018 13:50	43241.58	0.7	1	0.001	0	0.0002	0
M-62A	CH-CCR-M62A-082818_O	8/28/2018 14:36	43340.61	0.5	1	NA	NA	0.0001	0
M-62A	CH-CCR-M62A-21519	2/15/2019 20:13	43511.84236	NA	NA	NA	NA	0.0001	0
M-62A	CH-CCR-M62A-41819	4/18/2019 9:10	43573.38194	NA	NA	0.0005	0	0.0001	0

## **APPENDIX B**

### **RESULTS OF THE EXPLORATORY DATA ANALYSIS**





## Appendix B

### Results of the Exploratory Data Analysis

#### General Statistics on Uncensored Data

Date/Time of Computation ProUCL 5.17/23/2019 9:23:12 AM

#### User Selected Options

From File SEDIPond\_Cholla\_AssessMonApr2019.xls  
Full Precision OFF

From File: SEDIPond\_Cholla\_AssessMonApr2019.xls

#### General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method

Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Antimony (m-56a)	15	3	1	14	93.33%	1.0000E-4	0.05	1.1500E-4	2.250E-10	1.5000E-5	0.13
Antimony (m-57a)	15	3	1	14	93.33%	1.0000E-4	0.05	1.1000E-4	1.000E-10	1.0000E-5	0.0909
Antimony (m-58a)	15	3	0	15	100.00%	1.0000E-4	0.05	N/A	N/A	N/A	N/A
Antimony (m-62a)	15	3	0	15	100.00%	1.0000E-4	0.05	N/A	N/A	N/A	N/A
Arsenic (m-56a)	17	1	14	3	17.65%	0.001	0.01	0.00136	3.2262E-6	0.0018	1.325
Arsenic (m-57a)	17	1	17	0	0.00%	N/A	N/A	0.00396	4.4812E-6	0.00212	0.534
Arsenic (m-58a)	17	1	16	1	5.88%	0.01	0.01	0.00399	7.1184E-7	8.4370E-4	0.211
Arsenic (m-62a)	17	1	16	1	5.88%	0.01	0.01	0.00258	2.8527E-7	5.3411E-4	0.207
Barium (m-56a)	17	1	17	0	0.00%	N/A	N/A	0.0713	7.3971E-5	0.0086	0.121
Barium (m-57a)	17	1	17	0	0.00%	N/A	N/A	0.0468	7.9566E-5	0.00892	0.191
Barium (m-58a)	17	1	17	0	0.00%	N/A	N/A	0.0699	3.6693E-4	0.0192	0.274
Barium (m-62a)	16	2	16	0	0.00%	N/A	N/A	0.0808	4.7270E-4	0.0217	0.269
Beryllium (m-56a)	15	3	0	15	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Beryllium (m-57a)	15	3	0	15	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Beryllium (m-58a)	15	3	0	15	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Beryllium (m-62a)	15	3	0	15	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Cadmium (m-56a)	15	3	0	15	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
Cadmium (m-57a)	15	3	0	15	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
Cadmium (m-58a)	15	3	0	15	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
Cadmium (m-62a)	15	3	0	15	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
Chromium (m-56a)	17	1	13	4	23.53%	5.0000E-4	0.01	0.00916	3.0106E-4	0.0174	1.893
Chromium (m-57a)	17	1	15	2	11.76%	5.0000E-4	0.01	0.017	2.0906E-4	0.0145	0.852
Chromium (m-58a)	17	1	8	9	52.94%	5.0000E-4	0.01	0.00108	7.8191E-7	8.8426E-4	0.818
Chromium (m-62a)	17	1	9	8	47.06%	5.0000E-4	0.01	0.00104	1.8676E-7	4.3216E-4	0.415
Cobalt (m-56a)	17	1	11	6	35.29%	5.0000E-4	0.002	8.9708E-4	1.7218E-7	4.1495E-4	0.463
Cobalt (m-57a)	17	1	17	0	0.00%	N/A	N/A	0.00728	1.6294E-6	0.00128	0.175
Cobalt (m-58a)	17	1	6	11	64.71%	5.0000E-4	0.01	6.3400E-4	4.5100E-8	2.1237E-4	0.335
Cobalt (m-62a)	17	1	4	13	76.47%	5.0000E-4	0.002	6.1464E-4	1.8901E-7	4.3475E-4	0.707
Fluoride (m-56a)	17	1	8	9	52.94%	0.4	0.8	0.418	8.1875E-4	0.0286	0.0685
Fluoride (m-57a)	17	1	2	15	88.24%	0.4	0.4	0.409	9.3979E-4	0.0307	0.075
Fluoride (m-58a)	17	1	1	16	94.12%	0.4	0.8	0.402	5.2734E-5	0.00726	0.0181
Fluoride (m-62a)	17	1	1	16	94.12%	0.4	0.8	0.405	3.4793E-4	0.0187	0.046
Lead (m-56a)	15	3	0	15	100.00%	1.0000E-4	0.01	N/A	N/A	N/A	N/A
Lead (m-57a)	15	3	2	13	86.67%	5.0000E-4	0.01	2.6909E-4	3.4917E-8	1.8686E-4	0.694
Lead (m-58a)	15	3	4	11	73.33%	1.0000E-4	0.01	3.1371E-4	1.0796E-7	3.2857E-4	1.047
Lead (m-62a)	15	3	0	15	100.00%	1.0000E-4	0.01	N/A	N/A	N/A	N/A
Lithium (m-56a)	15	3	0	15	100.00%	0.2	0.2	N/A	N/A	N/A	N/A

## Appendix B

### Results of the Exploratory Data Analysis

Lithium (m-57a)	15	3	0	15	100.00%	0.2	0.2	N/A	N/A	N/A	N/A
Lithium (m-58a)	15	3	0	15	100.00%	0.2	0.2	N/A	N/A	N/A	N/A
Lithium (m-62a)	15	3	0	15	100.00%	0.2	0.2	N/A	N/A	N/A	N/A
Mercury (m-56a)	15	3	0	15	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (m-57a)	15	3	0	15	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (m-58a)	15	3	0	15	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (m-62a)	15	3	0	15	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Molybdenum (m-56a)	17	1	17	0	0.00%	N/A	N/A	0.0129	3.8263E-5	0.00619	0.48
Molybdenum (m-57a)	17	1	17	0	0.00%	N/A	N/A	0.00544	2.1443E-5	0.00463	0.851
Molybdenum (m-58a)	17	1	15	2	11.76%	0.0018	0.01	0.00308	1.8447E-5	0.00429	1.393
Molybdenum (m-62a)	17	1	17	0	0.00%	N/A	N/A	0.00295	4.6251E-6	0.00215	0.73
Radium (m-56a)	15	3	11	4	26.67%	0.4	1.2	1.017	0.309	0.556	0.546
Radium (m-57a)	15	3	5	10	66.67%	0.4	0.9	0.598	0.0884	0.297	0.497
Radium (m-58a)	15	3	8	7	46.67%	0.6	0.9	1.029	0.406	0.637	0.619
Radium (m-62a)	15	3	13	2	13.33%	0.7	0.7	1	0.18	0.424	0.424
Selenium (m-56a)	15	3	4	11	73.33%	5.0000E-4	0.01	3.9725E-4	1.2615E-8	1.1232E-4	0.283
Selenium (m-57a)	15	3	2	13	86.67%	5.0000E-4	0.01	3.2636E-4	1.3223E-8	1.1499E-4	0.352
Selenium (m-58a)	15	3	1	14	93.33%	5.0000E-4	0.01	2.4000E-4	0	0	N/A
Selenium (m-62a)	15	3	2	13	86.67%	5.0000E-4	0.01	5.4455E-4	9.1521E-9	9.5666E-5	0.176
Thallium (m-56a)	17	1	1	16	94.12%	1.0000E-4	0.002	1.0143E-4	2.653E-11	5.1508E-6	0.0508
Thallium (m-57a)	17	1	0	17	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
Thallium (m-58a)	17	1	0	17	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
Thallium (m-62a)	17	1	1	16	94.12%	1.0000E-4	4.0000E-4	1.2353E-4	8.8581E-9	9.4118E-5	0.762

## Appendix B Results of the Exploratory Data Analysis

### General Statistics for Raw Data Sets using Detected Data Only

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Antimony (m-56a)	1	3	1.3000E-4	1.3000E-4	1.3000E-4	1.3000E-4	N/A	N/A	0	N/A	N/A
Antimony (m-57a)	1	3	1.2000E-4	1.2000E-4	1.2000E-4	1.2000E-4	N/A	N/A	0	N/A	N/A
Antimony (m-58a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Antimony (m-62a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic (m-56a)	14	1	6.0000E-4	0.0082	0.00143	8.1500E-4	3.9115E-6	0.00198	1.8532E-4	3.561	1.382
Arsenic (m-57a)	17	1	0.0017	0.0098	0.00396	0.0038	4.4812E-6	0.00212	0.00178	1.437	0.534
Arsenic (m-58a)	16	1	0.0025	0.0057	0.00399	0.00395	7.5929E-7	8.7137E-4	9.6368E-4	0.0383	0.218
Arsenic (m-62a)	16	1	0.0016	0.0033	0.00258	0.00285	3.0429E-7	5.5163E-4	3.7064E-4	-0.615	0.214
Barium (m-56a)	17	1	0.055	0.086	0.0713	0.07	7.3971E-5	0.0086	0.00741	0.0887	0.121
Barium (m-57a)	17	1	0.038	0.072	0.0468	0.043	7.9566E-5	0.00892	0.00297	1.923	0.191
Barium (m-58a)	17	1	0.043	0.11	0.0699	0.064	3.6693E-4	0.0192	0.0178	0.663	0.274
Barium (m-62a)	16	2	0.064	0.16	0.0808	0.0755	4.7270E-4	0.0217	0.00519	3.612	0.269
Beryllium (m-56a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium (m-57a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium (m-58a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium (m-62a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium (m-56a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium (m-57a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium (m-58a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium (m-62a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium (m-56a)	13	1	5.1000E-4	0.076	0.0115	0.0052	4.0016E-4	0.02	0.00356	3.252	1.742
Chromium (m-57a)	15	1	6.6000E-4	0.045	0.019	0.016	2.1568E-4	0.0147	0.0178	0.41	0.773
Chromium (m-58a)	8	1	5.2000E-4	0.0033	0.00151	9.8500E-4	1.1888E-6	0.00109	6.6716E-4	0.999	0.724
Chromium (m-62a)	9	1	6.3000E-4	0.002	0.00123	0.0011	2.0319E-7	4.5076E-4	4.7443E-4	0.434	0.367
Cobalt (m-56a)	11	1	6.1000E-4	0.002	0.00107	0.0012	1.7533E-7	4.1872E-4	6.3751E-4	0.925	0.39
Cobalt (m-57a)	17	1	0.0049	0.0088	0.00728	0.0077	1.6294E-6	0.00128	0.00133	-0.725	0.175
Cobalt (m-58a)	6	1	5.1000E-4	0.0011	8.2333E-4	8.8000E-4	5.8547E-8	2.4196E-4	2.5204E-4	-0.364	0.294
Cobalt (m-62a)	4	1	4.6000E-4	0.0022	0.0011	8.7000E-4	6.4773E-7	8.0482E-4	5.4855E-4	1.144	0.732
Fluoride (m-56a)	8	1	0.4	0.49	0.435	0.425	0.00117	0.0342	0.0371	0.57	0.0787
Fluoride (m-57a)	2	1	0.42	0.53	0.475	0.475	0.00605	0.0778	0.0815	N/A	0.164
Fluoride (m-58a)	1	1	0.43	0.43	0.43	0.43	N/A	N/A	0	N/A	N/A
Fluoride (m-62a)	1	1	0.47	0.47	0.47	0.47	N/A	N/A	0	N/A	N/A
Lead (m-56a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead (m-57a)	2	3	2.1000E-4	8.6000E-4	5.3500E-4	5.3500E-4	2.1125E-7	4.5962E-4	4.8184E-4	N/A	0.859
Lead (m-58a)	4	3	5.6000E-4	0.0011	7.5750E-4	6.8500E-4	6.1625E-8	2.4824E-4	1.6308E-4	1.211	0.328
Lead (m-62a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithium (m-56a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithium (m-57a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithium (m-58a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithium (m-62a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (m-56a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (m-57a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (m-58a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (m-62a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum (m-56a)	17	1	0.0057	0.029	0.0129	0.011	3.8263E-5	0.00619	0.00297	1.463	0.48

## Appendix B

### Results of the Exploratory Data Analysis

Molybdenum (m-57a)	17	1	0.0011	0.022	0.00544	0.0042	2.1443E-5	0.00463	0.00193	3.142	0.851
Molybdenum (m-58a)	15	1	0.0014	0.02	0.00325	0.0018	2.2084E-5	0.0047	4.4477E-4	3.7	1.444
Molybdenum (m-62a)	17	1	0.0019	0.011	0.00295	0.0023	4.6251E-6	0.00215	1.4826E-4	3.702	0.73
Radium (m-56a)	11	3	0.5	1.9	1.209	1.4	0.309	0.556	0.593	-0.298	0.46
Radium (m-57a)	5	3	0.5	1.5	0.88	0.7	0.172	0.415	0.297	0.971	0.471
Radium (m-58a)	8	3	0.7	2.6	1.4	1.05	0.531	0.729	0.445	0.761	0.521
Radium (m-62a)	13	3	0.5	2	1.077	1	0.177	0.421	0.445	0.604	0.391
Selenium (m-56a)	4	3	3.3000E-4	6.2000E-4	5.2000E-4	5.6500E-4	1.6733E-8	1.2936E-4	4.4477E-5	-1.746	0.249
Selenium (m-57a)	2	3	2.9000E-4	6.9000E-4	4.9000E-4	4.9000E-4	8.0000E-8	2.8284E-4	2.9652E-4	N/A	0.577
Selenium (m-58a)	1	3	2.4000E-4	2.4000E-4	2.4000E-4	2.4000E-4	N/A	N/A	0	N/A	N/A
Selenium (m-62a)	2	3	7.1000E-4	7.8000E-4	7.4500E-4	7.4500E-4	2.4500E-9	4.9497E-5	5.1890E-5	N/A	0.0664
Thallium (m-56a)	1	1	1.2000E-4	1.2000E-4	1.2000E-4	1.2000E-4	N/A	N/A	0	N/A	N/A
Thallium (m-57a)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thallium (m-58a)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thallium (m-62a)	1	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	N/A	N/A	0	N/A	N/A

## Appendix B Results of the Exploratory Data Analysis

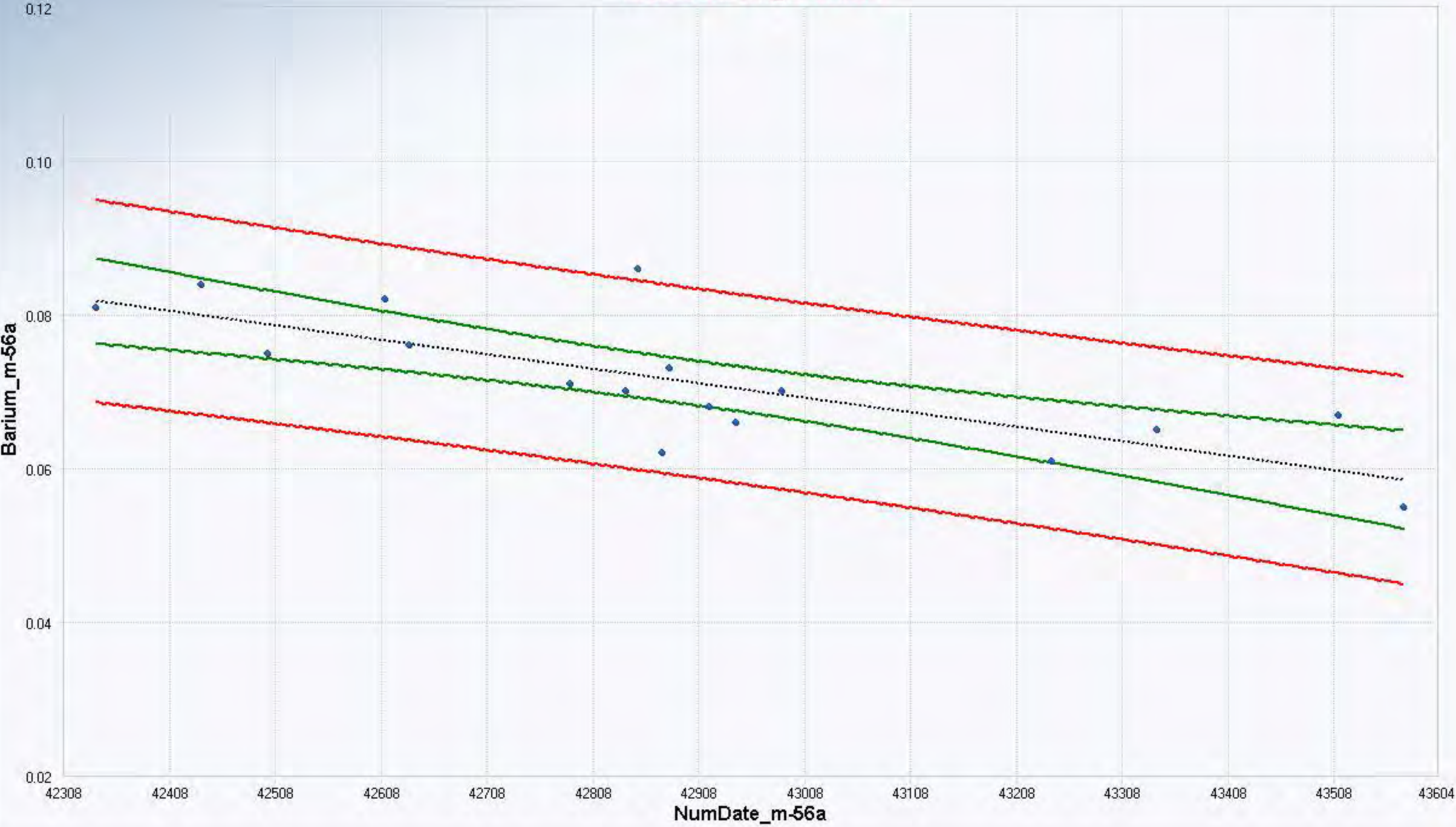
### Percentiles using all Detects (Ds) and Non-Detects (NDs)

Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Antimony (m-56a)	15	3	2.7800E-4	9.0000E-4	0.001	0.001	0.0015	0.0021	0.0034	0.0178	0.0436
Antimony (m-57a)	15	3	2.7200E-4	9.0000E-4	0.001	0.001	0.002	0.0021	0.0034	0.0178	0.0436
Antimony (m-58a)	15	3	2.6000E-4	9.0000E-4	0.001	0.001	0.002	0.0021	0.0034	0.0178	0.0436
Antimony (m-62a)	15	3	2.6000E-4	9.0000E-4	0.001	0.001	0.002	0.0021	0.0034	0.0178	0.0436
Arsenic (m-56a)	17	1	6.6800E-4	7.1000E-4	7.5000E-4	8.3000E-4	0.0013	0.00178	0.00448	0.00856	0.00971
Arsenic (m-57a)	17	1	0.00202	0.00228	0.0026	0.0038	0.0048	0.00504	0.00648	0.00724	0.00929
Arsenic (m-58a)	17	1	0.00288	0.0033	0.0037	0.004	0.0047	0.00478	0.00534	0.00656	0.00931
Arsenic (m-62a)	17	1	0.00182	0.00202	0.0021	0.0029	0.003	0.00308	0.00318	0.00464	0.00893
Barium (m-56a)	17	1	0.0616	0.0652	0.066	0.07	0.076	0.08	0.0828	0.0844	0.0857
Barium (m-57a)	17	1	0.041	0.0412	0.042	0.043	0.047	0.0502	0.0582	0.0648	0.0706
Barium (m-58a)	17	1	0.0486	0.055	0.055	0.064	0.08	0.0808	0.0982	0.102	0.108
Barium (m-62a)	16	2	0.07	0.072	0.0735	0.0755	0.0798	0.082	0.083	0.103	0.149
Beryllium (m-56a)	15	3	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Beryllium (m-57a)	15	3	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Beryllium (m-58a)	15	3	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Beryllium (m-62a)	15	3	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium (m-56a)	15	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.2000E-4	3.2000E-4	8.8000E-4	0.00178
Cadmium (m-57a)	15	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.5000E-4	2.0000E-4	3.2000E-4	8.8000E-4	0.00178
Cadmium (m-58a)	15	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.5000E-4	2.0000E-4	3.2000E-4	8.8000E-4	0.00178
Cadmium (m-62a)	15	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.5000E-4	2.0000E-4	3.2000E-4	8.8000E-4	0.00178
Chromium (m-56a)	17	1	5.0600E-4	0.00152	0.0028	0.0046	0.0091	0.00926	0.014	0.0312	0.067
Chromium (m-57a)	17	1	7.0800E-4	0.00318	0.0067	0.015	0.028	0.0304	0.0378	0.0426	0.0445
Chromium (m-58a)	17	1	5.0000E-4	5.2600E-4	5.5000E-4	0.001	0.002	0.0028	0.00358	0.0052	0.00904
Chromium (m-62a)	17	1	7.2000E-4	9.6600E-4	9.9000E-4	0.001	0.0017	0.00194	0.0028	0.0052	0.00904
Cobalt (m-56a)	17	1	5.0000E-4	5.2200E-4	6.1000E-4	7.7000E-4	0.0013	0.0013	0.00158	0.002	0.002
Cobalt (m-57a)	17	1	0.00542	0.00594	0.0065	0.0077	0.0082	0.00828	0.00864	0.00872	0.00878
Cobalt (m-58a)	17	1	5.0000E-4	5.0000E-4	5.0000E-4	5.1000E-4	0.001	0.001	0.00146	0.0036	0.00872
Cobalt (m-62a)	17	1	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.001	0.001	0.00152	0.00204	0.00217
Fluoride (m-56a)	17	1	0.4	0.4	0.4	0.4	0.43	0.454	0.478	0.552	0.75
Fluoride (m-57a)	17	1	0.4	0.4	0.4	0.4	0.4	0.4	0.408	0.442	0.512
Fluoride (m-58a)	17	1	0.4	0.4	0.4	0.4	0.4	0.4	0.412	0.504	0.741
Fluoride (m-62a)	17	1	0.4	0.4	0.4	0.4	0.47	0.734	0.8	0.8	0.8
Lead (m-56a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	6.0000E-4	0.0016	0.0044	0.00888
Lead (m-57a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	9.3000E-4	0.001	0.0016	0.0044	0.00888
Lead (m-58a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	8.9000E-4	0.00102	0.00164	0.0044	0.00888
Lead (m-62a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	7.5000E-4	0.001	0.0016	0.0044	0.00888
Lithium (m-56a)	15	3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lithium (m-57a)	15	3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lithium (m-58a)	15	3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lithium (m-62a)	15	3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Mercury (m-56a)	15	3	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
Mercury (m-57a)	15	3	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
Mercury (m-58a)	15	3	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
Mercury (m-62a)	15	3	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
Molybdenum (m-56a)	17	1	0.0077	0.00906	0.0093	0.011	0.014	0.0156	0.0218	0.0242	0.028

**Appendix B**  
**Results of the Exploratory Data Analysis**

Molybdenum (m-57a)	17	1	0.00278	0.00292	0.003	0.0042	0.0058	0.0062	0.00788	0.0108	0.0198
Molybdenum (m-58a)	17	1	0.00156	0.0017	0.0017	0.0018	0.0022	0.00244	0.00682	0.012	0.0184
Molybdenum (m-62a)	17	1	0.00206	0.0022	0.0022	0.0023	0.0026	0.0026	0.00356	0.00572	0.00994
Radium (m-56a)	15	3	0.5	0.58	0.6	1.2	1.55	1.62	1.76	1.83	1.886
Radium (m-57a)	15	3	0.54	0.6	0.6	0.7	0.7	0.74	1.02	1.22	1.444
Radium (m-58a)	15	3	0.6	0.68	0.7	0.8	1.05	1.34	2.08	2.32	2.544
Radium (m-62a)	15	3	0.58	0.7	0.7	0.9	1.25	1.32	1.46	1.65	1.93
Selenium (m-56a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	6.1000E-4	6.9600E-4	0.0016	0.0044	0.00888
Selenium (m-57a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	8.4500E-4	0.001	0.0016	0.0044	0.00888
Selenium (m-58a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	8.0000E-4	0.001	0.0016	0.0044	0.00888
Selenium (m-62a)	15	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	8.9000E-4	0.001	0.0016	0.0044	0.00888
Thallium (m-56a)	17	1	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.1600E-4	2.8000E-4	7.2000E-4	0.00174
Thallium (m-57a)	17	1	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.8000E-4	2.8000E-4	7.2000E-4	0.00174
Thallium (m-58a)	17	1	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.8000E-4	2.8000E-4	7.2000E-4	0.00174
Thallium (m-62a)	17	1	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.8000E-4	2.8000E-4	4.2000E-4	4.8400E-4

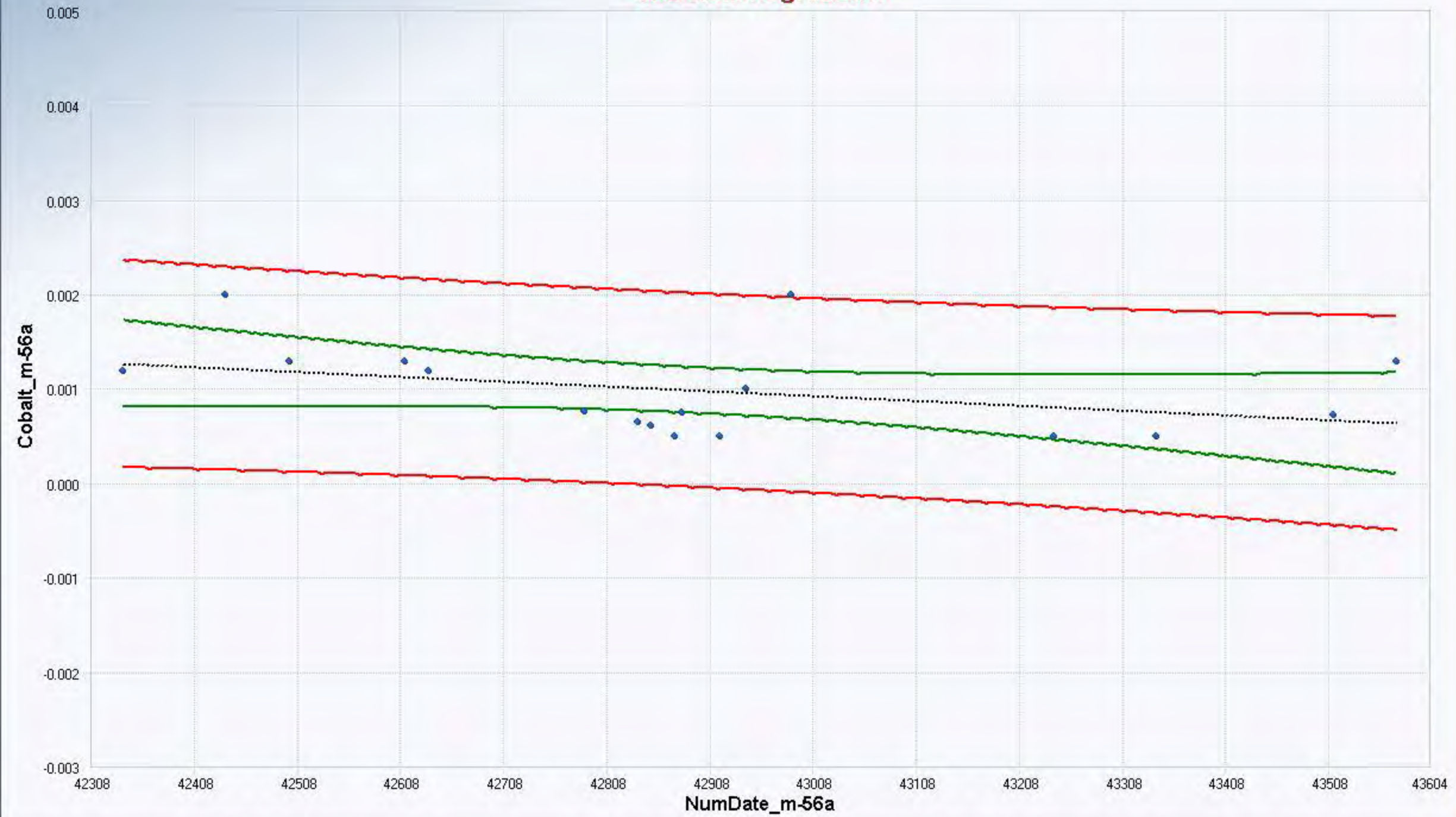
# Classical Regression



OLS	
n	17
Slope	0.0000
Intercept	0.8784
R-sq	0.6014
R	-0.7755
Scale Estimate	0.0056
P-value (Reg)	0.0003
P-value (Slope)	0.0003
Mann-Kendall	
S	-85.0000
SD of S	24.2556
Standardized S	-3.4631
Approximate p-value	0.0003
Confidence Coefficient	0.9500
Red = Prediction Interval Green = Confidence Interval	



# Classical Regression

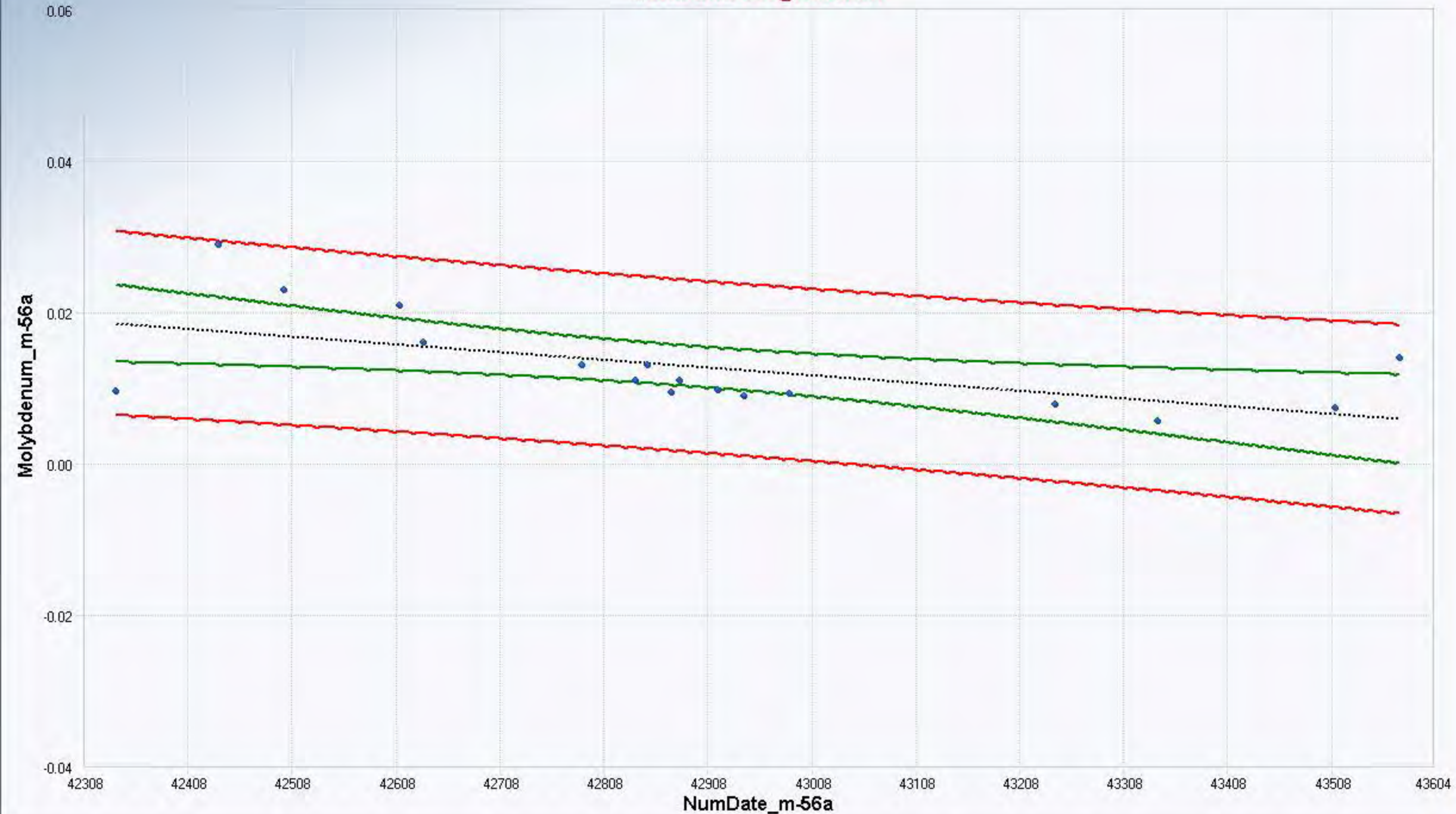


OLS		
n		17
Slope		0.0000
Intercept		0.0229
R-sq		0.1374
R		-0.3707
Scale Estimate		0.0005
P-value (Reg)		0.1430
P-value (Slope)		0.1430
Mann-Kendall		
S		-43.0000
SD of S		23.9792
Standardized S		-1.7515
Approximate p-value		0.0399
Confidence Coefficient		0.9500

Red = Prediction Interval  
Green = Confidence Interval



# Classical Regression



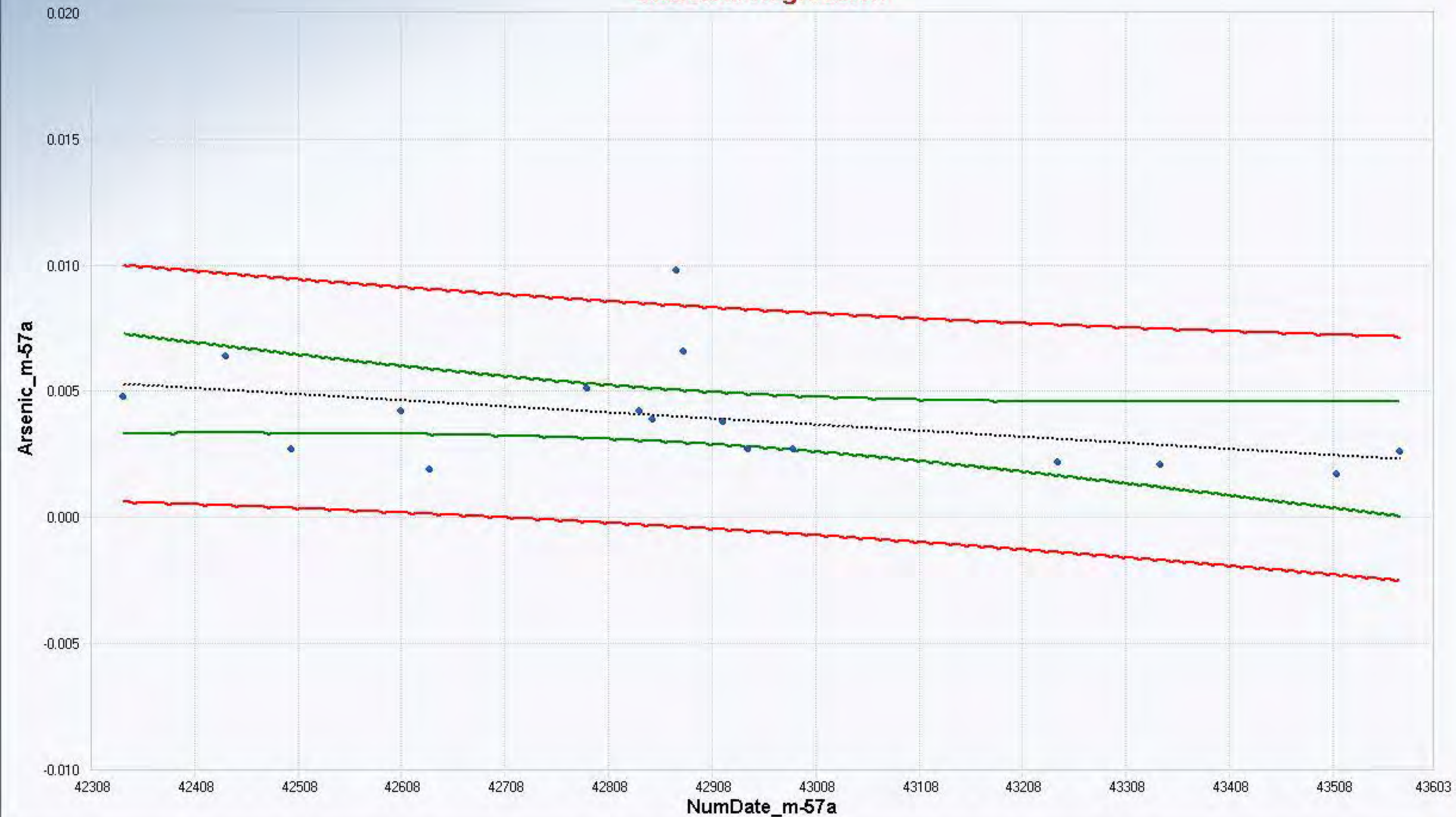
OLS	
n	17
Slope	0.0000
Intercept	0.4522
R-sq	0.3445
R	-0.5870
Scale Estimate	0.0052
P-value (Reg)	0.0132
P-value (Slope)	0.0132

Mann-Kendall	
S	-82.0000
SD of S	24.2350
Standardized S	-3.3423
Approximate p-value	0.0004

Confidence Coefficient 0.9500

Red = Prediction Interval  
Green = Confidence Interval

# Classical Regression



OLS	
n	17
Slope	0.0000
Intercept	0.1075
R-sq	0.1633
R	-0.4041
Scale Estimate	0.0020
P-value (Reg)	0.1077
P-value (Slope)	0.1077

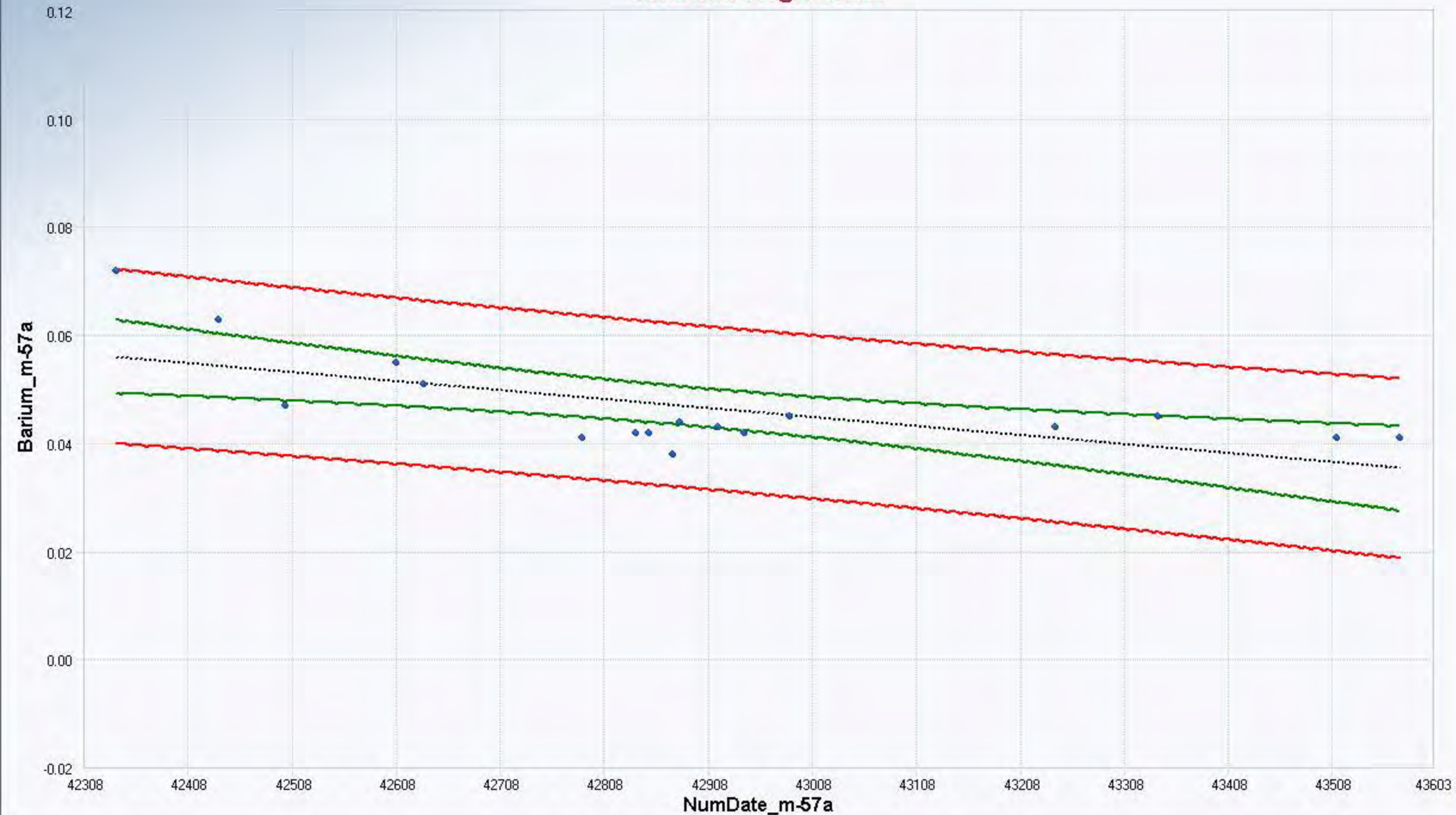
Mann-Kendall	
S	-60.0000
SD of S	24.1799
Standardized S	-2.4400
Approximate p-value	0.0073

Confidence Coefficient 0.9500

Red = Prediction Interval  
Green = Confidence Interval



# Classical Regression



OLS	
n	17
Slope	0.0000
Intercept	0.7659
R-sq	0.4440
R	-0.6663
Scale Estimate	0.0069
P-value (Reg)	0.0035
P-value (Slope)	0.0035

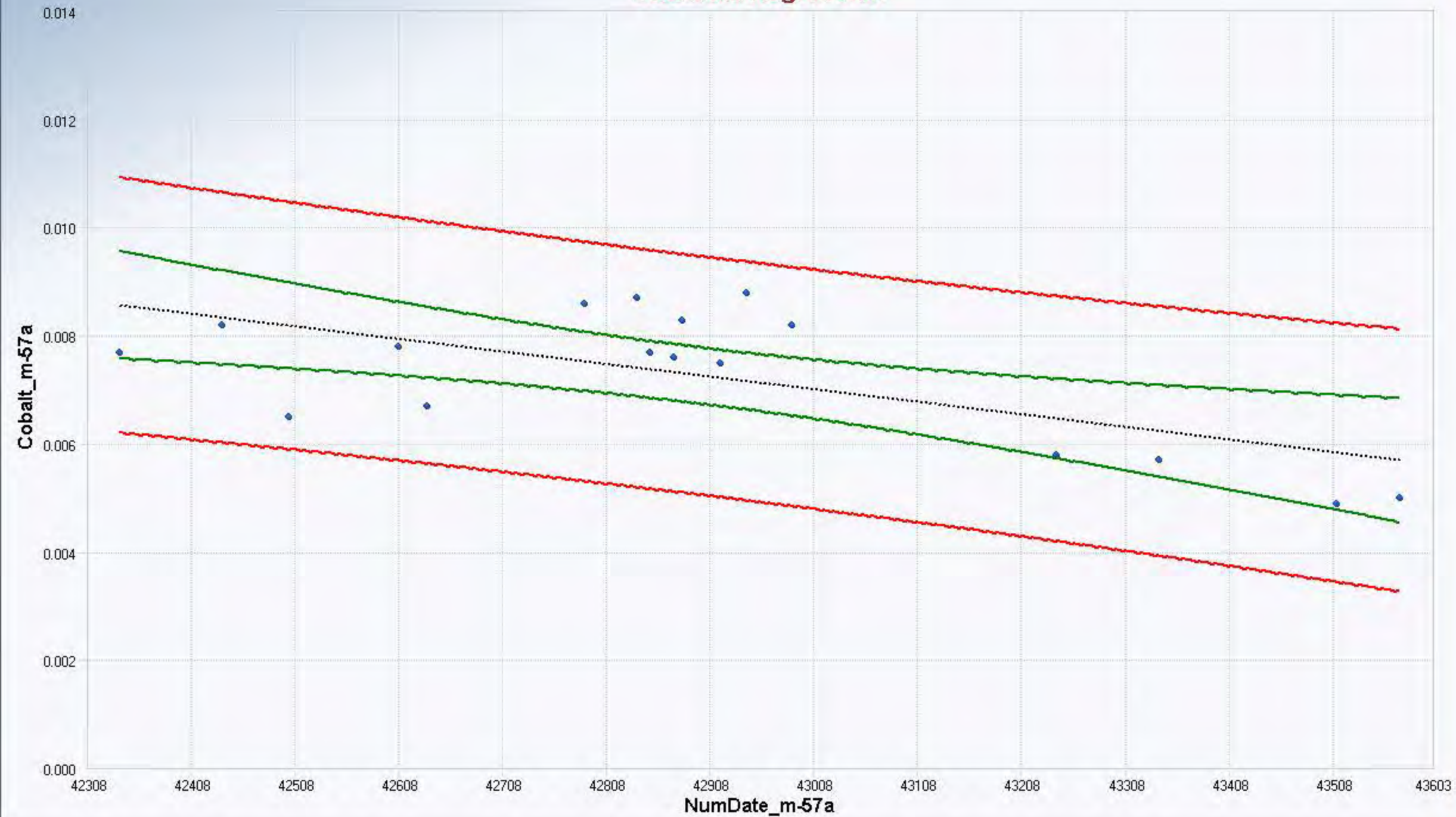
Mann-Kendall	
S	-56.0000
SD of S	24.0832
Standardized S	-2.2838
Approximate p-value	0.0112

Confidence Coefficient 0.9500

Red = Prediction Interval

Green = Confidence Interval

# Classical Regression



OLS	
n	17
Slope	0.0000
Intercept	0.1071
R-sq	0.4176
R	-0.6462
Scale Estimate	0.0010
P-value (Reg)	0.0051
P-value (Slope)	0.0051

Mann-Kendall	
S	-40.0000
SD of S	24.2350
Standardized S	-1.6092
Approximate p-value	0.0538

Confidence Coefficient 0.9500

Red = Prediction Interval  
Green = Confidence Interval

## Appendix B Results of the Exploratory Data Analysis

### Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

#### User Selected Options

Date/Time of Computation ProUCL 5.17/23/2019 10:54:12 AM  
 From File SEDIPond\_Cholla\_AssessMonApr2019.xls  
 Full Precision OFF  
 Confidence Coefficient 0.95

#### Antimony (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	1	14	93.33%

**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!  
 It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Antimony (m-56a) was not processed!**

#### Antimony (m-57a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	1	14	93.33%

**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!  
 It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Antimony (m-57a) was not processed!**

#### Antimony (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!  
 Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!  
 The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Antimony (m-58a) was not processed!**

#### Antimony (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!  
 Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!  
 The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Antimony (m-62a) was not processed!**



## Appendix B Results of the Exploratory Data Analysis

### Arsenic (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	14	3	17.65%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	3	0.001	0.01	0.00433	0.002	0.00493
Statistics (Non-Detects Only)	14	6.0000E-4	0.0082	0.00143	8.1500E-4	0.00198
Statistics (All: NDs treated as DL value)	17	6.0000E-4	0.01	0.00194	8.3000E-4	0.00274
Statistics (All: NDs treated as DL/2 value)	17	5.0000E-4	0.0082	0.00156	8.2000E-4	0.00201
Statistics (Normal ROS Imputed Data)	17	6.0000E-4	0.0082	0.00138	8.3000E-4	0.00179
Statistics (Gamma ROS Imputed Data)	17	6.0000E-4	0.01	0.00294	8.3000E-4	0.00381
Statistics (Lognormal ROS Imputed Data)	17	6.0000E-4	0.0082	0.00134	8.2000E-4	0.00179
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	1.597	1.302	8.9582E-4	-6.894	0.675	-0.0979
Statistics (NDs = DL)	1.188	1.017	0.00164	-6.72	0.833	-0.124
Statistics (NDs = DL/2)	1.46	1.242	0.00107	-6.843	0.747	-0.109
Statistics (Gamma ROS Estimates)	0.885	0.768	0.00333	-6.49	1.086	-0.167
Statistics (Lognormal ROS Estimates)	--	--	--	-6.915	0.611	-0.0884

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.629	0.706	0.709	0.619

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.427	0.874	Data Not Normal
Shapiro-Wilk (NDs = DL)	0.513	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.524	0.892	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.413	0.892	Data Not Normal
Lilliefors (Detects Only)	0.383	0.226	Data Not Normal
Lilliefors (NDs = DL)	0.374	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.375	0.207	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.39	0.207	Data Not Normal

#### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.808	0.886	0.884	0.886

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	2.395	0.75	
Kolmogorov-Smirnov (Detects Only)	0.307	0.233	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	2.642	0.762	
Kolmogorov-Smirnov (NDs = DL)	0.303	0.214	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.426	0.756	
Kolmogorov-Smirnov (NDs = DL/2)	0.31	0.213	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.627	0.771	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.325	0.216	Data Not Gamma Distributed

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.809	0.852	0.865	0.794
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.678	0.874	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.728	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.759	0.892	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.656	0.892	Data Not Lognormal	
Lilliefors (Detects Only)	0.265	0.226	Data Not Lognormal	
Lilliefors (NDs = DL)	0.25	0.207	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.249	0.207	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.274	0.207	Data Not Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Arsenic (m-57a)

#### Raw Statistics

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	14
Minimum	0.0017
Maximum	0.0098
Mean of Raw Data	0.00396
Standard Deviation of Raw Data	0.00212
Khat	4.435
Theta hat	8.9405E-4
Kstar	3.691
Theta star	0.00107
Mean of Log Transformed Data	-5.647
Standard Deviation of Log Transformed Data	0.488

#### Normal GOF Test Results

Correlation Coefficient R	0.928
Shapiro Wilk Test Statistic	0.867
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.0182
Lilliefors Test Statistic	0.195
Lilliefors Critical (0.05) Value	0.207

**Data appear Approximate Normal at (0.05) Significance Level**

#### Gamma GOF Test Results

Correlation Coefficient R	0.98
A-D Test Statistic	0.383
A-D Critical (0.05) Value	0.742
K-S Test Statistic	0.195
K-S Critical(0.05) Value	0.21

**Data appear Gamma Distributed at (0.05) Significance Level**

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

Correlation Coefficient R	0.984
Shapiro Wilk Test Statistic	0.962
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.699
Lilliefors Test Statistic	0.179
Lilliefors Critical (0.05) Value	0.207

Data appear Lognormal at (0.05) Significance Level

### Arsenic (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	16	1	5.88%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	1	0.01	0.01	0.01	0.01	N/A
Statistics (Non-Detects Only)	16	0.0025	0.0057	0.00399	0.00395	8.7137E-4
Statistics (All: NDs treated as DL value)	17	0.0025	0.01	0.00435	0.004	0.00168
Statistics (All: NDs treated as DL/2 value)	17	0.0025	0.0057	0.00405	0.004	8.7829E-4
Statistics (Normal ROS Imputed Data)	17	0.0025	0.0057	0.00399	0.00399	8.4370E-4
Statistics (Gamma ROS Imputed Data)	17	0.0025	0.01	0.00435	0.004	0.00168
Statistics (Lognormal ROS Imputed Data)	17	0.0025	0.0057	0.00399	0.0039	8.4400E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	21.45	17.47	1.8617E-4	-5.547	0.228	-0.041
Statistics (NDs = DL)	9.618	7.96	4.5196E-4	-5.491	0.317	-0.0578
Statistics (NDs = DL/2)	21.35	17.62	1.8982E-4	-5.532	0.228	-0.0413
Statistics (Gamma ROS Estimates)	9.618	7.96	4.5196E-4	-5.491	0.317	-0.0578
Statistics (Lognormal ROS Estimates)	--	--	--	-5.547	0.22	-0.0397

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.994	0.852	0.994	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.984	0.887	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.752	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.982	0.892	Data Appear Normal
Shapiro-Wilk (Normal ROS Estimates)	0.982	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.118	0.213	Data Appear Normal
Lilliefors (NDs = DL)	0.217	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.109	0.207	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.129	0.207	Data Appear Normal

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.991	0.901	0.988	0.901

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.206	0.736	
Kolmogorov-Smirnov (Detects Only)	0.141	0.215	Detected Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	0.636	0.739	
Kolmogorov-Smirnov (NDs = DL)	0.161	0.209	Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.232	0.738	
Kolmogorov-Smirnov (NDs = DL/2)	0.131	0.209	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.636	0.739	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.161	0.209	Data Appear Gamma Distributed



## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.986	0.949	0.983	0.983
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.969	0.887	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.919	0.892	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.962	0.892	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.966	0.892	Data Appear Lognormal	
Lilliefors (Detects Only)	0.158	0.213	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.139	0.207	Data Appear Lognormal	
Lilliefors (NDs = DL/2)	0.148	0.207	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.17	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Arsenic (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	16	1	5.88%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	1	0.01	0.01	0.01	0.01	N/A
Statistics (Non-Detects Only)	16	0.0016	0.0033	0.00258	0.00285	5.5163E-4
Statistics (All: NDs treated as DL value)	17	0.0016	0.01	0.00302	0.0029	0.00188
Statistics (All: NDs treated as DL/2 value)	17	0.0016	0.005	0.00272	0.0029	7.9335E-4
Statistics (Normal ROS Imputed Data)	17	0.0016	0.0033	0.00258	0.0028	5.3411E-4
Statistics (Gamma ROS Imputed Data)	17	0.0016	0.01	0.00302	0.0029	0.00188
Statistics (Lognormal ROS Imputed Data)	17	0.0016	0.0033	0.00258	0.0028	5.3432E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	20.88	17.01	1.2360E-4	-5.984	0.234	-0.0391
Statistics (NDs = DL)	5.199	4.32	5.8047E-4	-5.903	0.404	-0.0684
Statistics (NDs = DL/2)	13.51	11.16	2.0165E-4	-5.943	0.281	-0.0473
Statistics (Gamma ROS Estimates)	5.199	4.32	5.8047E-4	-5.903	0.404	-0.0684
Statistics (Lognormal ROS Estimates)	--	--	--	-5.984	0.226	-0.0378

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.952	0.703	0.925	0.958
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.891	0.887	Data Appear Normal	
Shapiro-Wilk (NDs = DL)	0.527	0.892	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.873	0.892	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.905	0.892	Data Appear Normal	
Lilliefors (Detects Only)	0.218	0.213	Data Not Normal	
Lilliefors (NDs = DL)	0.381	0.207	Data Not Normal	
Lilliefors (NDs = DL/2)	0.2	0.207	Data Appear Normal	
Lilliefors (Normal ROS Estimates)	0.195	0.207	Data Appear Normal	

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.928	0.784	0.941	0.784
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	0.915	0.736		
Kolmogorov-Smirnov (Detects Only)	0.236	0.215	Data Not Gamma Distributed	
Anderson-Darling (NDs = DL)	1.68	0.741		
Kolmogorov-Smirnov (NDs = DL)	0.303	0.21	Data Not Gamma Distributed	
Anderson-Darling (NDs = DL/2)	0.608	0.738		
Kolmogorov-Smirnov (NDs = DL/2)	0.165	0.209	Data Appear Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	1.68	0.741		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.303	0.21	Data Not Gamma Distributed	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.938	0.868	0.959	0.945
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.867	0.887	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.781	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.929	0.892	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.882	0.892	Data Not Lognormal	
Lilliefors (Detects Only)	0.236	0.213	Data Not Lognormal	
Lilliefors (NDs = DL)	0.261	0.207	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.18	0.207	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.209	0.207	Data Not Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Barium (m-56a)

#### Raw Statistics

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	16
Minimum	0.055
Maximum	0.086
Mean of Raw Data	0.0713
Standard Deviation of Raw Data	0.0086
Khat	72.47
Theta hat	9.8384E-4
Kstar	59.72
Theta star	0.00119
Mean of Log Transformed Data	-2.648
Standard Deviation of Log Transformed Data	0.122

#### Normal GOF Test Results

Correlation Coefficient R	0.991
Shapiro Wilk Test Statistic	0.977
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.926
Lilliefors Test Statistic	0.106
Lilliefors Critical (0.05) Value	0.207

**Data appear Normal at (0.05) Significance Level**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Gamma GOF Test Results**

Correlation Coefficient R	0.99
A-D Test Statistic	0.173
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.11
K-S Critical(0.05) Value	0.208

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.991
Shapiro Wilk Test Statistic	0.978
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.935
Lilliefors Test Statistic	0.101
Lilliefors Critical (0.05) Value	0.207

**Data appear Lognormal at (0.05) Significance Level**

**Barium (m-57a)**

**Raw Statistics**

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	11
Minimum	0.038
Maximum	0.072
Mean of Raw Data	0.0468
Standard Deviation of Raw Data	0.00892
Khat	34.6
Theta hat	0.00135
Kstar	28.53
Theta star	0.00164
Mean of Log Transformed Data	-3.077
Standard Deviation of Log Transformed Data	0.169

**Normal GOF Test Results**

Correlation Coefficient R	0.862
Shapiro Wilk Test Statistic	0.754
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	2.8968E-4
Lilliefors Test Statistic	0.284
Lilliefors Critical (0.05) Value	0.207

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.895
A-D Test Statistic	1.493
A-D Critical (0.05) Value	0.737
K-S Test Statistic	0.273
K-S Critical(0.05) Value	0.209

**Data not Gamma Distributed at (0.05) Significance Level**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.894
Shapiro Wilk Test Statistic	0.808
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.00192
Lilliefors Test Statistic	0.262
Lilliefors Critical (0.05) Value	0.207

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Sig**

**Barium (m-58a)**

**Raw Statistics**

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	15
Minimum	0.043
Maximum	0.11
Mean of Raw Data	0.0699
Standard Deviation of Raw Data	0.0192
Khat	14.8
Theta hat	0.00473
Kstar	12.23
Theta star	0.00572
Mean of Log Transformed Data	-2.694
Standard Deviation of Log Transformed Data	0.268

**Normal GOF Test Results**

Correlation Coefficient R	0.976
Shapiro Wilk Test Statistic	0.946
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.426
Lilliefors Test Statistic	0.151
Lilliefors Critical (0.05) Value	0.207

**Data appear Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.989
A-D Test Statistic	0.23
A-D Critical (0.05) Value	0.738
K-S Test Statistic	0.128
K-S Critical(0.05) Value	0.209

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.992
Shapiro Wilk Test Statistic	0.975
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.918
Lilliefors Test Statistic	0.11
Lilliefors Critical (0.05) Value	0.207

**Data appear Lognormal at (0.05) Significance Level**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Barium (m-62a)**

**Raw Statistics**

Number of Valid Observations	16
Number of Missing Observations	2
Number of Distinct Observations	11
Minimum	0.064
Maximum	0.16
Mean of Raw Data	0.0808
Standard Deviation of Raw Data	0.0217
Khat	22
Theta hat	0.00367
Kstar	17.92
Theta star	0.00451
Mean of Log Transformed Data	-2.539
Standard Deviation of Log Transformed Data	0.201

**Normal GOF Test Results**

Correlation Coefficient R	0.683
Shapiro Wilk Test Statistic	0.501
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	3.6079E-7
Lilliefors Test Statistic	0.379
Lilliefors Critical (0.05) Value	0.213

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.732
A-D Test Statistic	2.487
A-D Critical (0.05) Value	0.736
K-S Test Statistic	0.337
K-S Critical(0.05) Value	0.215

**Data not Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.76
Shapiro Wilk Test Statistic	0.613
Shapiro Wilk Critical (0.05) Value	0.887
Approximate Shapiro Wilk P Value	5.9461E-6
Lilliefors Test Statistic	0.317
Lilliefors Critical (0.05) Value	0.213

**Data not Lognormal at (0.05) Significance Level**

**Non-parametric GOF Test Results**

**Data do not follow a discernible distribution at (0.05) Level of Sig**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Beryllium (m-56a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Beryllium (m-56a) was not processed!**

**Beryllium (m-57a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Beryllium (m-57a) was not processed!**

**Beryllium (m-58a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Beryllium (m-58a) was not processed!**

**Beryllium (m-62a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Beryllium (m-62a) was not processed!**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Cadmium (m-56a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Cadmium (m-56a) was not processed!**

**Cadmium (m-57a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Cadmium (m-57a) was not processed!**

**Cadmium (m-58a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Cadmium (m-58a) was not processed!**

**Cadmium (m-62a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Cadmium (m-62a) was not processed!**

## Appendix B Results of the Exploratory Data Analysis

### Chromium (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	13	4	23.53%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	4	5.0000E-4	0.01	0.00375	0.00225	0.00448
Statistics (Non-Detects Only)	13	5.1000E-4	0.076	0.0115	0.0052	0.02
Statistics (All: NDs treated as DL value)	17	5.0000E-4	0.076	0.00967	0.0046	0.0178
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.076	0.00922	0.0046	0.0179
Statistics (Normal ROS Imputed Data)	17	-0.0254	0.076	0.00584	0.0042	0.0209
Statistics (Gamma ROS Imputed Data)	17	5.1000E-4	0.076	0.0111	0.0067	0.0173
Statistics (Lognormal ROS Imputed Data)	17	2.8053E-4	0.076	0.00905	0.0042	0.0179
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	0.785	0.655	0.0146	-5.225	1.222	-0.234
Statistics (NDs = DL)	0.713	0.626	0.0136	-5.485	1.335	-0.243
Statistics (NDs = DL/2)	0.636	0.563	0.0145	-5.648	1.472	-0.261
Statistics (Gamma ROS Estimates)	0.994	0.857	0.0112	-5.079	1.092	-0.215
Statistics (Lognormal ROS Estimates)	--	--	--	-5.676	1.416	-0.25

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.694	0.674	0.667	0.823

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.513	0.866	Data Not Normal
Shapiro-Wilk (NDs = DL)	0.484	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.474	0.892	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.714	0.892	Data Not Normal
Lilliefors (Detects Only)	0.39	0.234	Data Not Normal
Lilliefors (NDs = DL)	0.375	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.381	0.207	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.317	0.207	Data Not Normal

#### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.901	0.889	0.893	0.86

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.841	0.769	
Kolmogorov-Smirnov (Detects Only)	0.265	0.245	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	0.8	0.78	
Kolmogorov-Smirnov (NDs = DL)	0.217	0.218	Detected Data appear Approximate Gamma D
Anderson-Darling (NDs = DL/2)	0.751	0.786	
Kolmogorov-Smirnov (NDs = DL/2)	0.216	0.219	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.958	0.766	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.289	0.215	Data Not Gamma Distributed



## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.969	0.966	0.97	0.982
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.958	0.866	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.934	0.892	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.945	0.892	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.97	0.892	Data Appear Lognormal	
Lilliefors (Detects Only)	0.173	0.234	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.149	0.207	Data Appear Lognormal	
Lilliefors (NDs = DL/2)	0.144	0.207	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.139	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Chromium (m-57a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	15	2	11.76%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	5.0000E-4	0.01	0.00525	0.00525	0.00672
Statistics (Non-Detects Only)	15	6.6000E-4	0.045	0.019	0.016	0.0147
Statistics (All: NDs treated as DL value)	17	5.0000E-4	0.045	0.0174	0.015	0.0146
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.045	0.0171	0.015	0.0148
Statistics (Normal ROS Imputed Data)	17	-0.0167	0.045	0.0158	0.015	0.0167
Statistics (Gamma ROS Imputed Data)	17	6.6000E-4	0.045	0.0179	0.015	0.0141
Statistics (Lognormal ROS Imputed Data)	17	4.9011E-4	0.045	0.0169	0.015	0.0149
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	1.052	0.886	0.018	-4.51	1.37	-0.304
Statistics (NDs = DL)	0.907	0.786	0.0192	-4.697	1.484	-0.316
Statistics (NDs = DL/2)	0.834	0.726	0.0205	-4.779	1.581	-0.331
Statistics (Gamma ROS Estimates)	1.139	0.977	0.0157	-4.521	1.282	-0.284
Statistics (Lognormal ROS Estimates)	--	--	--	-4.784	1.522	-0.318

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.978	0.969	0.965	0.986
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.938	0.881	Data Appear Normal	
Shapiro-Wilk (NDs = DL)	0.921	0.892	Data Appear Normal	
Shapiro-Wilk (NDs = DL/2)	0.914	0.892	Data Appear Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.97	0.892	Data Appear Normal	
Lilliefors (Detects Only)	0.118	0.22	Data Appear Normal	
Lilliefors (NDs = DL)	0.126	0.207	Data Appear Normal	
Lilliefors (NDs = DL/2)	0.155	0.207	Data Appear Normal	
Lilliefors (Normal ROS Estimates)	0.122	0.207	Data Appear Normal	

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.944	0.948	0.943	0.962
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	0.435	0.762		
Kolmogorov-Smirnov (Detects Only)	0.14	0.228	Detected Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL)	0.464	0.77		
Kolmogorov-Smirnov (NDs = DL)	0.123	0.216	Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL/2)	0.392	0.773		
Kolmogorov-Smirnov (NDs = DL/2)	0.131	0.217	Data Appear Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	0.338	0.763		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.111	0.214	Data Appear Gamma Distributed	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.928	0.933	0.94	0.945
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.851	0.881	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.857	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.876	0.892	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.876	0.892	Data Not Lognormal	
Lilliefors (Detects Only)	0.192	0.22	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.182	0.207	Data Appear Lognormal	
Lilliefors (NDs = DL/2)	0.177	0.207	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.182	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Chromium (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	8	9	52.94%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	9	5.0000E-4	0.01	0.00228	0.001	0.0031
Statistics (Non-Detects Only)	8	5.2000E-4	0.0033	0.00151	9.8500E-4	0.00109
Statistics (All: NDs treated as DL value)	17	5.0000E-4	0.01	0.00191	0.001	0.00234
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.005	0.00131	9.1000E-4	0.00133
Statistics (Normal ROS Imputed Data)	17	-0.00152	0.0033	6.3084E-4	5.9929E-4	0.00125
Statistics (Gamma ROS Imputed Data)	17	5.2000E-4	0.01	0.006	0.01	0.00443
Statistics (Lognormal ROS Imputed Data)	17	1.6156E-4	0.0033	9.4831E-4	6.6108E-4	9.1460E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	2.409	1.589	6.2517E-4	-6.72	0.706	-0.105
Statistics (NDs = DL)	1.316	1.123	0.00145	-6.684	0.868	-0.13
Statistics (NDs = DL/2)	1.349	1.15	9.7253E-4	-7.051	0.925	-0.131
Statistics (Gamma ROS Estimates)	1.17	1.003	0.00513	-5.6	1.184	-0.211
Statistics (Lognormal ROS Estimates)	--	--	--	-7.301	0.825	-0.113

## Appendix B Results of the Exploratory Data Analysis

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.915	0.774	0.875	0.965

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.821	0.818	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.622	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.771	0.892	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.935	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.304	0.283	Data Not Normal
Lilliefors (NDs = DL)	0.299	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.299	0.207	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.208	0.207	Data Not Normal

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.958	0.932	0.983	0.729

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.492	0.723	
Kolmogorov-Smirnov (Detects Only)	0.27	0.297	Detected Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.108	0.759	
Kolmogorov-Smirnov (NDs = DL)	0.29	0.214	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.672	0.759	
Kolmogorov-Smirnov (NDs = DL/2)	0.208	0.214	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	1.905	0.762	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.346	0.214	Data Not Gamma Distributed

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.962	0.944	0.974	0.982

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.903	0.818	Data Appear Lognormal
Shapiro-Wilk (NDs = DL)	0.887	0.892	Data Not Lognormal
Shapiro-Wilk (NDs = DL/2)	0.935	0.892	Data Appear Lognormal
Shapiro-Wilk (Lognormal ROS Estimates)	0.961	0.892	Data Appear Lognormal
Lilliefors (Detects Only)	0.23	0.283	Data Appear Lognormal
Lilliefors (NDs = DL)	0.249	0.207	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.159	0.207	Data Appear Lognormal
Lilliefors (Lognormal ROS Estimates)	0.14	0.207	Data Appear Lognormal

**Note: Substitution methods such as DL or DL/2 are not recommended.**

## Appendix B Results of the Exploratory Data Analysis

### Chromium (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	9	8	47.06%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	8	5.0000E-4	0.01	0.00256	0.001	0.0032
Statistics (Non-Detects Only)	9	6.3000E-4	0.002	0.00123	0.0011	4.5076E-4
Statistics (All: NDs treated as DL value)	17	5.0000E-4	0.01	0.00186	0.001	0.00225
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.005	0.00125	9.9000E-4	0.00111
Statistics (Normal ROS Imputed Data)	17	1.6553E-4	0.002	0.001	9.9000E-4	4.5717E-4
Statistics (Gamma ROS Imputed Data)	17	6.3000E-4	0.01	0.00536	0.002	0.00452
Statistics (Lognormal ROS Imputed Data)	17	4.7559E-4	0.002	0.00102	9.4695E-4	4.0920E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	8.266	5.585	1.4866E-4	-6.763	0.377	-0.0558
Statistics (NDs = DL)	1.685	1.427	0.0011	-6.614	0.709	-0.107
Statistics (NDs = DL/2)	2.084	1.755	6.0150E-4	-6.94	0.717	-0.103
Statistics (Gamma ROS Estimates)	1.101	0.946	0.00486	-5.748	1.142	-0.199
Statistics (Lognormal ROS Estimates)	--	--	--	-6.954	0.382	-0.0549

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.985	0.707	0.83	0.975

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.962	0.829	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.528	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.712	0.892	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.958	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.168	0.274	Data Appear Normal
Lilliefors (NDs = DL)	0.357	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.202	0.207	Data Appear Normal
Lilliefors (Normal ROS Estimates)	0.195	0.207	Data Appear Normal

#### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.992	0.866	0.933	0.76

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.184	0.722	
Kolmogorov-Smirnov (Detects Only)	0.135	0.28	Detected Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.603	0.753	
Kolmogorov-Smirnov (NDs = DL)	0.243	0.212	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.462	0.749	
Kolmogorov-Smirnov (NDs = DL/2)	0.127	0.212	Data Appear Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.069	0.764	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.32	0.215	Data Not Gamma Distributed

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.992	0.919	0.979	0.986
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.976	0.829	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.862	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.967	0.892	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.971	0.892	Data Appear Lognormal	
Lilliefors (Detects Only)	0.139	0.274	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.198	0.207	Data Appear Lognormal	
Lilliefors (NDs = DL/2)	0.12	0.207	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.168	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Cobalt (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	11	6	35.29%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	6	5.0000E-4	0.002	8.3333E-4	5.0000E-4	6.0553E-4
Statistics (Non-Detects Only)	11	6.1000E-4	0.002	0.00107	0.0012	4.1872E-4
Statistics (All: NDs treated as DL value)	17	5.0000E-4	0.002	9.8882E-4	7.7000E-4	4.8803E-4
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.002	8.4176E-4	7.5000E-4	4.9290E-4
Statistics (Normal ROS Imputed Data)	17	-1.302E-4	0.002	8.0044E-4	7.4862E-4	5.3403E-4
Statistics (Gamma ROS Imputed Data)	17	6.1000E-4	0.01	0.00422	0.0013	0.00441
Statistics (Lognormal ROS Imputed Data)	17	3.3943E-4	0.002	8.7709E-4	7.4976E-4	4.3759E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	7.744	5.692	1.3865E-4	-6.903	0.379	-0.0548
Statistics (NDs = DL)	4.799	3.992	2.0603E-4	-7.027	0.474	-0.0675
Statistics (NDs = DL/2)	2.768	2.318	3.0415E-4	-7.271	0.678	-0.0932
Statistics (Gamma ROS Estimates)	0.932	0.806	0.00453	-6.092	1.171	-0.192
Statistics (Lognormal ROS Estimates)	--	--	--	-7.149	0.482	-0.0674

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.928	0.933	0.96	0.978
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.865	0.85	Data Appear Normal	
Shapiro-Wilk (NDs = DL)	0.857	0.892	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.916	0.892	Data Appear Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.962	0.892	Data Appear Normal	
Lilliefors (Detects Only)	0.22	0.251	Data Appear Normal	
Lilliefors (NDs = DL)	0.202	0.207	Data Appear Normal	
Lilliefors (NDs = DL/2)	0.146	0.207	Data Appear Normal	
Lilliefors (Normal ROS Estimates)	0.17	0.207	Data Appear Normal	

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.952	0.965	0.97	0.818
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	0.628	0.73		
Kolmogorov-Smirnov (Detects Only)	0.229	0.256	Detected Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL)	0.629	0.742		
Kolmogorov-Smirnov (NDs = DL)	0.174	0.21	Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL/2)	0.562	0.746		
Kolmogorov-Smirnov (NDs = DL/2)	0.164	0.211	Data Appear Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	2.081	0.769		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.308	0.216	Data Not Gamma Distributed	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.951	0.962	0.953	0.981
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.898	0.85	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.906	0.892	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.892	0.892	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.959	0.892	Data Appear Lognormal	
Lilliefors (Detects Only)	0.226	0.251	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.149	0.207	Data Appear Lognormal	
Lilliefors (NDs = DL/2)	0.17	0.207	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.164	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Cobalt (m-57a)

#### Raw Statistics

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	15
Minimum	0.0049
Maximum	0.0088
Mean of Raw Data	0.00728
Standard Deviation of Raw Data	0.00128
Khat	31.18
Theta hat	2.3340E-4
Kstar	25.71
Theta star	2.8298E-4
Mean of Log Transformed Data	-4.939
Standard Deviation of Log Transformed Data	0.19

#### Normal GOF Test Results

Correlation Coefficient R	0.955
Shapiro Wilk Test Statistic	0.896
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.0709
Lilliefors Test Statistic	0.217
Lilliefors Critical (0.05) Value	0.207

**Data appear Approximate Normal at (0.05) Significance Level**

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

Correlation Coefficient R	0.934
A-D Test Statistic	0.849
A-D Critical (0.05) Value	0.737
K-S Test Statistic	0.238
K-S Critical(0.05) Value	0.209

**Data not Gamma Distributed at (0.05) Significance Level**

### Lognormal GOF Test Results

Correlation Coefficient R	0.939
Shapiro Wilk Test Statistic	0.868
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.023
Lilliefors Test Statistic	0.243
Lilliefors Critical (0.05) Value	0.207

**Data not Lognormal at (0.05) Significance Level**

### Cobalt (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	6	11	64.71%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	5.0000E-4	0.01	0.00155	5.0000E-4	0.00284
Statistics (Non-Detects Only)	6	5.1000E-4	0.0011	8.2333E-4	8.8000E-4	2.4196E-4
Statistics (All: NDs treated as DL value)	17	5.0000E-4	0.01	0.00129	5.1000E-4	0.00228
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.005	7.9059E-4	5.0000E-4	0.00113
Statistics (Normal ROS Imputed Data)	17	-2.132E-4	0.0011	4.4207E-4	4.3558E-4	3.6463E-4
Statistics (Gamma ROS Imputed Data)	17	5.1000E-4	0.01	0.00676	0.01	0.00452
Statistics (Lognormal ROS Imputed Data)	17	2.1109E-4	0.0011	5.4028E-4	4.8258E-4	2.6566E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	12.67	6.444	6.5004E-5	-7.142	0.318	-0.0445
Statistics (NDs = DL)	1.163	0.997	0.00111	-7.14	0.772	-0.108
Statistics (NDs = DL/2)	1.261	1.078	6.2690E-4	-7.589	0.844	-0.111
Statistics (Gamma ROS Estimates)	1.13	0.969	0.00599	-5.501	1.262	-0.229
Statistics (Lognormal ROS Estimates)	--	--	--	-7.628	0.467	-0.0612

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.965	0.591	0.682	0.984
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.909	0.788	Data Appear Normal	
Shapiro-Wilk (NDs = DL)	0.38	0.892	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.494	0.892	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.964	0.892	Data Appear Normal	
Lilliefors (Detects Only)	0.228	0.325	Data Appear Normal	
Lilliefors (NDs = DL)	0.416	0.207	Data Not Normal	
Lilliefors (NDs = DL/2)	0.333	0.207	Data Not Normal	
Lilliefors (Normal ROS Estimates)	0.138	0.207	Data Appear Normal	

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.944	0.8	0.857	0.627
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	0.407	0.698		
Kolmogorov-Smirnov (Detects Only)	0.256	0.332	Detected Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL)	2.983	0.763		
Kolmogorov-Smirnov (NDs = DL)	0.323	0.214	Data Not Gamma Distributed	
Anderson-Darling (NDs = DL/2)	1.594	0.761		
Kolmogorov-Smirnov (NDs = DL/2)	0.249	0.214	Data Not Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	3.099	0.763		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.421	0.215	Data Not Gamma Distributed	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.954	0.798	0.894	0.98
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.888	0.788	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.654	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.801	0.892	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.955	0.892	Data Appear Lognormal	
Lilliefors (Detects Only)	0.239	0.325	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.275	0.207	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.269	0.207	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.166	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Cobalt (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	4	13	76.47%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	13	5.0000E-4	0.002	6.9231E-4	5.0000E-4	4.3486E-4
Statistics (Non-Detects Only)	4	4.6000E-4	0.0022	0.0011	8.7000E-4	8.0482E-4
Statistics (All: NDs treated as DL value)	17	4.6000E-4	0.0022	7.8824E-4	5.0000E-4	5.4319E-4
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.0022	5.2353E-4	2.5000E-4	5.1531E-4
Statistics (Normal ROS Imputed Data)	17	-7.003E-4	0.0022	3.9089E-4	3.9047E-4	6.5627E-4
Statistics (Gamma ROS Imputed Data)	17	4.6000E-4	0.01	0.00791	0.01	0.00391
Statistics (Lognormal ROS Imputed Data)	17	1.6114E-4	0.0022	5.6499E-4	4.5687E-4	4.8270E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	2.645	0.828	4.1589E-4	-7.013	0.729	-0.104
Statistics (NDs = DL)	3.408	2.846	2.3128E-4	-7.3	0.519	-0.0711
Statistics (NDs = DL/2)	1.971	1.662	2.6565E-4	-7.83	0.679	-0.0867
Statistics (Gamma ROS Estimates)	1.655	1.402	0.00478	-5.172	1.099	-0.213
Statistics (Lognormal ROS Estimates)	--	--	--	-7.691	0.618	-0.0803



## Appendix B Results of the Exploratory Data Analysis

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.941	0.786	0.77	0.952

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.878	0.748	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.622	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.609	0.892	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.924	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.257	0.375	Data Appear Normal
Lilliefors (NDs = DL)	0.382	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.311	0.207	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.175	0.207	Data Appear Normal

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.993	0.892	0.917	0.559

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.346	0.66	
Kolmogorov-Smirnov (Detects Only)	0.293	0.397	Detected Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	2.771	0.744	
Kolmogorov-Smirnov (NDs = DL)	0.387	0.21	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.155	0.75	
Kolmogorov-Smirnov (NDs = DL/2)	0.338	0.212	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.898	0.754	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.481	0.213	Data Not Gamma Distributed

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.966	0.823	0.858	0.963

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.918	0.748	Data Appear Lognormal
Shapiro-Wilk (NDs = DL)	0.674	0.892	Data Not Lognormal
Shapiro-Wilk (NDs = DL/2)	0.734	0.892	Data Not Lognormal
Shapiro-Wilk (Lognormal ROS Estimates)	0.941	0.892	Data Appear Lognormal
Lilliefors (Detects Only)	0.258	0.375	Data Appear Lognormal
Lilliefors (NDs = DL)	0.373	0.207	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.341	0.207	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.158	0.207	Data Appear Lognormal

**Note: Substitution methods such as DL or DL/2 are not recommended.**

## Appendix B Results of the Exploratory Data Analysis

### Fluoride (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	8	9	52.94%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	9	0.4	0.8	0.444	0.4	0.133
Statistics (Non-Detects Only)	8	0.4	0.49	0.435	0.425	0.0342
Statistics (All: NDs treated as DL value)	17	0.4	0.8	0.44	0.4	0.0971
Statistics (All: NDs treated as DL/2 value)	17	0.2	0.49	0.322	0.4	0.121
Statistics (Normal ROS Imputed Data)	17	0.275	0.49	0.384	0.384	0.0603
Statistics (Gamma ROS Imputed Data)	17	0.284	0.49	0.386	0.385	0.0579
Statistics (Lognormal ROS Imputed Data)	17	0.302	0.49	0.39	0.386	0.0533
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	188.2	117.7	0.00231	-0.835	0.0776	-0.0929
Statistics (NDs = DL)	30.81	25.41	0.0143	-0.837	0.171	-0.205
Statistics (NDs = DL/2)	7.093	5.88	0.0454	-1.204	0.398	-0.33
Statistics (Gamma ROS Estimates)	46.56	38.38	0.00828	-0.963	0.152	-0.158
Statistics (Lognormal ROS Estimates)	--	--	--	-0.951	0.137	-0.144

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.96	0.663	0.885	0.997

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.9	0.818	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.467	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.759	0.892	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.988	0.892	Data Appear Normal
Lilliefors (Detects Only)	0.183	0.283	Data Appear Normal
Lilliefors (NDs = DL)	0.34	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.314	0.207	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.0768	0.207	Data Appear Normal

#### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.963	0.714	0.882	0.996

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.405	0.715	
Kolmogorov-Smirnov (Detects Only)	0.178	0.294	Detected Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	3.184	0.737	
Kolmogorov-Smirnov (NDs = DL)	0.323	0.209	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.187	0.74	
Kolmogorov-Smirnov (NDs = DL/2)	0.323	0.209	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.104	0.737	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.0878	0.208	Data Appear Gamma Distributed

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.962	0.71	0.868	0.997
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.904	0.818	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.528	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.728	0.892	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.987	0.892	Data Appear Lognormal	
Lilliefors (Detects Only)	0.171	0.283	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.322	0.207	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.317	0.207	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.0758	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Fluoride (m-57a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	2	15	88.24%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	15	0.4	0.4	0.4	0.4	5.746E-17
Statistics (Non-Detects Only)	2	0.42	0.53	0.475	0.475	0.0778
Statistics (All: NDs treated as DL value)	17	0.4	0.53	0.409	0.4	0.0316
Statistics (All: NDs treated as DL/2 value)	17	0.2	0.53	0.232	0.2	0.0934
Statistics (Normal ROS Imputed Data)	17	-0.543	0.53	-0.0285	-0.0354	0.292
Statistics (Gamma ROS Imputed Data)	17	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Imputed Data)	17	0.0548	0.53	0.195	0.16	0.128
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (NDs = DL)	208.9	172.1	0.00196	-0.897	0.0685	-0.0764
Statistics (NDs = DL/2)	10.37	8.583	0.0224	-1.508	0.288	-0.191
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Estimates)	--	--	--	-1.816	0.618	-0.34

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	1	0.536	0.616	0.998
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (NDs = DL)	0.317	0.892	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.399	0.892	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.992	0.892	Data Appear Normal	
Lilliefors (Detects Only)	N/A	N/A		
Lilliefors (NDs = DL)	0.492	0.207	Data Not Normal	
Lilliefors (NDs = DL/2)	0.518	0.207	Data Not Normal	
Lilliefors (Normal ROS Estimates)	0.0552	0.207	Data Appear Normal	

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	0.561	0.699	0.984
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	N/A	N/A		
Kolmogorov-Smirnov (Detects Only)	N/A	N/A		
Anderson-Darling (NDs = DL)	5.322	0.736		
Kolmogorov-Smirnov (NDs = DL)	0.497	0.208	Data Not Gamma Distributed	
Anderson-Darling (NDs = DL/2)	5.244	0.739		
Kolmogorov-Smirnov (NDs = DL/2)	0.525	0.209	Data Not Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	N/A	0.736		
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.208		

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	1	0.542	0.617	N/A
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (NDs = DL)	0.323	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.398	0.892	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.992	0.892	Data Appear Lognormal	
Lilliefors (Detects Only)	N/A	N/A		
Lilliefors (NDs = DL)	0.494	0.207	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.519	0.207	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.0552	0.207	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

#### Fluoride (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	1	16	94.12%

**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!  
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Fluoride (m-58a) was not processed!**

#### Fluoride (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	1	16	94.12%

**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!  
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Fluoride (m-62a) was not processed!**

## Appendix B Results of the Exploratory Data Analysis

### Lead (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Lead (m-56a) was not processed!**

### Lead (m-57a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	2	13	86.67%

	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	13	5.0000E-4	0.01	0.00142	5.0000E-4	0.00261
Statistics (Non-Detects Only)	2	2.1000E-4	8.6000E-4	5.3500E-4	5.3500E-4	4.5962E-4
Statistics (All: NDs treated as DL value)	15	2.1000E-4	0.01	0.0013	5.0000E-4	0.00244
Statistics (All: NDs treated as DL/2 value)	15	2.1000E-4	0.005	6.8800E-4	2.5000E-4	0.00122
Statistics (Normal ROS Imputed Data)	15	-2.297E-4	8.6000E-4	2.5692E-4	2.5112E-4	2.6661E-4
Statistics (Gamma ROS Imputed Data)	15	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Imputed Data)	15	8.0909E-5	8.6000E-4	2.7493E-4	2.2959E-4	1.9037E-4

	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (NDs = DL)	0.971	0.822	0.00134	-7.238	0.884	-0.122
Statistics (NDs = DL/2)	1.032	0.87	6.6641E-4	-7.839	0.858	-0.109
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Estimates)	--	--	--	-8.367	0.578	-0.0691

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	1	0.61	0.624	0.984

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (NDs = DL)	0.404	0.881	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.419	0.881	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.98	0.881	Data Appear Normal
Lilliefors (Detects Only)	N/A	N/A	
Lilliefors (NDs = DL)	0.416	0.22	Data Not Normal
Lilliefors (NDs = DL/2)	0.361	0.22	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.114	0.22	Data Appear Normal

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	0.828	0.839	0.444
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	N/A	N/A		
Kolmogorov-Smirnov (Detects Only)	N/A	N/A		
Anderson-Darling (NDs = DL)	2.603	0.764		
Kolmogorov-Smirnov (NDs = DL)	0.342	0.228	Data Not Gamma Distributed	
Anderson-Darling (NDs = DL/2)	2.66	0.762		
Kolmogorov-Smirnov (NDs = DL/2)	0.369	0.228	Data Not Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	N/A	0.734		
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.221		

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	1	0.836	0.807	N/A
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (NDs = DL)	0.73	0.881	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.668	0.881	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.98	0.881	Data Appear Lognormal	
Lilliefors (Detects Only)	N/A	N/A		
Lilliefors (NDs = DL)	0.326	0.22	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.369	0.22	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.114	0.22	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Lead (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	4	11	73.33%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	1.0000E-4	0.01	0.00151	5.0000E-4	0.00286
Statistics (Non-Detects Only)	4	5.6000E-4	0.0011	7.5750E-4	6.8500E-4	2.4824E-4
Statistics (All: NDs treated as DL value)	15	1.0000E-4	0.01	0.00131	5.0000E-4	0.00244
Statistics (All: NDs treated as DL/2 value)	15	5.0000E-5	0.005	7.5533E-4	2.5000E-4	0.00121
Statistics (Normal ROS Imputed Data)	15	-4.574E-4	0.0011	2.3731E-4	2.2485E-4	3.9925E-4
Statistics (Gamma ROS Imputed Data)	15	5.6000E-4	0.01	0.00754	0.01	0.00423
Statistics (Lognormal ROS Imputed Data)	15	1.6156E-4	0.0011	4.3214E-4	3.7674E-4	2.4345E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	13.53	3.548	5.6000E-5	-7.223	0.31	-0.0429
Statistics (NDs = DL)	0.924	0.784	0.00142	-7.269	0.97	-0.133
Statistics (NDs = DL/2)	0.982	0.83	7.6913E-4	-7.777	1.03	-0.132
Statistics (Gamma ROS Estimates)	1.347	1.122	0.00559	-5.303	1.207	-0.228
Statistics (Lognormal ROS Estimates)	--	--	--	-7.869	0.496	-0.063

## Appendix B Results of the Exploratory Data Analysis

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.94	0.618	0.683	0.983
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.878	0.748	Data Appear Normal	
Shapiro-Wilk (NDs = DL)	0.415	0.881	Data Not Normal	
Shapiro-Wilk (NDs = DL/2)	0.497	0.881	Data Not Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.973	0.881	Data Appear Normal	
Lilliefors (Detects Only)	0.25	0.375	Data Appear Normal	
Lilliefors (NDs = DL)	0.401	0.22	Data Not Normal	
Lilliefors (NDs = DL/2)	0.322	0.22	Data Not Normal	
Lilliefors (Normal ROS Estimates)	0.175	0.22	Data Appear Normal	

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.975	0.836	0.876	0.568
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	0.366	0.657		
Kolmogorov-Smirnov (Detects Only)	0.285	0.395	Detected Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL)	2.236	0.767		
Kolmogorov-Smirnov (NDs = DL)	0.29	0.229	Data Not Gamma Distributed	
Anderson-Darling (NDs = DL/2)	1.273	0.764		
Kolmogorov-Smirnov (NDs = DL/2)	0.248	0.228	Data Not Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	3.379	0.757		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.469	0.226	Data Not Gamma Distributed	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.956	0.87	0.93	0.983
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.905	0.748	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.795	0.881	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.892	0.881	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.973	0.881	Data Appear Lognormal	
Lilliefors (Detects Only)	0.254	0.375	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.299	0.22	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.241	0.22	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.175	0.22	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

#### Lead (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!  
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!  
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Lead (m-62a) was not processed!**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Lithium (m-56a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Lithium (m-56a) was not processed!**

**Lithium (m-57a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Lithium (m-57a) was not processed!**

**Lithium (m-58a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Lithium (m-58a) was not processed!**

**Lithium (m-62a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Lithium (m-62a) was not processed!**



**Appendix B**  
**Results of the Exploratory Data Analysis**

**Mercury (m-56a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Mercury (m-56a) was not processed!**

**Mercury (m-57a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Mercury (m-57a) was not processed!**

**Mercury (m-58a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Mercury (m-58a) was not processed!**

**Mercury (m-62a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	0	15	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Mercury (m-62a) was not processed!**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Molybdenum (m-56a)**

**Raw Statistics**

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	15
Minimum	0.0057
Maximum	0.029
Mean of Raw Data	0.0129
Standard Deviation of Raw Data	0.00619
Khat	5.649
Theta hat	0.00228
Kstar	4.691
Theta star	0.00275
Mean of Log Transformed Data	-4.442
Standard Deviation of Log Transformed Data	0.426

**Normal GOF Test Results**

Correlation Coefficient R	0.918
Shapiro Wilk Test Statistic	0.849
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.00892
Lilliefors Test Statistic	0.209
Lilliefors Critical (0.05) Value	0.207

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.969
A-D Test Statistic	0.571
A-D Critical (0.05) Value	0.741
K-S Test Statistic	0.177
K-S Critical(0.05) Value	0.21

**Data appear Gamma Distributed at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.977
Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.558
Lilliefors Test Statistic	0.151
Lilliefors Critical (0.05) Value	0.207

**Data appear Lognormal at (0.05) Significance Level**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Molybdenum (m-57a)**

**Raw Statistics**

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	16
Minimum	0.0011
Maximum	0.022
Mean of Raw Data	0.00544
Standard Deviation of Raw Data	0.00463
Khat	2.574
Theta hat	0.00211
Kstar	2.159
Theta star	0.00252
Mean of Log Transformed Data	-5.42
Standard Deviation of Log Transformed Data	0.624

**Normal GOF Test Results**

Correlation Coefficient R	0.773
Shapiro Wilk Test Statistic	0.629
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	5.2017E-6
Lilliefors Test Statistic	0.261
Lilliefors Critical (0.05) Value	0.207

**Data not Normal at (0.05) Significance Level**

**Gamma GOF Test Results**

Correlation Coefficient R	0.88
A-D Test Statistic	0.832
A-D Critical (0.05) Value	0.747
K-S Test Statistic	0.2
K-S Critical(0.05) Value	0.211

**Data follow Appr. Gamma Distribution at (0.05) Significance Level**

**Lognormal GOF Test Results**

Correlation Coefficient R	0.949
Shapiro Wilk Test Statistic	0.929
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	0.162
Lilliefors Test Statistic	0.154
Lilliefors Critical (0.05) Value	0.207

**Data appear Lognormal at (0.05) Significance Level**

## Appendix B Results of the Exploratory Data Analysis

### Molybdenum (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	15	2	11.76%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.0018	0.01	0.0059	0.0059	0.0058
Statistics (Non-Detects Only)	15	0.0014	0.02	0.00325	0.0018	0.0047
Statistics (All: NDs treated as DL value)	17	0.0014	0.02	0.00356	0.0018	0.00471
Statistics (All: NDs treated as DL/2 value)	17	9.0000E-4	0.02	0.00322	0.0018	0.00446
Statistics (Normal ROS Imputed Data)	17	1.6738E-4	0.02	0.00304	0.0018	0.00446
Statistics (Gamma ROS Imputed Data)	17	0.0014	0.02	0.00405	0.0018	0.00493
Statistics (Lognormal ROS Imputed Data)	17	0.00133	0.02	0.00307	0.0018	0.00443
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	1.563	1.295	0.00208	-6.081	0.665	-0.109
Statistics (NDs = DL)	1.491	1.267	0.00239	-6.008	0.722	-0.12
Statistics (NDs = DL/2)	1.572	1.334	0.00205	-6.09	0.692	-0.114
Statistics (Gamma ROS Estimates)	1.401	1.193	0.00289	-5.907	0.792	-0.134
Statistics (Lognormal ROS Estimates)	--	--	--	-6.118	0.636	-0.104

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.603	0.678	0.639	0.623

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.395	0.881	Data Not Normal
Shapiro-Wilk (NDs = DL)	0.484	0.892	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.439	0.892	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.422	0.892	Data Not Normal
Lilliefors (Detects Only)	0.43	0.22	Data Not Normal
Lilliefors (NDs = DL)	0.413	0.207	Data Not Normal
Lilliefors (NDs = DL/2)	0.387	0.207	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.408	0.207	Data Not Normal

#### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.787	0.863	0.814	0.915

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	2.99	0.753	
Kolmogorov-Smirnov (Detects Only)	0.383	0.225	Data Not Gamma Distributed
Anderson-Darling (NDs = DL)	3.018	0.756	
Kolmogorov-Smirnov (NDs = DL)	0.374	0.213	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.442	0.755	
Kolmogorov-Smirnov (NDs = DL/2)	0.336	0.213	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	2.516	0.758	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.357	0.213	Data Not Gamma Distributed

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.769	0.811	0.857	0.773
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.618	0.881	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.671	0.892	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.76	0.892	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.625	0.892	Data Not Lognormal	
Lilliefors (Detects Only)	0.323	0.22	Data Not Lognormal	
Lilliefors (NDs = DL)	0.326	0.207	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.282	0.207	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.324	0.207	Data Not Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Molybdenum (m-62a)

#### Raw Statistics

Number of Valid Observations	17
Number of Missing Observations	1
Number of Distinct Observations	10
Minimum	0.0019
Maximum	0.011
Mean of Raw Data	0.00295
Standard Deviation of Raw Data	0.00215
Khat	4.401
Theta hat	6.6964E-4
Kstar	3.664
Theta star	8.0443E-4
Mean of Log Transformed Data	-5.945
Standard Deviation of Log Transformed Data	0.415

#### Normal GOF Test Results

Correlation Coefficient R	0.641
Shapiro Wilk Test Statistic	0.441
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	3.8482E-8
Lilliefors Test Statistic	0.388
Lilliefors Critical (0.05) Value	0.207

**Data not Normal at (0.05) Significance Level**

#### Gamma GOF Test Results

Correlation Coefficient R	0.757
A-D Test Statistic	3.052
A-D Critical (0.05) Value	0.742
K-S Test Statistic	0.362
K-S Critical(0.05) Value	0.21

**Data not Gamma Distributed at (0.05) Significance Level**

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

Correlation Coefficient R	0.763
Shapiro Wilk Test Statistic	0.608
Shapiro Wilk Critical (0.05) Value	0.892
Approximate Shapiro Wilk P Value	2.9958E-6
Lilliefors Test Statistic	0.331
Lilliefors Critical (0.05) Value	0.207

**Data not Lognormal at (0.05) Significance Level**

### Non-parametric GOF Test Results

**Data do not follow a discernible distribution at (0.05) Level of Sig**

### Radium (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	11	4	26.67%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	4	0.4	1.2	0.8	0.8	0.337
Statistics (Non-Detects Only)	11	0.5	1.9	1.209	1.4	0.556
Statistics (All: NDs treated as DL value)	15	0.4	1.9	1.1	1.2	0.529
Statistics (All: NDs treated as DL/2 value)	15	0.2	1.9	0.993	0.6	0.603
Statistics (Normal ROS Imputed Data)	15	-0.157	1.9	0.984	0.6	0.629
Statistics (Gamma ROS Imputed Data)	15	0.193	1.9	1.018	0.6	0.58
Statistics (Lognormal ROS Imputed Data)	15	0.286	1.9	1.018	0.6	0.577
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	4.258	3.157	0.284	0.0679	0.548	8.074
Statistics (NDs = DL)	4.151	3.365	0.265	-0.03	0.538	-17.95
Statistics (NDs = DL/2)	2.557	2.09	0.388	-0.215	0.705	-3.281
Statistics (Gamma ROS Estimates)	2.896	2.362	0.351	-0.165	0.664	-4.036
Statistics (Lognormal ROS Estimates)	--	--	--	-0.149	0.615	-4.112

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.941	0.965	0.944	0.948

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.857	0.85	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.907	0.881	Data Appear Normal
Shapiro-Wilk (NDs = DL/2)	0.87	0.881	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.889	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.227	0.251	Data Appear Normal
Lilliefors (NDs = DL)	0.175	0.22	Data Appear Normal
Lilliefors (NDs = DL/2)	0.276	0.22	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.263	0.22	Data Not Normal

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.906	0.95	0.928	0.927
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	0.89	0.732		
Kolmogorov-Smirnov (Detects Only)	0.233	0.256	Detected Data appear Approximate Gamma D	
Anderson-Darling (NDs = DL)	0.594	0.74		
Kolmogorov-Smirnov (NDs = DL)	0.168	0.222	Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL/2)	0.754	0.746		
Kolmogorov-Smirnov (NDs = DL/2)	0.234	0.224	Data Not Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	0.912	0.745		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.267	0.223	Data Not Gamma Distributed	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.917	0.961	0.956	0.94
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.814	0.85	Data Not Lognormal	
Shapiro-Wilk (NDs = DL)	0.903	0.881	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.902	0.881	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.869	0.881	Data Not Lognormal	
Lilliefors (Detects Only)	0.233	0.251	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.187	0.22	Data Appear Lognormal	
Lilliefors (NDs = DL/2)	0.196	0.22	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.255	0.22	Data Not Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Radium (m-57a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	5	10	66.67%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	10	0.4	0.9	0.65	0.65	0.127
Statistics (Non-Detects Only)	5	0.5	1.5	0.88	0.7	0.415
Statistics (All: NDs treated as DL value)	15	0.4	1.5	0.727	0.7	0.269
Statistics (All: NDs treated as DL/2 value)	15	0.2	1.5	0.51	0.35	0.354
Statistics (Normal ROS Imputed Data)	15	-0.324	1.5	0.348	0.292	0.506
Statistics (Gamma ROS Imputed Data)	15	0.01	1.5	0.424	0.315	0.425
Statistics (Lognormal ROS Imputed Data)	15	0.207	1.5	0.523	0.415	0.355
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	6.104	2.575	0.144	-0.212	0.452	-2.133
Statistics (NDs = DL)	10	8.047	0.0726	-0.37	0.315	-0.852
Statistics (NDs = DL/2)	3.305	2.688	0.154	-0.832	0.54	-0.649
Statistics (Gamma ROS Estimates)	0.739	0.636	0.574	-1.669	1.697	-1.017
Statistics (Lognormal ROS Estimates)	--	--	--	-0.815	0.57	-0.699

## Appendix B Results of the Exploratory Data Analysis

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.951	0.868	0.843	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.896	0.762	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.776	0.881	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.724	0.881	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.947	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.268	0.343	Data Appear Normal
Lilliefors (NDs = DL)	0.34	0.22	Data Not Normal
Lilliefors (NDs = DL/2)	0.275	0.22	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.11	0.22	Data Appear Normal

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.985	0.917	0.938	0.988

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.317	0.68	
Kolmogorov-Smirnov (Detects Only)	0.258	0.358	Detected Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.017	0.737	
Kolmogorov-Smirnov (NDs = DL)	0.305	0.222	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	1.104	0.743	
Kolmogorov-Smirnov (NDs = DL/2)	0.275	0.223	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	0.407	0.776	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.146	0.23	Data Appear Gamma Distributed

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.976	0.933	0.936	0.978

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.94	0.762	Data Appear Lognormal
Shapiro-Wilk (NDs = DL)	0.89	0.881	Data Appear Lognormal
Shapiro-Wilk (NDs = DL/2)	0.883	0.881	Data Appear Lognormal
Shapiro-Wilk (Lognormal ROS Estimates)	0.951	0.881	Data Appear Lognormal
Lilliefors (Detects Only)	0.226	0.343	Data Appear Lognormal
Lilliefors (NDs = DL)	0.283	0.22	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.256	0.22	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.0967	0.22	Data Appear Lognormal

**Note: Substitution methods such as DL or DL/2 are not recommended.**



## Appendix B Results of the Exploratory Data Analysis

### Radium (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	8	7	46.67%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	7	0.6	0.9	0.686	0.7	0.107
Statistics (Non-Detects Only)	8	0.7	2.6	1.4	1.05	0.729
Statistics (All: NDs treated as DL value)	15	0.6	2.6	1.067	0.8	0.638
Statistics (All: NDs treated as DL/2 value)	15	0.3	2.6	0.907	0.7	0.752
Statistics (Normal ROS Imputed Data)	15	-1.085	2.6	0.517	0.7	1.142
Statistics (Gamma ROS Imputed Data)	15	0.01	2.6	0.772	0.7	0.867
Statistics (Lognormal ROS Imputed Data)	15	0.22	2.6	0.908	0.7	0.752
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	4.536	2.918	0.309	0.222	0.505	2.272
Statistics (NDs = DL)	4.11	3.333	0.26	-0.062	0.485	-7.825
Statistics (NDs = DL/2)	1.889	1.555	0.48	-0.385	0.767	-1.991
Statistics (Gamma ROS Estimates)	0.486	0.434	1.586	-1.571	2.183	-1.39
Statistics (Lognormal ROS Estimates)	--	--	--	-0.395	0.797	-2.017

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.934	0.852	0.897	0.981

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.856	0.818	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.724	0.881	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.796	0.881	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.95	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.254	0.283	Data Appear Normal
Lilliefors (NDs = DL)	0.336	0.22	Data Not Normal
Lilliefors (NDs = DL/2)	0.237	0.22	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.158	0.22	Data Appear Normal

#### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.965	0.93	0.974	0.943

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.531	0.719	
Kolmogorov-Smirnov (Detects Only)	0.262	0.295	Detected Data Appear Gamma Distributed
Anderson-Darling (NDs = DL)	1.41	0.74	
Kolmogorov-Smirnov (NDs = DL)	0.3	0.222	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	0.788	0.748	
Kolmogorov-Smirnov (NDs = DL/2)	0.208	0.225	Detected Data appear Approximate Gamma D
Anderson-Darling (Gamma ROS Estimates)	0.684	0.796	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.195	0.234	Data Appear Gamma Distributed

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.955	0.909	0.951	0.981
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.891	0.818	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.816	0.881	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.883	0.881	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.946	0.881	Data Appear Lognormal	
Lilliefors (Detects Only)	0.242	0.283	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.269	0.22	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.207	0.22	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.158	0.22	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Radium (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	13	2	13.33%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	2	0.7	0.7	0.7	0.7	0
Statistics (Non-Detects Only)	13	0.5	2	1.077	1	0.421
Statistics (All: NDs treated as DL value)	15	0.5	2	1.027	0.9	0.411
Statistics (All: NDs treated as DL/2 value)	15	0.35	2	0.98	0.9	0.466
Statistics (Normal ROS Imputed Data)	15	0.319	2	0.99	0.9	0.454
Statistics (Gamma ROS Imputed Data)	15	0.406	2	0.997	0.9	0.443
Statistics (Lognormal ROS Imputed Data)	15	0.473	2	1.004	0.9	0.435
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	6.931	5.383	0.155	2.3393E-4	0.41	1752
Statistics (NDs = DL)	6.949	5.604	0.148	-0.0474	0.4	-8.439
Statistics (NDs = DL/2)	4.341	3.518	0.226	-0.14	0.53	-3.789
Statistics (Gamma ROS Estimates)	5.338	4.314	0.187	-0.0992	0.465	-4.687
Statistics (Lognormal ROS Estimates)	--	--	--	-0.0857	0.444	-5.176

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.976	0.967	0.979	0.98
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.953	0.866	Data Appear Normal	
Shapiro-Wilk (NDs = DL)	0.936	0.881	Data Appear Normal	
Shapiro-Wilk (NDs = DL/2)	0.954	0.881	Data Appear Normal	
Shapiro-Wilk (Normal ROS Estimates)	0.96	0.881	Data Appear Normal	
Lilliefors (Detects Only)	0.125	0.234	Data Appear Normal	
Lilliefors (NDs = DL)	0.154	0.22	Data Appear Normal	
Lilliefors (NDs = DL/2)	0.115	0.22	Data Appear Normal	
Lilliefors (Normal ROS Estimates)	0.112	0.22	Data Appear Normal	

## Appendix B Results of the Exploratory Data Analysis

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.988	0.989	0.985	0.989
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Anderson-Darling (Detects Only)	0.245	0.735		
Kolmogorov-Smirnov (Detects Only)	0.14	0.237	Detected Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL)	0.246	0.738		
Kolmogorov-Smirnov (NDs = DL)	0.127	0.222	Data Appear Gamma Distributed	
Anderson-Darling (NDs = DL/2)	0.316	0.74		
Kolmogorov-Smirnov (NDs = DL/2)	0.161	0.222	Data Appear Gamma Distributed	
Anderson-Darling (Gamma ROS Estimates)	0.268	0.738		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.132	0.222	Data Appear Gamma Distributed	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.978	0.986	0.973	0.98
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.952	0.866	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL)	0.965	0.881	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.937	0.881	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.947	0.881	Data Appear Lognormal	
Lilliefors (Detects Only)	0.168	0.234	Data Appear Lognormal	
Lilliefors (NDs = DL)	0.117	0.22	Data Appear Lognormal	
Lilliefors (NDs = DL/2)	0.193	0.22	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.149	0.22	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Selenium (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	4	11	73.33%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	11	5.0000E-4	0.01	0.00155	5.0000E-4	0.00284
Statistics (Non-Detects Only)	4	3.3000E-4	6.2000E-4	5.2000E-4	5.6500E-4	1.2936E-4
Statistics (All: NDs treated as DL value)	15	3.3000E-4	0.01	0.00128	5.0000E-4	0.00245
Statistics (All: NDs treated as DL/2 value)	15	2.5000E-4	0.005	7.0867E-4	3.0000E-4	0.00121
Statistics (Normal ROS Imputed Data)	15	2.0883E-4	6.2000E-4	4.0518E-4	4.0150E-4	1.1144E-4
Statistics (Gamma ROS Imputed Data)	15	3.3000E-4	0.01	0.00747	0.01	0.00434
Statistics (Lognormal ROS Imputed Data)	15	2.5547E-4	6.2000E-4	4.0448E-4	3.8982E-4	1.0394E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	17.88	4.635	2.9091E-5	-7.59	0.288	-0.0379
Statistics (NDs = DL)	0.987	0.834	0.0013	-7.247	0.836	-0.115
Statistics (NDs = DL/2)	1.13	0.949	6.2699E-4	-7.756	0.815	-0.105
Statistics (Gamma ROS Estimates)	1.129	0.947	0.00662	-5.401	1.373	-0.254
Statistics (Lognormal ROS Estimates)	--	--	--	-7.842	0.245	-0.0313

## Appendix B Results of the Exploratory Data Analysis

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	0.889	0.591	0.622	0.973

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.805	0.748	Data Appear Normal
Shapiro-Wilk (NDs = DL)	0.381	0.881	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.417	0.881	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.949	0.881	Data Appear Normal
Lilliefors (Detects Only)	0.371	0.375	Data Appear Normal
Lilliefors (NDs = DL)	0.412	0.22	Data Not Normal
Lilliefors (NDs = DL/2)	0.396	0.22	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.182	0.22	Data Appear Normal

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	0.839	0.815	0.827	0.547

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	0.634	0.657	
Kolmogorov-Smirnov (Detects Only)	0.404	0.394	Detected Data appear Approximate Gamma D
Anderson-Darling (NDs = DL)	3.209	0.764	
Kolmogorov-Smirnov (NDs = DL)	0.413	0.228	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.301	0.761	
Kolmogorov-Smirnov (NDs = DL/2)	0.295	0.227	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	3.457	0.761	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.471	0.227	Data Not Gamma Distributed

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	0.867	0.772	0.833	0.972

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)	0.766	0.748	Data Appear Lognormal
Shapiro-Wilk (NDs = DL)	0.623	0.881	Data Not Lognormal
Shapiro-Wilk (NDs = DL/2)	0.708	0.881	Data Not Lognormal
Shapiro-Wilk (Lognormal ROS Estimates)	0.944	0.881	Data Appear Lognormal
Lilliefors (Detects Only)	0.389	0.375	Data Not Lognormal
Lilliefors (NDs = DL)	0.366	0.22	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.254	0.22	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.182	0.22	Data Appear Lognormal

**Note: Substitution methods such as DL or DL/2 are not recommended.**

## Appendix B Results of the Exploratory Data Analysis

### Selenium (m-57a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	2	13	86.67%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	13	5.0000E-4	0.01	0.00143	5.0000E-4	0.00261
Statistics (Non-Detects Only)	2	2.9000E-4	6.9000E-4	4.9000E-4	4.9000E-4	2.8284E-4
Statistics (All: NDs treated as DL value)	15	2.9000E-4	0.01	0.00131	5.0000E-4	0.00244
Statistics (All: NDs treated as DL/2 value)	15	2.5000E-4	0.005	6.8533E-4	2.5000E-4	0.00121
Statistics (Normal ROS Imputed Data)	15	3.2547E-5	6.9000E-4	3.1960E-4	3.1531E-4	1.5701E-4
Statistics (Gamma ROS Imputed Data)	15	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Imputed Data)	15	1.6600E-4	6.9000E-4	3.2745E-4	3.0635E-4	1.2546E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (NDs = DL)	0.999	0.844	0.00131	-7.219	0.85	-0.118
Statistics (NDs = DL/2)	1.072	0.902	6.3930E-4	-7.82	0.827	-0.106
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Estimates)	--	--	--	-8.081	0.34	-0.0421

#### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	1	0.604	0.613	0.974

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (NDs = DL)	0.397	0.881	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.406	0.881	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.964	0.881	Data Appear Normal
Lilliefors (Detects Only)	N/A	N/A	
Lilliefors (NDs = DL)	0.416	0.22	Data Not Normal
Lilliefors (NDs = DL/2)	0.365	0.22	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.17	0.22	Data Appear Normal

#### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	0.823	0.828	0.446

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	2.763	0.763	
Kolmogorov-Smirnov (NDs = DL)	0.331	0.228	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.69	0.762	
Kolmogorov-Smirnov (NDs = DL/2)	0.326	0.228	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	N/A	0.734	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.221	

## Appendix B Results of the Exploratory Data Analysis

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	1	0.815	0.799	N/A
	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)	
Shapiro-Wilk (NDs = DL)	0.692	0.881	Data Not Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.654	0.881	Data Not Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.964	0.881	Data Appear Lognormal	
Lilliefors (Detects Only)	N/A	N/A		
Lilliefors (NDs = DL)	0.273	0.22	Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.305	0.22	Data Not Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.17	0.22	Data Appear Lognormal	

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Selenium (m-58a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	1	14	93.33%

**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!  
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Selenium (m-58a) was not processed!**

### Selenium (m-62a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	3	15	2	13	86.67%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	13	5.0000E-4	0.01	0.00142	5.0000E-4	0.00261
Statistics (Non-Detects Only)	2	7.1000E-4	7.8000E-4	7.4500E-4	7.4500E-4	4.9497E-5
Statistics (All: NDs treated as DL value)	15	5.0000E-4	0.01	0.00133	5.0000E-4	0.00243
Statistics (All: NDs treated as DL/2 value)	15	2.5000E-4	0.005	7.1600E-4	2.5000E-4	0.00121
Statistics (Normal ROS Imputed Data)	15	2.3901E-4	7.8000E-4	4.9718E-4	4.9510E-4	1.4204E-4
Statistics (Gamma ROS Imputed Data)	15	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Imputed Data)	15	3.7713E-4	7.8000E-4	5.4271E-4	5.3197E-4	1.0609E-4
	K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (NDs = DL)	1.057	0.89	0.00126	-7.163	0.815	-0.114
Statistics (NDs = DL/2)	1.094	0.92	6.5447E-4	-7.764	0.846	-0.109
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A
Statistics (Lognormal ROS Estimates)	--	--	--	-7.536	0.191	-0.0253

## Appendix B Results of the Exploratory Data Analysis

### Normal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Normal ROS
Correlation Coefficient R	1	0.598	0.633	0.991

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (NDs = DL)	0.388	0.881	Data Not Normal
Shapiro-Wilk (NDs = DL/2)	0.43	0.881	Data Not Normal
Shapiro-Wilk (Normal ROS Estimates)	0.985	0.881	Data Appear Normal
Lilliefors (Detects Only)	N/A	N/A	
Lilliefors (NDs = DL)	0.421	0.22	Data Not Normal
Lilliefors (NDs = DL/2)	0.35	0.22	Data Not Normal
Lilliefors (Normal ROS Estimates)	0.106	0.22	Data Appear Normal

### Gamma GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Gamma ROS
Correlation Coefficient R	N/A	0.817	0.84	0.469

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Anderson-Darling (Detects Only)	N/A	N/A	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A	
Anderson-Darling (NDs = DL)	2.982	0.762	
Kolmogorov-Smirnov (NDs = DL)	0.346	0.228	Data Not Gamma Distributed
Anderson-Darling (NDs = DL/2)	2.339	0.761	
Kolmogorov-Smirnov (NDs = DL/2)	0.324	0.227	Data Not Gamma Distributed
Anderson-Darling (Gamma ROS Estimates)	N/A	0.734	
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.221	

### Lognormal GOF Test Results

	No NDs	NDs = DL	NDs = DL/2	Log ROS
Correlation Coefficient R	1	0.774	0.826	N/A

	Test value	Crit. (0.05)	Conclusion with Alpha(0.05)
Shapiro-Wilk (NDs = DL)	0.617	0.881	Data Not Lognormal
Shapiro-Wilk (NDs = DL/2)	0.693	0.881	Data Not Lognormal
Shapiro-Wilk (Lognormal ROS Estimates)	0.985	0.881	Data Appear Lognormal
Lilliefors (Detects Only)	N/A	N/A	
Lilliefors (NDs = DL)	0.304	0.22	Data Not Lognormal
Lilliefors (NDs = DL/2)	0.334	0.22	Data Not Lognormal
Lilliefors (Lognormal ROS Estimates)	0.106	0.22	Data Appear Lognormal

**Note: Substitution methods such as DL or DL/2 are not recommended.**

### Thallium (m-56a)

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	1	16	94.12%

**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!  
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Thallium (m-56a) was not processed!**

**Appendix B**  
**Results of the Exploratory Data Analysis**

**Thallium (m-57a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	0	17	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Thallium (m-57a) was not processed!**

**Thallium (m-58a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	0	17	100.00%

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**  
**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**  
**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Thallium (m-58a) was not processed!**

**Thallium (m-62a)**

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	18	1	17	1	16	94.12%

**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**  
**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**

**The data set for variable Thallium (m-62a) was not processed!**



## **APPENDIX J**

**WOOD TECHNICAL MEMORANDUM DOCUMENTING THE STATISTICAL ANALYSIS  
OF APPENDIX IV CONSTITUENT DATA COLLECTED FROM THE SEDI IN AUGUST  
2019**



# Technical Memorandum

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**To:** Natalie Chrisman Lazarr, PE  
Byron Conrad, PE  
Pam Norris

**Wood File No:** 1420182040.\*\*\*\*.03

**From:** Carla Landrum, PhD, Formation

**Reviewed by:** Emily LoDolce, PE, Wood

**Date:** January 14, 2020

**Subject: CCR GROUNDWATER ASSESSMENT MONITORING  
STATISTICAL EVALUATION OF AUGUST 2019 DATA  
COLLECTED FROM THE SEDIMENTATION POND  
Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

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## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents the routine statistical evaluation of assessment monitoring groundwater data collected in August 2019 from the Sedimentation Pond (SEDI) located at the Arizona Public Service (APS) Cholla Power Plant (Cholla) in Navajo County, Arizona. This routine statistical evaluation was conducted in accordance with the Statistical Data Analysis Work Plan for the Cholla Power Plant (Wood, 2018). Wood Environment & Infrastructure Solutions, Inc. (Wood) contracted with Formation Environmental, LLC (Formation) to prepare this Tech Memo on behalf of APS.

Table 1 presents the concentrations of Appendix IV constituents in samples collected from SEDI background (i.e., M-62A) and compliance monitoring wells (i.e., M-56A, M-57A and M-58A) in August 2019. The August 2019 sampling event constitutes the second Semiannual Assessment Monitoring event of 2019 and included analysis for Appendix IV constituents that have previously been detected at the site.

## 2.0 STATISTICAL EVALUATION APPROACH

Appendix A contains the contents of the ProUCL data upload tables for the subject analysis which includes SEDI compliance well data collected from November 2015 through August 2019. The Appendix IV analytes are listed by name as column headers in the ProUCL data upload table. Each analyte has a corresponding data column (indicated with a "D\_" prefix) that indicates if the analyte was detected or not at a concentration that exceeds the analytical reporting limit, where detectable concentrations are symbolized by a "1" and non-detectable concentrations are symbolized by a "0". The non-detectable concentration corresponds to the analyte's reporting limit value for the corresponding sample date. Field and split sample duplicates were retracted from the analysis.

Appendix B presents the raw outputs from the Exploratory Data Analysis (EDA) of SEDI Appendix IV groundwater data incorporating August 2019 sampling events.

### 3.0 EXCEEDANCE ASSESSMENT

Table 2 summarizes the GWPS for each Appendix IV constituent. GWPS selection is documented in the January 2019 Tech Memo (Wood, 2019) and constitutes either the statistically calculated Background Threshold Value (BTV), the US EPA's promulgated Maximum Contaminant Level (MCL) for Drinking Water, or the risk-based alternative GWPS identified for constituents without MCLs, whichever value is higher. For all Appendix IV constituents except antimony and lithium, the US EPA's promulgated MCL, or the risk-based alternative GWPS, is higher than the BTVs.

Table 2 summarizes: 1) compliance well comparisons to their respective GWPS for Appendix IV constituents, 2) which compliance wells exhibit statistically significant temporal trends, and 3) the type of LCL test applied after incorporating the August 2019 sampling event for each monitoring well and Appendix IV constituent pair. The addition of data to the sample population over time can cause the type of statistical test in Table 2 to change from previous evaluations.

This statistical analysis indicates there is insufficient evidence to declare a GWPS exceedance for SEDI monitoring wells M-56A, M-57A, and M-58A at the current time.

Several compliance monitoring wells exhibit statistically significant ( $p < 0.05$ ) temporal trends with no SSI declaration, including statistically significant ( $p < 0.05$ ) decreasing temporal trends in: M-56A (barium, and molybdenum), M-57A (arsenic, barium and cobalt), and M-58A (cobalt) in addition to statistically significant ( $p < 0.05$ ) increasing temporal trends in: M-56A (chromium) and M-57A (chromium).

### 4.0 RECOMMENDATION

On the basis that one or more Appendix IV single-sample constituent concentrations exceed current BTVs (Table 1) and the statistical assessment documented herein indicates that Appendix IV constituent concentrations do not exceed applicable GWPSs (Table 2), Formation and Wood recommend continuing Assessment Monitoring at the SEDI in accordance with 40 Code of Federal Regulations Section 257.95(f) (Federal Register, 2018).

### 5.0 REFERENCES

Federal Register, 2018. *40 Code of Federal Regulations Part 257 – Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule promulgated April 17, 2015 with Amendments to the National Minimum Criteria (Phase One, Part One) effective August 29, 2018.*

US Environmental Protection Agency, 2015. *ProUCL (Version 5.1.1) User Guide, Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations.* EPA/600/R-07/041. Washington D.C. October 2015.

Wood, 2019. *CCR Groundwater Assessment Monitoring Statistical Analysis and Results for the Sedimentation Pond.* Arizona Public Service Cholla Power Plant, Navajo County, Arizona. Technical Memorandum dated January 14, 2019.

Wood, 2018. *Statistical Data Analysis Work Plan.* Coal Combustion Residual Rule Groundwater Monitoring System Compliance, Cholla Power Plant, Navajo County, Arizona. Prepared for Arizona Public Service. October 2018.

## **TABLES**

**Table 1**  
**Assessment Monitoring Data Collected from the Sedimentation Pond During August 2019**

Constituent List	Analyte	Units	BTV	Analyte Concentration by Location and Date			
				M-56A (Compliance)	M-57A (Compliance)	M-58A (Compliance)	M-62A (Background)
				8/9/19	8/9/19	8/9/19	8/9/19
Appendix IV	Antimony	mg/L	0.05	NS	NS	NS	NS
Appendix IV	Arsenic	mg/L	0.004	<b>0.0085</b>	0.0019	0.0038	0.0031
Appendix IV	Barium	mg/L	0.08	0.078	0.039	0.066	0.067
Appendix IV	Beryllium	mg/L	0.001	NS	NS	NS	NS
Appendix IV	Cadmium	mg/L	0.002	NS	NS	NS	NS
Appendix IV	Chromium	mg/L	0.004	<b>0.023</b>	<b>0.038</b>	<0.001	0.0037
Appendix IV	Cobalt	mg/L	0.002	0.0012	<b>0.004</b>	<0.0005	<0.0005
Appendix IV	Fluoride	mg/L	0.8	<0.8	<0.8	<0.8	<0.4
Appendix IV	Lead	mg/L	0.01	NS	NS	NS	NS
Appendix IV	Lithium	mg/L	0.2	<0.20	<0.2	<0.2	<0.2
Appendix IV	Mercury	mg/L	0.0002	NS	NS	NS	NS
Appendix IV	Molybdenum	mg/L	0.011	0.011	0.0068	0.0018	0.0028
Appendix IV	Total Radium	pCi/L	1.1	0.6	<0.7	<0.7	0.8
Appendix IV	Selenium	mg/L	0.01	NS	NS	NS	NS
Appendix IV	Thallium	mg/L	0.0004	<0.0001	<0.0001	<0.0001	<0.0001

**Notes:**

Constituent concentrations that exceed BTVs are presented in bolded text.

**Acronyms:**

BTV = Background Threshold Value  
 mg/L = milligrams per liter  
 NS = analyte not sampled for  
 pCi/L = picocuries per liter  
 SEDI = Sedimentation Pond

SU = standard units  
 TDS = total dissolved solids  
 < = sample concentration  
 below the reporting limit value

**Table 2**  
**GWPS Exceedance Summary for Data Collected from the Sedimentation Pond thru August 2019**

Lower Confidence Limit (LCL) Results - Appendix IV Constituents									
Analyte	Units	GWPS	M-56A		M-57A		M-58A		Exceedance
			LCL	Recent Test	LCL	Recent Test	LCL	Recent Test	
Antimony	mg/L	0.05	0.0025	NP-LCL	0.0025	NP-LCL	0.0030	NP-LCL	No
Arsenic	mg/L	0.01	0.0020	NP-LCL	0.0014	P-LCLT	0.0035	P-LCL	No
Barium	mg/L	2	0.0534	P-LCLT	0.0293	NP-LCL	0.0611	P-LCL	No
Beryllium	mg/L	0.004	0.0010	NP-LCL	0.0010	NP-LCL	0.0010	NP-LCL	No
Cadmium	mg/L	0.005	0.0002	NP-LCL	0.0002	NP-LCL	0.0002	NP-LCL	No
Chromium	mg/L	0.1	0.0105	P-LCLT	0.0187	P-LCLT	0.0030	NP-LCL	No
Cobalt	mg/L	0.006	0.0005	P-LCL	0.0000	P-LCLT	0.0010	NP-LCL	No
Fluoride	mg/L	4	0.4700	NP-LCL	0.4200	NP-LCL	0.4000	NP-LCL	No
Lead	mg/L	0.015	0.0010	NP-LCL	0.0010	NP-LCL	0.0011	NP-LCL	No
Lithium	mg/L	0.2	0.2000	NP-LCL	0.2000	NP-LCL	0.2000	NP-LCL	No
Mercury	mg/L	0.002	0.0002	NP-LCL	0.0002	NP-LCL	0.0002	NP-LCL	No
Molybdenum	mg/L	0.1	0.0007	P-LCLT	0.0036	P-LCL	0.0025	NP-LCL	No
Total Radium	pCi/L	5	0.5360	P-LCL	0.9000	NP-LCL	1.9000	NP-LCL	No
Selenium	mg/L	0.05	0.0010	NP-LCL	0.0010	NP-LCL	0.0010	NP-LCL	No
Thallium	mg/L	0.002	0.0001	NP-LCL	0.0002	NP-LCL	0.0002	NP-LCL	No

**Notes:**

Statistically significant temporal trend (p<0.05)

**Acronyms:**

GWPS = Groundwater Protection Standard  
 mg/L = milligrams per liter  
 pCi/L = picocuries per liter

P-LCL = Parametric Lower Confidence Limit  
 NP-LCL = Non-Parametric Lower Confidence Limit  
 P-LCLT = Parametric Lower Confidence Limit with a Trend

## **APPENDIX A**

### **PROUCL DATA UPLOAD TABLE**

Appendix A  
ProUCL Data

StationName	QC_SampleID	SampDate	NumDate	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium
M-56A	7873_O	11/30/2015 12:08	42338.51	0.0025	0	0.0019	1	0.081	1	0.001	0	0.0001	0	0.00051
M-56A	CH-M-56A-0316_O	3/8/2016 13:40	42437.57	0.05	0	0.01	0	0.084	1	0.001	0	0.002	0	0.01
M-56A	CH-CCR-M56A-05102016_O	5/10/2016 14:11	42500.59	0.0001	0	0.00093	1	0.075	1	0.001	0	0.0001	0	0.0005
M-56A	CH-CCR-M56A-816_O	8/29/2016 9:01	42611.38	0.00013	1	0.00082	1	0.082	1	0.001	0	0.0001	0	0.0005
M-56A	CH-CCR-M56A-916_O	9/21/2016 10:52	42634.45	0.0005	0	0.00083	1	0.076	1	0.001	0	0.0001	0	0.0012
M-56A	CH-CCR-M56A-217_O	2/20/2017 11:21	42786.47	0.001	0	0.00068	1	0.071	1	0.001	0	0.0001	0	0.0093
M-56A	CH-CCR-M56A-41317_O	4/13/2017 7:45	42838.32	0.001	0	0.00076	1	0.07	1	0.001	0	0.0001	0	0.0091
M-56A	CH-CCR-M56A-42517_O	4/25/2017 9:11	42850.38	0.001	0	0.00075	1	0.086	1	0.001	0	0.0001	0	0.0067
M-56A	CH-CCR-M56A-51817_O	5/18/2017 9:21	42873.39	0.001	0	0.0006	1	0.062	1	0.001	0	0.0001	0	0.0063
M-56A	CH-CCR-M56A-52517_O	5/25/2017 10:17	42880.43	0.001	0	0.0007	1	0.073	1	0.001	0	0.0001	0	0.02
M-56A	CH-CCR-M56A-70117_O	7/1/2017 14:43	42917.61	0.001	0	0.00065	1	0.068	1	0.001	0	0.0001	0	0.0034
M-56A	CH-CCR-M56A-72617_O	7/26/2017 14:40	42942.61	0.002	0	0.001	0	0.066	1	0.001	0	0.0002	0	0.0028
M-56A	CH-CCR-M56A-90817_O	9/8/2017 8:35	42986.36	0.004	0	0.002	0	0.07	1	0.001	0	0.0004	0	0.004
M-56A	CH-CCR-M56A-120817_O	12/8/2017 11:15	43077.47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-56A	CH-CCR-M-56A-52118_O	5/21/2018 12:01	43241.50	0.001	0	0.00081	1	0.061	1	0.001	0	0.0001	0	0.0046
M-56A	CH-CCR-M56A-082818_O	8/28/2018 14:07	43340.59	NA	NA	0.0013	1	0.065	1	NA	NA	NA	NA	0.0042
M-56A	CH-CCR-M56A-21519	2/15/2019 22:14	43511.93	NA	NA	0.0082	1	0.067	1	NA	NA	NA	NA	0.0052
M-56A	CH-CCR-M56A-41819	4/18/2019 9:58	43573.42	0.001	0	0.0011	1	0.055	1	0.001	0	0.0001	0	0.076
M-56A	CH-CCR-M56A-8919	8/9/2019 0:00	43686.00	NA	NA	0.0085	1	0.078	1	NA	NA	NA	NA	0.023
M-57A	7874_O	11/30/2015 13:05	42338.55	0.0025	0	0.0048	1	0.072	1	0.001	0	0.0001	0	0.00074
M-57A	CH-M-57A-0316_O	3/8/2016 14:40	42437.61	0.05	0	0.0064	1	0.063	1	0.001	0	0.002	0	0.01
M-57A	CH-CCR-M57A-05112016_O	5/11/2016 8:53	42501.37	0.0001	0	0.0027	1	0.047	1	0.001	0	0.0001	0	0.0005
M-57A	CH-CCR-M57A-816_O	8/25/2016 13:23	42607.56	0.00012	1	0.0042	1	0.055	1	0.001	0	0.0001	0	0.00066
M-57A	CH-CCR-M57A-916_O	9/21/2016 13:59	42634.58	0.0005	0	0.0019	1	0.051	1	0.001	0	0.0001	0	0.016
M-57A	CH-CCR-M57A-217_O	2/20/2017 10:30	42786.44	0.001	0	0.0051	1	0.041	1	0.001	0	0.0001	0	0.042
M-57A	CH-CCR-M57A-41217_O	4/12/2017 18:28	42837.77	0.001	0	0.0042	1	0.042	1	0.001	0	0.0001	0	0.031
M-57A	CH-CCR-M57A-42517_O	4/25/2017 8:39	42850.36	0.001	0	0.0039	1	0.042	1	0.001	0	0.0001	0	0.019
M-57A	CH-CCR-M57A-51817_O	5/18/2017 10:10	42873.42	0.001	0	0.0098	1	0.038	1	0.001	0	0.0001	0	0.024
M-57A	CH-CCR-M57A-52517_O	5/25/2017 8:30	42880.35	0.001	0	0.0066	1	0.044	1	0.001	0	0.0001	0	0.035
M-57A	CH-CCR-M57A-70117_O	7/1/2017 14:11	42917.59	0.001	0	0.0038	1	0.043	1	0.001	0	0.0001	0	0.012
M-57A	CH-CCR-M57A-72617_O	7/26/2017 13:53	42942.58	0.002	0	0.0027	1	0.042	1	0.001	0	0.0002	0	0.028
M-57A	CH-CCR-M57A-90817_O	9/8/2017 8:01	42986.33	0.004	0	0.0027	1	0.045	1	0.001	0	0.0004	0	0.015
M-57A	CH-CCR-M57A-120817_O	12/8/2017 10:54	43077.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-57A	CH-CCR-M-57A-52118_O	5/21/2018 12:33	43241.52	0.002	0	0.0022	1	0.043	1	0.001	0	0.0002	0	0.0023
M-57A	CH-CCR-M57A-082818_O	8/28/2018 13:07	43340.55	NA	NA	0.0021	1	0.045	1	NA	NA	NA	NA	0.0067
M-57A	CH-CCR-M57A-21519	2/15/2019 21:41	43511.90	NA	NA	0.0017	1	0.041	1	NA	NA	NA	NA	0.0074
M-57A	CH-CCR-M57A-41719	4/17/2019 15:28	43572.64	0.001	0	0.0026	1	0.041	1	0.001	0	0.0001	0	0.045
M-57A	CH-CCR-M57A-8919	8/9/2019 0:00	43686.00	NA	NA	0.0019	1	0.039	1	NA	NA	NA	NA	0.038
M-58A	7876_O	11/30/2015 14:30	42338.60	0.0025	0	0.0032	1	0.1	1	0.001	0	0.0001	0	0.0005
M-58A	CH-M-58A-0316_O	3/8/2016 14:50	42437.62	0.05	0	0.01	0	0.081	1	0.001	0	0.002	0	0.01
M-58A	CH-CCR-M58A-05112016_O	5/11/2016 10:20	42501.43	0.0001	0	0.0025	1	0.055	1	0.001	0	0.0001	0	0.0005
M-58A	CH-CCR-M58A-816_O	8/25/2016 14:11	42607.59	0.0001	0	0.0045	1	0.097	1	0.001	0	0.0001	0	0.00097
M-58A	CH-CCR-M58A-916_O	9/21/2016 13:16	42634.55	0.0005	0	0.0039	1	0.076	1	0.001	0	0.0001	0	0.0018
M-58A	CH-CCR-M58A-217_O	2/20/2017 9:49	42786.41	0.001	0	0.0027	1	0.064	1	0.001	0	0.0001	0	0.0033
M-58A	CH-CCR-M58A-41217_O	4/12/2017 17:41	42837.74	0.001	0	0.0037	1	0.048	1	0.001	0	0.0001	0	0.00091
M-58A	CH-CCR-M58A-42517_O	4/25/2017 8:08	42850.34	0.001	0	0.004	1	0.049	1	0.001	0	0.0001	0	0.001
M-58A	CH-CCR-M58A-51817_O	5/18/2017 10:40	42873.44	0.001	0	0.003	1	0.043	1	0.001	0	0.0001	0	0.00052
M-58A	CH-CCR-M58A-52517_O	5/25/2017 7:48	42880.33	0.001	0	0.0051	1	0.055	1	0.001	0	0.0001	0	0.00055



Appendix A  
ProUCL Data

StationName	QC_SampleID	SampDate	NumDate	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium
M-58A	CH-CCR-M58A-70117_O	7/1/2017 13:41	42917.57	0.001	0	0.0047	1	0.063	1	0.001	0	0.0001	0	0.0005
M-58A	CH-CCR-M58A-72617_O	7/26/2017 11:10	42942.47	0.002	0	0.0057	1	0.11	1	0.001	0	0.0002	0	0.003
M-58A	CH-CCR-M58A-90817_O	9/8/2017 7:29	42986.31	0.004	0	0.0048	1	0.08	1	0.001	0	0.0004	0	0.004
M-58A	CH-CCR-M58A-120817_O	12/8/2017 10:22	43077.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-58A	CH-CCR-M-58A-52118_O	5/21/2018 13:18	43241.55	0.002	0	0.0042	1	0.071	1	0.001	0	0.0002	0	0.002
M-58A	CH-CCR-M58A-082818_O	8/28/2018 9:35	43340.40	NA	NA	0.0037	1	0.075	1	NA	NA	NA	NA	0.001
M-58A	CH-CCR-M58A-21519	2/15/2019 21:04	43511.88	NA	NA	0.0043	1	0.063	1	NA	NA	NA	NA	0.001
M-58A	CH-CCR-M58A-41719	4/17/2019 14:59	43572.62	0.001	0	0.0039	1	0.059	1	0.001	0	0.0001	0	0.001
M-58A	CH-CCR-M58A-8919	8/9/2019 0:00	43686.00	NA	NA	0.0038	1	0.066	1	NA	NA	NA	NA	0.001
M-62A	7872_O	11/30/2015 10:56	42338.46	0.0025	0	0.002	1	0.082	1	0.001	0	0.0001	0	0.00078
M-62A	CH-M-62A-0316_O	3/8/2016 11:54	42437.50	0.05	0	0.01	0	0.16	1	0.001	0	0.002	0	0.01
M-62A	CH-CCR-MW62A-50516_O	5/5/2016 14:06	42495.59	0.0001	0	0.003	1	0.084	1	0.001	0	0.0001	0	0.0014
M-62A	CH-CCR-M62A-816_O	8/29/2016 10:55	42611.45	0.0001	0	0.0031	1	0.082	1	0.001	0	0.0001	0	0.0005
M-62A	CH-CCR-M62A-916_O	9/21/2016 15:02	42634.63	0.0005	0	0.0028	1	0.075	1	0.001	0	0.0001	0	0.00099
M-62A	CH-CCR-M62A-217_O	2/20/2017 12:04	42786.50	0.001	0	0.0029	1	0.064	1	0.001	0	0.0001	0	0.002
M-62A	CH-CCR-M62A-41317_O	4/13/2017 8:50	42838.37	0.001	0	0.0021	1	0.074	1	0.001	0	0.0001	0	0.0015
M-62A	CH-CCR-M62A-42517_O	4/25/2017 9:58	42850.42	0.001	0	0.0017	1	0.079	1	0.001	0	0.0001	0	0.0017
M-62A	CH-CCR-M62A-51817_O	5/18/2017 11:17	42873.47	0.001	0	0.0016	1	0.072	1	0.001	0	0.0001	0	0.00063
M-62A	CH-CCR-M62A-52517_O	5/25/2017 10:52	42880.45	0.001	0	0.0019	1	0.077	1	0.001	0	0.0001	0	0.00096
M-62A	CH-CCR-M62A-70117_O	7/1/2017 15:13	42917.63	0.001	0	0.0026	1	0.076	1	0.001	0	0.0001	0	0.0011
M-62A	CH-CCR-M62A-72617_O	7/26/2017 15:19	42942.64	0.002	0	0.0024	1	0.075	1	0.001	0	0.0002	0	0.001
M-62A	CH-CCR-M62A-90717_O	9/7/2017 18:34	42985.77	0.004	0	0.0031	1	0.079	1	0.001	0	0.0004	0	0.004
M-62A	CH-CCR-M62A-120817_O	12/8/2017 11:39	43077.49	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-62A	CH-CCR-M-62A-52118_O	5/21/2018 13:50	43241.58	0.002	0	0.0029	1	0.072	1	0.001	0	0.0002	0	0.002
M-62A	CH-CCR-M62A-082818_O	8/28/2018 14:36	43340.61	NA	NA	0.0029	1	0.074	1	NA	NA	NA	NA	0.001
M-62A	CH-CCR-M62A-21519	2/15/2019 20:13	43511.84	NA	NA	0.003	1	0.068	1	NA	NA	NA	NA	0.001
M-62A	CH-CCR-M62A-41819	4/18/2019 9:10	43573.38	0.001	0	0.0033	1	0.068	1	0.001	0	0.0001	0	0.001
M-62A	CH-CCR-M62A-8919	8/9/2019 0:00	43686.00	NA	NA	0.0031	1	0.067	1	NA	NA	NA	NA	0.0037

Appendix A  
ProUCL Data

StationName	QC_SampleID	SampDate	NumDate	D_Chromium	Cobalt	D_Cobalt	Fluoride	D_Fluoride	Lead	D_Lead	Lithium	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum
M-56A	7873_O	11/30/2015 12:08	42338.51	1	0.0012	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0096	1
M-56A	CH-M-56A-0316_O	3/8/2016 13:40	42437.57	0	0.002	1	0.43	1	0.01	0	0.2	0	0.0002	0	0.029	1
M-56A	CH-CCR-M56A-05102016_O	5/10/2016 14:11	42500.59	0	0.0013	1	0.42	1	0.0005	0	0.2	0	0.0002	0	0.023	1
M-56A	CH-CCR-M56A-816_O	8/29/2016 9:01	42611.38	0	0.0013	1	0.46	1	0.0005	0	0.2	0	0.0002	0	0.021	1
M-56A	CH-CCR-M56A-916_O	9/21/2016 10:52	42634.45	1	0.0012	1	0.4	1	0.0001	0	0.2	0	0.0002	0	0.016	1
M-56A	CH-CCR-M56A-217_O	2/20/2017 11:21	42786.47	1	0.00077	1	0.4	1	0.0005	0	0.2	0	0.0002	0	0.013	1
M-56A	CH-CCR-M56A-41317_O	4/13/2017 7:45	42838.32	1	0.00065	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.011	1
M-56A	CH-CCR-M56A-42517_O	4/25/2017 9:11	42850.38	1	0.00061	1	0.8	0	0.0005	0	0.2	0	0.0002	0	0.013	1
M-56A	CH-CCR-M56A-51817_O	5/18/2017 9:21	42873.39	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0095	1
M-56A	CH-CCR-M56A-52517_O	5/25/2017 10:17	42880.43	1	0.00075	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.011	1
M-56A	CH-CCR-M56A-70117_O	7/1/2017 14:43	42917.61	1	0.0005	0	0.41	1	0.0005	0	0.2	0	0.0002	0	0.0098	1
M-56A	CH-CCR-M56A-72617_O	7/26/2017 14:40	42942.61	1	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.009	1
M-56A	CH-CCR-M56A-90817_O	9/8/2017 8:35	42986.36	0	0.002	0	0.47	1	0.002	0	0.2	0	0.0002	0	0.0093	1
M-56A	CH-CCR-M56A-120817_O	12/8/2017 11:15	43077.47	NA	NA	NA	0.49	1	NA	NA	NA	NA	NA	NA	NA	NA
M-56A	CH-CCR-M-56A-52118_O	5/21/2018 12:01	43241.50	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0079	1
M-56A	CH-CCR-M56A-082818_O	8/28/2018 14:07	43340.59	1	0.0005	0	NA	NA	NA	NA	NA	NA	NA	NA	0.0057	1
M-56A	CH-CCR-M56A-21519	2/15/2019 22:14	43511.93	1	0.00073	1	0.4	0	NA	NA	NA	NA	NA	NA	0.0074	1
M-56A	CH-CCR-M56A-41819	4/18/2019 9:58	43573.42	1	0.0013	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.014	1
M-56A	CH-CCR-M56A-8919	8/9/2019 0:00	43686.00	1	0.0012	1	0.8	0	NA	NA	0.2	0	NA	NA	0.011	1
M-57A	7874_O	11/30/2015 13:05	42338.55	1	0.0077	1	0.4	0	0.00086	1	0.2	0	0.0002	0	0.008	1
M-57A	CH-M-57A-0316_O	3/8/2016 14:40	42437.61	0	0.0082	1	0.4	0	0.01	0	0.2	0	0.0002	0	0.004	1
M-57A	CH-CCR-M57A-05112016_O	5/11/2016 8:53	42501.37	0	0.0065	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0011	1
M-57A	CH-CCR-M57A-816_O	8/25/2016 13:23	42607.56	1	0.0078	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.022	1
M-57A	CH-CCR-M57A-916_O	9/21/2016 13:59	42634.58	1	0.0067	1	0.4	0	0.00021	1	0.2	0	0.0002	0	0.0029	1
M-57A	CH-CCR-M57A-217_O	2/20/2017 10:30	42786.44	1	0.0086	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0048	1
M-57A	CH-CCR-M57A-41217_O	4/12/2017 18:28	42837.77	1	0.0087	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0047	1
M-57A	CH-CCR-M57A-42517_O	4/25/2017 8:39	42850.36	1	0.0077	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0042	1
M-57A	CH-CCR-M57A-51817_O	5/18/2017 10:10	42873.42	1	0.0076	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0041	1
M-57A	CH-CCR-M57A-52517_O	5/25/2017 8:30	42880.35	1	0.0083	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0063	1
M-57A	CH-CCR-M57A-70117_O	7/1/2017 14:11	42917.59	1	0.0075	1	0.42	1	0.0005	0	0.2	0	0.0002	0	0.0037	1
M-57A	CH-CCR-M57A-72617_O	7/26/2017 13:53	42942.58	1	0.0088	1	0.4	0	0.001	0	0.2	0	0.0002	0	0.0058	1
M-57A	CH-CCR-M57A-90817_O	9/8/2017 8:01	42986.33	1	0.0082	1	0.4	0	0.002	0	0.2	0	0.0002	0	0.0046	1
M-57A	CH-CCR-M57A-120817_O	12/8/2017 10:54	43077.45	NA	NA	NA	0.4	0	NA	NA	NA	NA	NA	NA	NA	NA
M-57A	CH-CCR-M-57A-52118_O	5/21/2018 12:33	43241.52	1	0.0058	1	0.4	0	0.001	0	0.2	0	0.0002	0	0.0026	1
M-57A	CH-CCR-M57A-082818_O	8/28/2018 13:07	43340.55	1	0.0057	1	NA	NA	NA	NA	NA	NA	NA	NA	0.003	1
M-57A	CH-CCR-M57A-21519	2/15/2019 21:41	43511.90	1	0.0049	1	0.4	0	NA	NA	NA	NA	NA	NA	0.0029	1
M-57A	CH-CCR-M57A-41719	4/17/2019 15:28	43572.64	1	0.005	1	0.53	1	0.0005	0	0.2	0	0.0002	0	0.0078	1
M-57A	CH-CCR-M57A-8919	8/9/2019 0:00	43686.00	1	0.004	1	0.8	0	NA	NA	0.2	0	NA	NA	0.0068	1
M-58A	7876_O	11/30/2015 14:30	42338.60	0	0.0011	1	0.43	1	0.00056	1	0.2	0	0.0002	0	0.0047	1
M-58A	CH-M-58A-0316_O	3/8/2016 14:50	42437.62	0	0.01	0	0.4	0	0.01	0	0.2	0	0.0002	0	0.01	0
M-58A	CH-CCR-M58A-05112016_O	5/11/2016 10:20	42501.43	0	0.00051	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0018	1
M-58A	CH-CCR-M58A-816_O	8/25/2016 14:11	42607.59	1	0.00079	1	0.4	0	0.00059	1	0.2	0	0.0002	0	0.02	1
M-58A	CH-CCR-M58A-916_O	9/21/2016 13:16	42634.55	1	0.00057	1	0.4	0	0.0001	0	0.2	0	0.0002	0	0.0025	1
M-58A	CH-CCR-M58A-217_O	2/20/2017 9:49	42786.41	1	0.00097	1	0.4	0	0.00078	1	0.2	0	0.0002	0	0.0022	1
M-58A	CH-CCR-M58A-41217_O	4/12/2017 17:41	42837.74	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0017	1
M-58A	CH-CCR-M58A-42517_O	4/25/2017 8:08	42850.34	1	0.0005	0	0.8	0	0.0005	0	0.2	0	0.0002	0	0.0015	1
M-58A	CH-CCR-M58A-51817_O	5/18/2017 10:40	42873.44	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0014	1
M-58A	CH-CCR-M58A-52517_O	5/25/2017 7:48	42880.33	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0016	1

Appendix A  
ProUCL Data

StationName	QC_SampleID	SampDate	NumDate	D_Chromium	Cobalt	D_Cobalt	Fluoride	D_Fluoride	Lead	D_Lead	Lithium	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum
M-58A	CH-CCR-M58A-70117_O	7/1/2017 13:41	42917.57	0	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0018	1
M-58A	CH-CCR-M58A-72617_O	7/26/2017 11:10	42942.47	1	0.001	1	0.4	0	0.0011	1	0.2	0	0.0002	0	0.0021	1
M-58A	CH-CCR-M58A-90817_O	9/8/2017 7:29	42986.31	0	0.002	0	0.4	0	0.002	0	0.2	0	0.0002	0	0.0022	1
M-58A	CH-CCR-M58A-120817_O	12/8/2017 10:22	43077.43	NA	NA	NA	0.4	0	NA	NA	NA	NA	NA	NA	NA	NA
M-58A	CH-CCR-M-58A-52118_O	5/21/2018 13:18	43241.55	0	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.0018	1
M-58A	CH-CCR-M58A-082818_O	8/28/2018 9:35	43340.40	0	0.0005	0	NA	NA	NA	NA	NA	NA	NA	NA	0.0017	1
M-58A	CH-CCR-M58A-21519	2/15/2019 21:04	43511.88	0	0.0005	0	0.4	0	NA	NA	NA	NA	NA	NA	0.0018	NA
M-58A	CH-CCR-M58A-41719	4/17/2019 14:59	43572.62	0	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0018	1
M-58A	CH-CCR-M58A-8919	8/9/2019 0:00	43686.00	0	0.0005	0	0.8	0	NA	NA	0.2	0	NA	NA	0.0018	1
M-62A	7872_O	11/30/2015 10:56	42338.46	1	0.00054	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.011	1
M-62A	CH-M-62A-0316_O	3/8/2016 11:54	42437.50	0	0.0022	1	0.8	0	0.01	0	0.2	0	0.0002	0	0.0044	1
M-62A	CH-CCR-MW62A-50516_O	5/5/2016 14:06	42495.59	1	0.0012	1	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0026	1
M-62A	CH-CCR-M62A-816_O	8/29/2016 10:55	42611.45	0	0.0005	0	0.8	0	0.0005	0	0.2	0	0.0002	0	0.0023	1
M-62A	CH-CCR-M62A-916_O	9/21/2016 15:02	42634.63	1	0.00046	1	0.8	0	0.0001	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-217_O	2/20/2017 12:04	42786.50	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0019	1
M-62A	CH-CCR-M62A-41317_O	4/13/2017 8:50	42838.37	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0023	1
M-62A	CH-CCR-M62A-42517_O	4/25/2017 9:58	42850.42	1	0.0005	0	0.8	0	0.0005	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-51817_O	5/18/2017 11:17	42873.47	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.002	1
M-62A	CH-CCR-M62A-52517_O	5/25/2017 10:52	42880.45	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-70117_O	7/1/2017 15:13	42917.63	1	0.0005	0	0.4	0	0.0005	0	0.2	0	0.0002	0	0.0022	1
M-62A	CH-CCR-M62A-72617_O	7/26/2017 15:19	42942.64	0	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.0021	1
M-62A	CH-CCR-M62A-90717_O	9/7/2017 18:34	42985.77	0	0.002	0	0.4	0	0.002	0	0.2	0	0.0002	0	0.003	1
M-62A	CH-CCR-M62A-120817_O	12/8/2017 11:39	43077.49	NA	NA	NA	0.4	0	NA	NA	NA	NA	NA	NA	NA	NA
M-62A	CH-CCR-M-62A-52118_O	5/21/2018 13:50	43241.58	0	0.001	0	0.4	0	0.001	0	0.2	0	0.0002	0	0.0024	1
M-62A	CH-CCR-M62A-082818_O	8/28/2018 14:36	43340.61	0	0.0005	0	NA	NA	NA	NA	NA	NA	NA	NA	0.0023	1
M-62A	CH-CCR-M62A-21519	2/15/2019 20:13	43511.84	0	0.0005	0	0.4	0	NA	NA	NA	NA	NA	NA	0.0024	1
M-62A	CH-CCR-M62A-41819	4/18/2019 9:10	43573.38	0	0.0005	0	0.47	1	0.0005	0	0.2	0	0.0002	0	0.0026	1
M-62A	CH-CCR-M62A-8919	8/9/2019 0:00	43686.00	1	0.0005	0	0.4	0	NA	NA	0.2	0	NA	NA	0.0028	1

Appendix A  
ProUCL Data

StationName	QC_SampleID	SampDate	NumDate	Radium	D_Radium	Selenium	D_Selenium	Thallium	D_Thallium
M-56A	7873_O	11/30/2015 12:08	42338.51	0.9	0	0.00033	1	0.0001	0
M-56A	CH-M-56A-0316_O	3/8/2016 13:40	42437.57	0.4	0	0.01	0	0.002	0
M-56A	CH-CCR-M56A-05102016_O	5/10/2016 14:11	42500.59	0.6	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-816_O	8/29/2016 9:01	42611.38	1.6	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-916_O	9/21/2016 10:52	42634.45	0.6	1	0.0006	0	0.0001	0
M-56A	CH-CCR-M56A-217_O	2/20/2017 11:21	42786.47	1.8	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-41317_O	4/13/2017 7:45	42838.32	1.2	1	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-42517_O	4/25/2017 9:11	42850.38	1.9	1	0.00056	1	0.0001	0
M-56A	CH-CCR-M56A-51817_O	5/18/2017 9:21	42873.39	1.2	0	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-52517_O	5/25/2017 10:17	42880.43	1.5	1	0.00057	1	0.0001	0
M-56A	CH-CCR-M56A-70117_O	7/1/2017 14:43	42917.61	0.7	0	0.0005	0	0.0001	0
M-56A	CH-CCR-M56A-72617_O	7/26/2017 14:40	42942.61	1.7	1	0.001	0	0.0002	0
M-56A	CH-CCR-M56A-90817_O	9/8/2017 8:35	42986.36	0.5	1	0.002	0	0.0004	0
M-56A	CH-CCR-M56A-120817_O	12/8/2017 11:15	43077.47	NA	NA	NA	NA	NA	NA
M-56A	CH-CCR-M-56A-52118_O	5/21/2018 12:01	43241.50	1.4	1	0.0005	0	0.00012	1
M-56A	CH-CCR-M56A-082818_O	8/28/2018 14:07	43340.59	0.5	1	NA	NA	0.0001	0
M-56A	CH-CCR-M56A-21519	2/15/2019 22:14	43511.93	NA	NA	NA	NA	0.0001	0
M-56A	CH-CCR-M56A-41819	4/18/2019 9:58	43573.42	0.7	0	0.00062	1	0.0001	0
M-56A	CH-CCR-M56A-8919	8/9/2019 0:00	43686.00	0.6	1	NA	NA	0.0001	0
M-57A	7874_O	11/30/2015 13:05	42338.55	0.9	0	0.00029	1	0.0001	0
M-57A	CH-M-57A-0316_O	3/8/2016 14:40	42437.61	0.4	0	0.01	0	0.002	0
M-57A	CH-CCR-M57A-05112016_O	5/11/2016 8:53	42501.37	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-816_O	8/25/2016 13:23	42607.56	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-916_O	9/21/2016 13:59	42634.58	0.7	0	0.0006	0	0.0001	0
M-57A	CH-CCR-M57A-217_O	2/20/2017 10:30	42786.44	1.1	1	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-41217_O	4/12/2017 18:28	42837.77	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-42517_O	4/25/2017 8:39	42850.36	0.6	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-51817_O	5/18/2017 10:10	42873.42	1.5	1	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-52517_O	5/25/2017 8:30	42880.35	0.5	1	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-70117_O	7/1/2017 14:11	42917.59	0.7	0	0.0005	0	0.0001	0
M-57A	CH-CCR-M57A-72617_O	7/26/2017 13:53	42942.58	0.7	0	0.001	0	0.0002	0
M-57A	CH-CCR-M57A-90817_O	9/8/2017 8:01	42986.33	0.6	1	0.002	0	0.0004	0
M-57A	CH-CCR-M57A-120817_O	12/8/2017 10:54	43077.45	NA	NA	NA	NA	NA	NA
M-57A	CH-CCR-M-57A-52118_O	5/21/2018 12:33	43241.52	0.7	0	0.001	0	0.0002	0
M-57A	CH-CCR-M57A-082818_O	8/28/2018 13:07	43340.55	0.7	1	NA	NA	0.0001	0
M-57A	CH-CCR-M57A-21519	2/15/2019 21:41	43511.90	NA	NA	NA	NA	0.0001	0
M-57A	CH-CCR-M57A-41719	4/17/2019 15:28	43572.64	0.7	0	0.00069	1	0.0001	0
M-57A	CH-CCR-M57A-8919	8/9/2019 0:00	43686.00	0.7	0	NA	NA	0.0001	0
M-58A	7876_O	11/30/2015 14:30	42338.60	0.9	0	0.00024	1	0.0001	0
M-58A	CH-M-58A-0316_O	3/8/2016 14:50	42437.62	0.6	0	0.01	0	0.002	0
M-58A	CH-CCR-M58A-05112016_O	5/11/2016 10:20	42501.43	0.9	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-816_O	8/25/2016 14:11	42607.59	2.6	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-916_O	9/21/2016 13:16	42634.55	1.2	1	0.0006	0	0.0001	0
M-58A	CH-CCR-M58A-217_O	2/20/2017 9:49	42786.41	0.8	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-41217_O	4/12/2017 17:41	42837.74	1.9	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-42517_O	4/25/2017 8:08	42850.34	0.9	1	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-51817_O	5/18/2017 10:40	42873.44	0.6	0	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-52517_O	5/25/2017 7:48	42880.33	2.2	1	0.0005	0	0.0001	0

Appendix A  
ProUCL Data

StationName	QC_SampleID	SampDate	NumDate	Radium	D_Radium	Selenium	D_Selenium	Thallium	D_Thallium
M-58A	CH-CCR-M58A-70117_O	7/1/2017 13:41	42917.57	0.7	0	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-72617_O	7/26/2017 11:10	42942.47	0.7	0	0.001	0	0.0002	0
M-58A	CH-CCR-M58A-90817_O	9/8/2017 7:29	42986.31	0.7	0	0.002	0	0.0004	0
M-58A	CH-CCR-M58A-120817_O	12/8/2017 10:22	43077.43	NA	NA	NA	NA	NA	NA
M-58A	CH-CCR-M-58A-52118_O	5/21/2018 13:18	43241.55	0.7	1	0.001	0	0.0002	0
M-58A	CH-CCR-M58A-082818_O	8/28/2018 9:35	43340.40	0.6	0	NA	NA	0.0001	0
M-58A	CH-CCR-M58A-21519	2/15/2019 21:04	43511.88	NA	NA	NA	NA	0.0001	0
M-58A	CH-CCR-M58A-41719	4/17/2019 14:59	43572.62	0.7	0	0.0005	0	0.0001	0
M-58A	CH-CCR-M58A-8919	8/9/2019 0:00	43686.00	0.7	0	NA	NA	0.0001	0
M-62A	7872_O	11/30/2015 10:56	42338.46	0.7	0	0.00071	1	0.0001	0
M-62A	CH-M-62A-0316_O	3/8/2016 11:54	42437.50	1	1	0.01	0	0.0005	1
M-62A	CH-CCR-MW62A-50516_O	5/5/2016 14:06	42495.59	0.5	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-816_O	8/29/2016 10:55	42611.45	0.9	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-916_O	9/21/2016 15:02	42634.63	2	1	0.00078	1	0.0001	0
M-62A	CH-CCR-M62A-217_O	2/20/2017 12:04	42786.50	1.4	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-41317_O	4/13/2017 8:50	42838.37	1.2	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-42517_O	4/25/2017 9:58	42850.42	0.9	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-51817_O	5/18/2017 11:17	42873.47	1.2	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-52517_O	5/25/2017 10:52	42880.45	1.5	1	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-70117_O	7/1/2017 15:13	42917.63	0.7	0	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-72617_O	7/26/2017 15:19	42942.64	1.3	1	0.001	0	0.0002	0
M-62A	CH-CCR-M62A-90717_O	9/7/2017 18:34	42985.77	0.9	1	0.002	0	0.0004	0
M-62A	CH-CCR-M62A-120817_O	12/8/2017 11:39	43077.49	NA	NA	NA	NA	NA	NA
M-62A	CH-CCR-M-62A-52118_O	5/21/2018 13:50	43241.58	0.7	1	0.001	0	0.0002	0
M-62A	CH-CCR-M62A-082818_O	8/28/2018 14:36	43340.61	0.5	1	NA	NA	0.0001	0
M-62A	CH-CCR-M62A-21519	2/15/2019 20:13	43511.84	NA	NA	NA	NA	0.0001	0
M-62A	CH-CCR-M62A-41819	4/18/2019 9:10	43573.38	0.7	0	0.0005	0	0.0001	0
M-62A	CH-CCR-M62A-8919	8/9/2019 0:00	43686.00	0.8	1	NA	NA	0.0001	0

## **APPENDIX B**

### **RESULTS OF THE EXPLORATORY DATA ANALYSIS**

A	B	C	D	E	F	G	H	I	J	K	L	M	
1			<b>General Statistics on Uncensored Data</b>										
2	Date/Time of Computation		ProUCL 5.112/20/2019 1:55:50 PM										
3	<b>User Selected Options</b>												
4	From File		SEDIPond_Cholla_AssessMonApr2019_Append.xls										
5	Full Precision		OFF										
6													
7	From File: SEDIPond_Cholla_AssessMonApr2019_Append.xls												
8													
9	<b>General Statistics for Censored Data Set (with NDs) using Kaplan Meier Method</b>												
10													
11	<b>Variable</b>	<b>NumObs</b>	<b># Missing</b>	<b>Num Ds</b>	<b>NumNDs</b>	<b>% NDs</b>	<b>Min ND</b>	<b>Max ND</b>	<b>KM Mean</b>	<b>KM Var</b>	<b>KM SD</b>	<b>KM CV</b>	
12	Antimony (m-56a)	16	6	1	15	93.75%	1.0000E-4	0.05	1.1500E-4	2.250E-10	1.5000E-5	0.13	
13	Antimony (m-57a)	16	6	1	15	93.75%	1.0000E-4	0.05	1.1000E-4	1.000E-10	1.0000E-5	0.0909	
14	Antimony (m-58a)	16	6	0	16	100.00%	1.0000E-4	0.05	N/A	N/A	N/A	N/A	
15	Antimony (m-62a)	16	6	0	16	100.00%	1.0000E-4	0.05	N/A	N/A	N/A	N/A	
16	Arsenic (m-56a)	19	3	14	5	26.32%	0.001	0.01	0.00132	3.0572E-6	0.00175	1.325	
17	Arsenic (m-57a)	19	3	17	2	10.53%	0.0019	0.0026	0.00374	4.2144E-6	0.00205	0.549	
18	Arsenic (m-58a)	19	3	16	3	15.79%	0.0038	0.01	0.0039	7.2907E-7	8.5386E-4	0.219	
19	Arsenic (m-62a)	19	3	16	3	15.79%	0.0031	0.01	0.00257	2.8346E-7	5.3241E-4	0.207	
20	Barium (m-56a)	19	3	17	2	10.53%	0.055	0.078	0.0702	7.8300E-5	0.00885	0.126	
21	Barium (m-57a)	19	3	17	2	10.53%	0.039	0.041	0.0458	7.4238E-5	0.00862	0.188	
22	Barium (m-58a)	19	3	17	2	10.53%	0.059	0.066	0.0681	3.4217E-4	0.0185	0.272	
23	Barium (m-62a)	18	4	16	2	11.11%	0.067	0.068	0.0789	4.2183E-4	0.0205	0.26	
24	Beryllium (m-56a)	16	6	0	16	100.00%	0.001	0.001	N/A	N/A	N/A	N/A	
25	Beryllium (m-57a)	16	6	0	16	100.00%	0.001	0.001	N/A	N/A	N/A	N/A	
26	Beryllium (m-58a)	16	6	0	16	100.00%	0.001	0.001	N/A	N/A	N/A	N/A	
27	Beryllium (m-62a)	16	6	0	16	100.00%	0.001	0.001	N/A	N/A	N/A	N/A	
28	Cadmium (m-56a)	16	6	0	16	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A	
29	Cadmium (m-57a)	16	6	0	16	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A	
30	Cadmium (m-58a)	16	6	0	16	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A	
31	Cadmium (m-62a)	16	6	0	16	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A	
32	Chromium (m-56a)	19	3	13	6	31.58%	5.0000E-4	0.076	0.00872	2.7346E-4	0.0165	1.896	
33	Chromium (m-57a)	19	3	15	4	21.05%	5.0000E-4	0.045	0.0167	2.0349E-4	0.0143	0.855	
34	Chromium (m-58a)	19	3	8	11	57.89%	5.0000E-4	0.01	0.00103	7.1481E-7	8.4546E-4	0.823	
35	Chromium (m-62a)	19	3	9	10	52.63%	5.0000E-4	0.01	0.00102	1.8140E-7	4.2592E-4	0.416	
36	Cobalt (m-56a)	19	3	11	8	42.11%	5.0000E-4	0.002	8.7080E-4	1.6309E-7	4.0385E-4	0.464	
37	Cobalt (m-57a)	19	3	17	2	10.53%	0.004	0.005	0.00696	2.2651E-6	0.00151	0.216	
38	Cobalt (m-58a)	19	3	6	13	68.42%	5.0000E-4	0.01	6.1765E-4	4.1579E-8	2.0391E-4	0.33	
39	Cobalt (m-62a)	19	3	4	15	78.95%	5.0000E-4	0.002	5.9791E-4	1.7125E-7	4.1383E-4	0.692	
40	Fluoride (m-56a)	19	3	8	11	57.89%	0.4	0.8	0.416	7.8754E-4	0.0281	0.0674	
41	Fluoride (m-57a)	19	3	2	17	89.47%	0.4	0.8	0.408	8.9189E-4	0.0299	0.0731	
42	Fluoride (m-58a)	19	3	1	18	94.74%	0.4	0.8	0.402	4.9827E-5	0.00706	0.0176	
43	Fluoride (m-62a)	19	3	1	18	94.74%	0.4	0.8	0.405	3.0489E-4	0.0175	0.0431	
44	Lead (m-56a)	16	6	0	16	100.00%	1.0000E-4	0.01	N/A	N/A	N/A	N/A	
45	Lead (m-57a)	16	6	2	14	87.50%	5.0000E-4	0.01	2.6417E-4	3.2274E-8	1.7965E-4	0.68	
46	Lead (m-58a)	16	6	4	12	75.00%	1.0000E-4	0.01	2.9756E-4	1.0313E-7	3.2114E-4	1.079	
47	Lead (m-62a)	16	6	0	16	100.00%	1.0000E-4	0.01	N/A	N/A	N/A	N/A	
48	Lithium (m-56a)	17	5	0	17	100.00%	0.2	0.2	N/A	N/A	N/A	N/A	
49	Lithium (m-57a)	17	5	0	17	100.00%	0.2	0.2	N/A	N/A	N/A	N/A	
50	Lithium (m-58a)	17	5	0	17	100.00%	0.2	0.2	N/A	N/A	N/A	N/A	
51	Lithium (m-62a)	17	5	0	17	100.00%	0.2	0.2	N/A	N/A	N/A	N/A	
52	Mercury (m-56a)	16	6	0	16	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A	

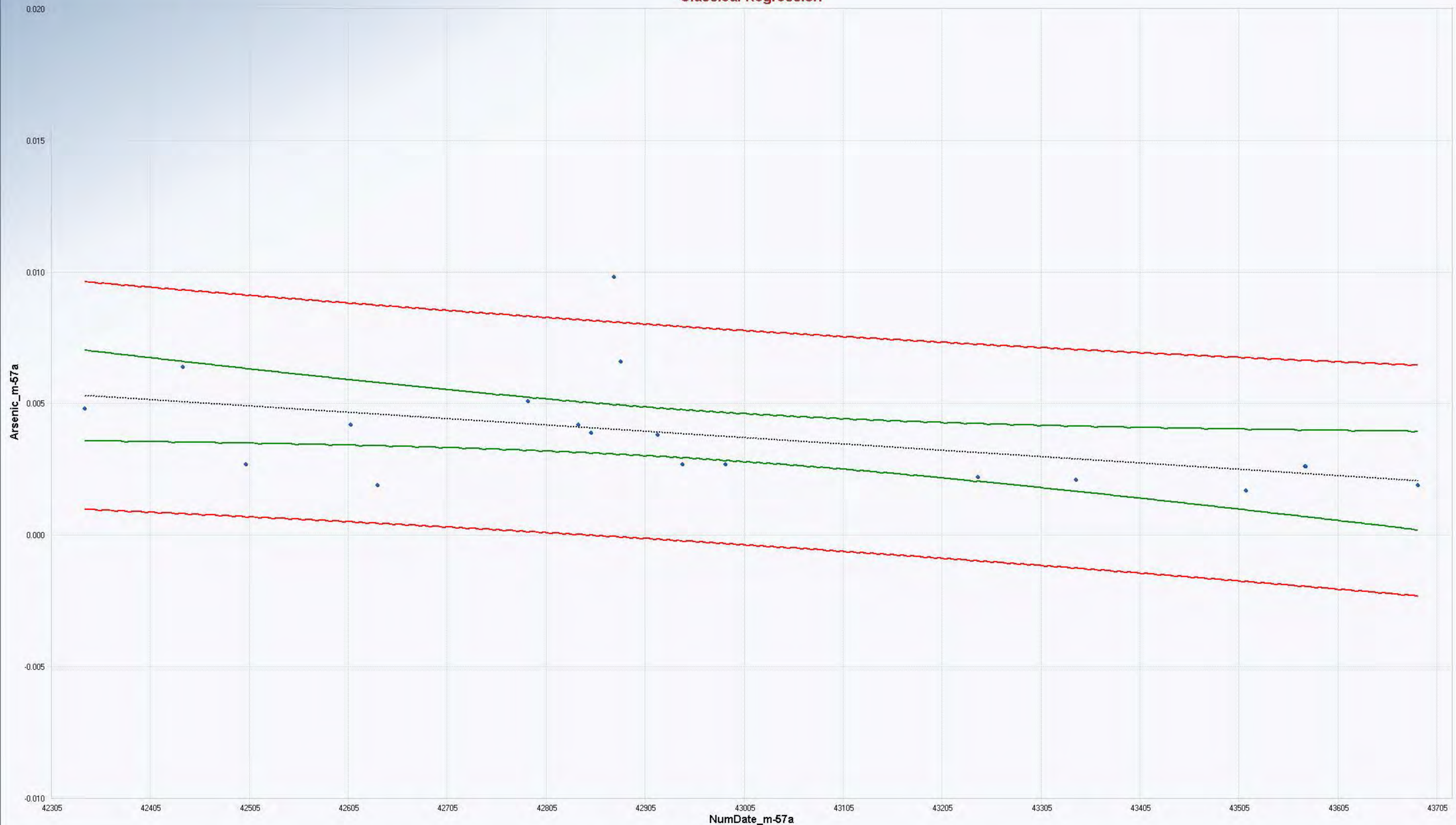
A	B	C	D	E	F	G	H	I	J	K	L	M
53	Mercury (m-57a)	16	6	0	16	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
54	Mercury (m-58a)	16	6	0	16	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
55	Mercury (m-62a)	16	6	0	16	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
56	Molybdenum (m-56a)	19	3	17	2	10.53%	0.011	0.014	0.0125	3.3946E-5	0.00583	0.466
57	Molybdenum (m-57a)	19	3	17	2	10.53%	0.0068	0.0078	0.00528	1.8458E-5	0.0043	0.814
58	Molybdenum (m-58a)	19	3	15	4	21.05%	0.0018	0.01	0.00292	1.6722E-5	0.00409	1.4
59	Molybdenum (m-62a)	19	3	17	2	10.53%	0.0026	0.0028	0.00287	3.9457E-6	0.00199	0.692
60	Radium (m-56a)	17	5	11	6	35.29%	0.4	1.2	0.954	0.303	0.551	0.578
61	Radium (m-57a)	17	5	5	12	70.59%	0.4	0.9	0.583	0.0803	0.283	0.486
62	Radium (m-58a)	17	5	8	9	52.94%	0.6	0.9	0.978	0.377	0.614	0.628
63	Radium (m-62a)	17	5	13	4	23.53%	0.7	0.8	0.943	0.183	0.428	0.454
64	Selenium (m-56a)	16	6	4	12	75.00%	5.0000E-4	0.01	3.9569E-4	1.2354E-8	1.1115E-4	0.281
65	Selenium (m-57a)	16	6	2	14	87.50%	5.0000E-4	0.01	3.2333E-4	1.2222E-8	1.1055E-4	0.342
66	Selenium (m-58a)	16	6	1	15	93.75%	5.0000E-4	0.01	2.4000E-4	0	0	N/A
67	Selenium (m-62a)	16	6	2	14	87.50%	5.0000E-4	0.01	5.4083E-4	8.5410E-9	9.2417E-5	0.171
68	Thallium (m-56a)	19	3	1	18	94.74%	1.0000E-4	0.002	1.0125E-4	2.344E-11	4.8412E-6	0.0478
69	Thallium (m-57a)	19	3	0	19	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
70	Thallium (m-58a)	19	3	0	19	100.00%	1.0000E-4	0.002	N/A	N/A	N/A	N/A
71	Thallium (m-62a)	19	3	1	18	94.74%	1.0000E-4	4.0000E-4	1.2105E-4	7.9778E-9	8.9319E-5	0.738
72												
73	General Statistics for Raw Data Sets using Detected Data Only											
74												
75	Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
76	Antimony (m-56a)	1	6	1.3000E-4	1.3000E-4	1.3000E-4	1.3000E-4	N/A	N/A	0	N/A	N/A
77	Antimony (m-57a)	1	6	1.2000E-4	1.2000E-4	1.2000E-4	1.2000E-4	N/A	N/A	0	N/A	N/A
78	Antimony (m-58a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
79	Antimony (m-62a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
80	Arsenic (m-56a)	14	3	6.0000E-4	0.0082	0.00143	8.1500E-4	3.9115E-6	0.00198	1.8532E-4	3.561	1.382
81	Arsenic (m-57a)	17	3	0.0017	0.0098	0.00396	0.0038	4.4812E-6	0.00212	0.00178	1.437	0.534
82	Arsenic (m-58a)	16	3	0.0025	0.0057	0.00399	0.00395	7.5929E-7	8.7137E-4	9.6368E-4	0.0383	0.218
83	Arsenic (m-62a)	16	3	0.0016	0.0033	0.00258	0.00285	3.0429E-7	5.5163E-4	3.7064E-4	-0.615	0.214
84	Barium (m-56a)	17	3	0.055	0.086	0.0713	0.07	7.3971E-5	0.0086	0.00741	0.0887	0.121
85	Barium (m-57a)	17	3	0.038	0.072	0.0468	0.043	7.9566E-5	0.00892	0.00297	1.923	0.191
86	Barium (m-58a)	17	3	0.043	0.11	0.0699	0.064	3.6693E-4	0.0192	0.0178	0.663	0.274
87	Barium (m-62a)	16	4	0.064	0.16	0.0808	0.0755	4.7270E-4	0.0217	0.00519	3.612	0.269
88	Beryllium (m-56a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
89	Beryllium (m-57a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
90	Beryllium (m-58a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
91	Beryllium (m-62a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
92	Cadmium (m-56a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
93	Cadmium (m-57a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
94	Cadmium (m-58a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
95	Cadmium (m-62a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
96	Chromium (m-56a)	13	3	5.1000E-4	0.076	0.0115	0.0052	4.0016E-4	0.02	0.00356	3.252	1.742
97	Chromium (m-57a)	15	3	6.6000E-4	0.045	0.019	0.016	2.1568E-4	0.0147	0.0178	0.41	0.773
98	Chromium (m-58a)	8	3	5.2000E-4	0.0033	0.00151	9.8500E-4	1.1888E-6	0.00109	6.6716E-4	0.999	0.724
99	Chromium (m-62a)	9	3	6.3000E-4	0.002	0.00123	0.0011	2.0319E-7	4.5076E-4	4.7443E-4	0.434	0.367
100	Cobalt (m-56a)	11	3	6.1000E-4	0.002	0.00107	0.0012	1.7533E-7	4.1872E-4	6.3751E-4	0.925	0.39
101	Cobalt (m-57a)	17	3	0.0049	0.0088	0.00728	0.0077	1.6294E-6	0.00128	0.00133	-0.725	0.175
102	Cobalt (m-58a)	6	3	5.1000E-4	0.0011	8.2333E-4	8.8000E-4	5.8547E-8	2.4196E-4	2.5204E-4	-0.364	0.294
103	Cobalt (m-62a)	4	3	4.6000E-4	0.0022	0.0011	8.7000E-4	6.4773E-7	8.0482E-4	5.4855E-4	1.144	0.732
104	Fluoride (m-56a)	8	3	0.4	0.49	0.435	0.425	0.00117	0.0342	0.0371	0.57	0.0787



A	B	C	D	E	F	G	H	I	J	K	L	M
105	Fluoride (m-57a)	2	3	0.42	0.53	0.475	0.475	0.00605	0.0778	0.0815	N/A	0.164
106	Fluoride (m-58a)	1	3	0.43	0.43	0.43	0.43	N/A	N/A	0	N/A	N/A
107	Fluoride (m-62a)	1	3	0.47	0.47	0.47	0.47	N/A	N/A	0	N/A	N/A
108	Lead (m-56a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
109	Lead (m-57a)	2	6	2.1000E-4	8.6000E-4	5.3500E-4	5.3500E-4	2.1125E-7	4.5962E-4	4.8184E-4	N/A	0.859
110	Lead (m-58a)	4	6	5.6000E-4	0.0011	7.5750E-4	6.8500E-4	6.1625E-8	2.4824E-4	1.6308E-4	1.211	0.328
111	Lead (m-62a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
112	Lithium (m-56a)	0	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
113	Lithium (m-57a)	0	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
114	Lithium (m-58a)	0	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
115	Lithium (m-62a)	0	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
116	Mercury (m-56a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
117	Mercury (m-57a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
118	Mercury (m-58a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
119	Mercury (m-62a)	0	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
120	Molybdenum (m-56a)	17	3	0.0057	0.029	0.0129	0.011	3.8263E-5	0.00619	0.00297	1.463	0.48
121	Molybdenum (m-57a)	17	3	0.0011	0.022	0.00544	0.0042	2.1443E-5	0.00463	0.00193	3.142	0.851
122	Molybdenum (m-58a)	15	3	0.0014	0.02	0.00325	0.0018	2.2084E-5	0.0047	4.4477E-4	3.7	1.444
123	Molybdenum (m-62a)	17	3	0.0019	0.011	0.00295	0.0023	4.6251E-6	0.00215	1.4826E-4	3.702	0.73
124	Radium (m-56a)	11	5	0.5	1.9	1.209	1.4	0.309	0.556	0.593	-0.298	0.46
125	Radium (m-57a)	5	5	0.5	1.5	0.88	0.7	0.172	0.415	0.297	0.971	0.471
126	Radium (m-58a)	8	5	0.7	2.6	1.4	1.05	0.531	0.729	0.445	0.761	0.521
127	Radium (m-62a)	13	5	0.5	2	1.077	1	0.177	0.421	0.445	0.604	0.391
128	Selenium (m-56a)	4	6	3.3000E-4	6.2000E-4	5.2000E-4	5.6500E-4	1.6733E-8	1.2936E-4	4.4477E-5	-1.746	0.249
129	Selenium (m-57a)	2	6	2.9000E-4	6.9000E-4	4.9000E-4	4.9000E-4	8.0000E-8	2.8284E-4	2.9652E-4	N/A	0.577
130	Selenium (m-58a)	1	6	2.4000E-4	2.4000E-4	2.4000E-4	2.4000E-4	N/A	N/A	0	N/A	N/A
131	Selenium (m-62a)	2	6	7.1000E-4	7.8000E-4	7.4500E-4	7.4500E-4	2.4500E-9	4.9497E-5	5.1890E-5	N/A	0.0664
132	Thallium (m-56a)	1	3	1.2000E-4	1.2000E-4	1.2000E-4	1.2000E-4	N/A	N/A	0	N/A	N/A
133	Thallium (m-57a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
134	Thallium (m-58a)	0	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
135	Thallium (m-62a)	1	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	N/A	N/A	0	N/A	N/A
136												
137	Percentiles using all Detects (Ds) and Non-Detects (NDs)											
138												
139	Variable	NumObs	# Missing	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
140	Antimony (m-56a)	16	6	3.1500E-4	0.001	0.001	0.001	0.00125	0.002	0.00325	0.0155	0.0431
141	Antimony (m-57a)	16	6	3.1000E-4	0.001	0.001	0.001	0.002	0.002	0.00325	0.0155	0.0431
142	Antimony (m-58a)	16	6	3.0000E-4	0.001	0.001	0.001	0.002	0.002	0.00325	0.0155	0.0431
143	Antimony (m-62a)	16	6	3.0000E-4	0.001	0.001	0.001	0.002	0.002	0.00325	0.0155	0.0431
144	Arsenic (m-56a)	19	3	6.7400E-4	7.3000E-4	7.5500E-4	9.3000E-4	0.0016	0.00194	0.00826	0.00865	0.00973
145	Arsenic (m-57a)	19	3	0.0019	0.00216	0.0024	0.0027	0.0045	0.00492	0.00644	0.00692	0.00922
146	Arsenic (m-58a)	19	3	0.00294	0.0035	0.0037	0.0039	0.0046	0.00474	0.00522	0.00613	0.00923
147	Arsenic (m-62a)	19	3	0.00186	0.00206	0.00225	0.0029	0.0031	0.0031	0.0033	0.00397	0.00879
148	Barium (m-56a)	19	3	0.0598	0.0638	0.0655	0.07	0.077	0.0792	0.0824	0.0842	0.0856
149	Barium (m-57a)	19	3	0.0406	0.041	0.041	0.043	0.046	0.0486	0.0566	0.0639	0.0704
150	Barium (m-58a)	19	3	0.0488	0.055	0.057	0.064	0.078	0.0804	0.0976	0.101	0.108
151	Barium (m-62a)	18	4	0.0677	0.0696	0.072	0.075	0.079	0.0808	0.0826	0.0954	0.147
152	Beryllium (m-56a)	16	6	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
153	Beryllium (m-57a)	16	6	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
154	Beryllium (m-58a)	16	6	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
155	Beryllium (m-62a)	16	6	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
156	Cadmium (m-56a)	16	6	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	3.0000E-4	8.0000E-4	0.00176

A	B	C	D	E	F	G	H	I	J	K	L	M
157	Cadmium (m-57a)	16	6	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.2500E-4	2.0000E-4	3.0000E-4	8.0000E-4	0.00176
158	Cadmium (m-58a)	16	6	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.2500E-4	2.0000E-4	3.0000E-4	8.0000E-4	0.00176
159	Cadmium (m-62a)	16	6	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.2500E-4	2.0000E-4	3.0000E-4	8.0000E-4	0.00176
160	Chromium (m-56a)	19	3	5.0800E-4	0.00216	0.0031	0.0052	0.00965	0.014	0.0336	0.076	0.076
161	Chromium (m-57a)	19	3	7.2400E-4	0.00494	0.00705	0.016	0.033	0.0362	0.0426	0.045	0.045
162	Chromium (m-58a)	19	3	5.0000E-4	5.3800E-4	7.3000E-4	0.001	0.0019	0.0024	0.00344	0.0046	0.00892
163	Chromium (m-62a)	19	3	7.5000E-4	9.7800E-4	9.9500E-4	0.001	0.00185	0.002	0.00376	0.0046	0.00892
164	Cobalt (m-56a)	19	3	5.0000E-4	5.6600E-4	6.3000E-4	0.001	0.0013	0.0013	0.00144	0.002	0.002
165	Cobalt (m-57a)	19	3	0.00498	0.00542	0.00575	0.0076	0.0082	0.00824	0.00862	0.00871	0.00878
166	Cobalt (m-58a)	19	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	9.8500E-4	0.001	0.00128	0.0028	0.00856
167	Cobalt (m-62a)	19	3	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	7.7000E-4	0.001	0.00136	0.00202	0.00216
168	Fluoride (m-56a)	19	3	0.4	0.4	0.4	0.4	0.445	0.464	0.552	0.8	0.8
169	Fluoride (m-57a)	19	3	0.4	0.4	0.4	0.4	0.4	0.408	0.53	0.557	0.751
170	Fluoride (m-58a)	19	3	0.4	0.4	0.4	0.4	0.4	0.4	0.504	0.8	0.8
171	Fluoride (m-62a)	19	3	0.4	0.4	0.4	0.4	0.47	0.602	0.8	0.8	0.8
172	Lead (m-56a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	0.0015	0.004	0.0088
173	Lead (m-57a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	8.9500E-4	0.001	0.0015	0.004	0.0088
174	Lead (m-58a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	8.3500E-4	0.001	0.00155	0.004	0.0088
175	Lead (m-62a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	6.2500E-4	0.001	0.0015	0.004	0.0088
176	Lithium (m-56a)	17	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
177	Lithium (m-57a)	17	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
178	Lithium (m-58a)	17	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
179	Lithium (m-62a)	17	5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
180	Mercury (m-56a)	16	6	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
181	Mercury (m-57a)	16	6	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
182	Mercury (m-58a)	16	6	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
183	Mercury (m-62a)	16	6	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4	2.0000E-4
184	Molybdenum (m-56a)	19	3	0.0078	0.00918	0.0094	0.011	0.014	0.0148	0.0214	0.0236	0.0279
185	Molybdenum (m-57a)	19	3	0.00284	0.00296	0.00335	0.0046	0.00655	0.0072	0.00784	0.0094	0.0195
186	Molybdenum (m-58a)	19	3	0.00158	0.0017	0.00175	0.0018	0.0022	0.00232	0.00576	0.011	0.0182
187	Molybdenum (m-62a)	19	3	0.00208	0.0022	0.0022	0.0023	0.0026	0.00268	0.00328	0.00506	0.00981
188	Radium (m-56a)	17	5	0.5	0.6	0.6	0.9	1.5	1.58	1.74	1.82	1.884
189	Radium (m-57a)	17	5	0.56	0.6	0.6	0.7	0.7	0.7	0.98	1.18	1.436
190	Radium (m-58a)	17	5	0.6	0.7	0.7	0.7	0.9	1.14	2.02	2.28	2.536
191	Radium (m-62a)	17	5	0.62	0.7	0.7	0.9	1.2	1.28	1.44	1.6	1.92
192	Selenium (m-56a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.3000E-4	6.2000E-4	6.2000E-4	0.0015	0.004	0.0088
193	Selenium (m-57a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	7.6750E-4	0.001	0.0015	0.004	0.0088
194	Selenium (m-58a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	7.0000E-4	0.001	0.0015	0.004	0.0088
195	Selenium (m-62a)	16	6	5.0000E-4	5.0000E-4	5.0000E-4	5.0000E-4	8.3500E-4	0.001	0.0015	0.004	0.0088
196	Thallium (m-56a)	19	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0800E-4	2.4000E-4	5.6000E-4	0.00171
197	Thallium (m-57a)	19	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.4000E-4	2.4000E-4	5.6000E-4	0.00171
198	Thallium (m-58a)	19	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.4000E-4	2.4000E-4	5.6000E-4	0.00171
199	Thallium (m-62a)	19	3	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	1.4000E-4	2.4000E-4	4.1000E-4	4.8200E-4

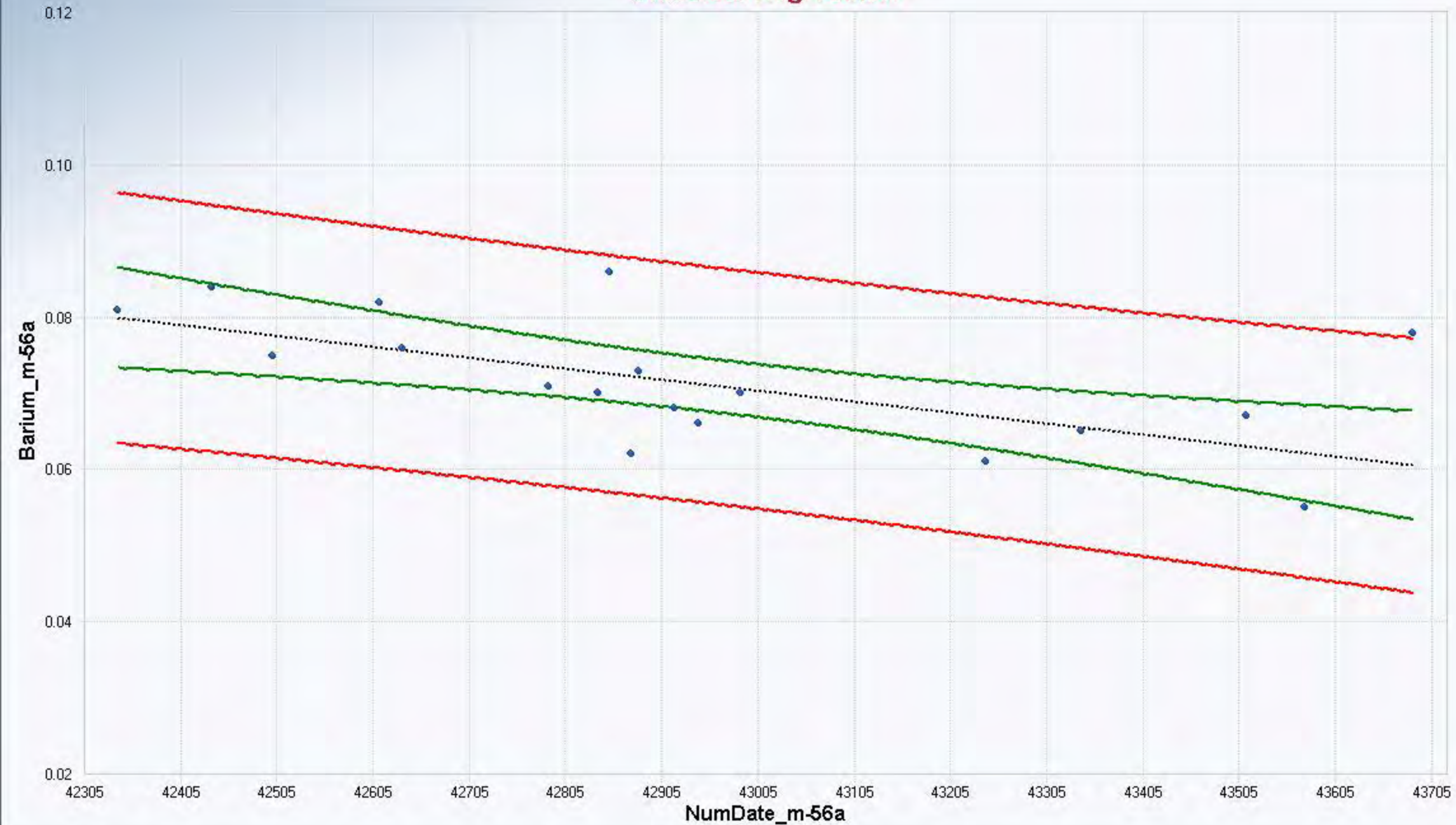
# Classical Regression



OLS	
n	19
Slope	0.0000
Intercept	0.1069
R-sq	0.2218
R	-0.4709
Scale Estimate	0.0019
P-value (Reg)	0.0418
P-value (Slope)	0.0418
Mann-Kendall	
S	-83.0000
SD of S	28.4664
Standardized S	-2.8806
Approximate p-value	0.0020
Confidence Coefficient	0.9500
Red = Prediction Interval Green = Confidence Interval	



# Classical Regression



OLS	
n	19
Slope	0.0000
Intercept	0.6892
R-sq	0.4137
R	-0.6432
Scale Estimate	0.0072
P-value (Reg)	0.0030
P-value (Slope)	0.0030

Mann-Kendall	
S	-91.0000
SD of S	28.5482
Standardized S	-3.1526
Approximate p-value	0.0008

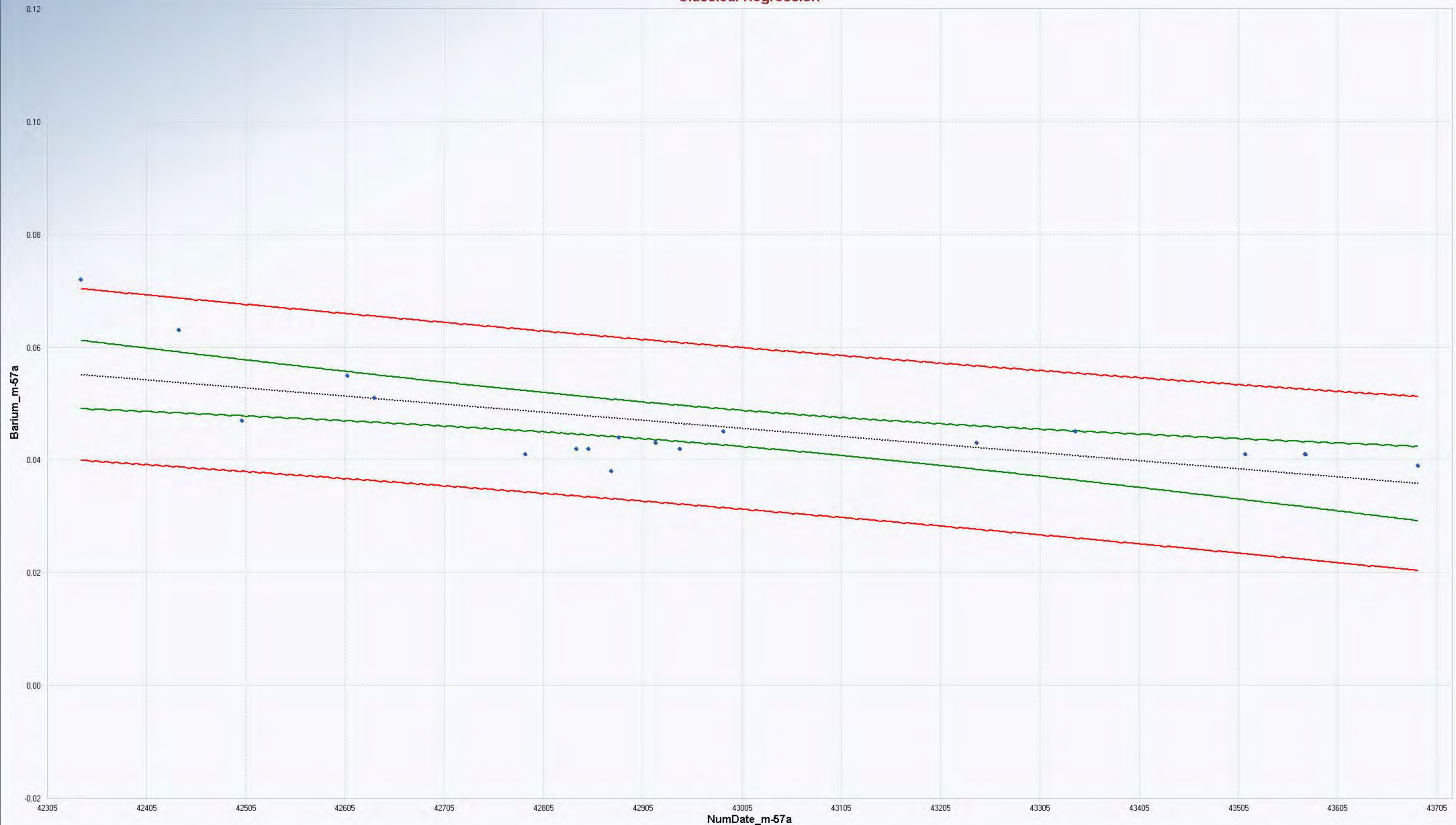
Confidence Coefficient 0.9500

Red = Prediction Interval

Green = Confidence Interval



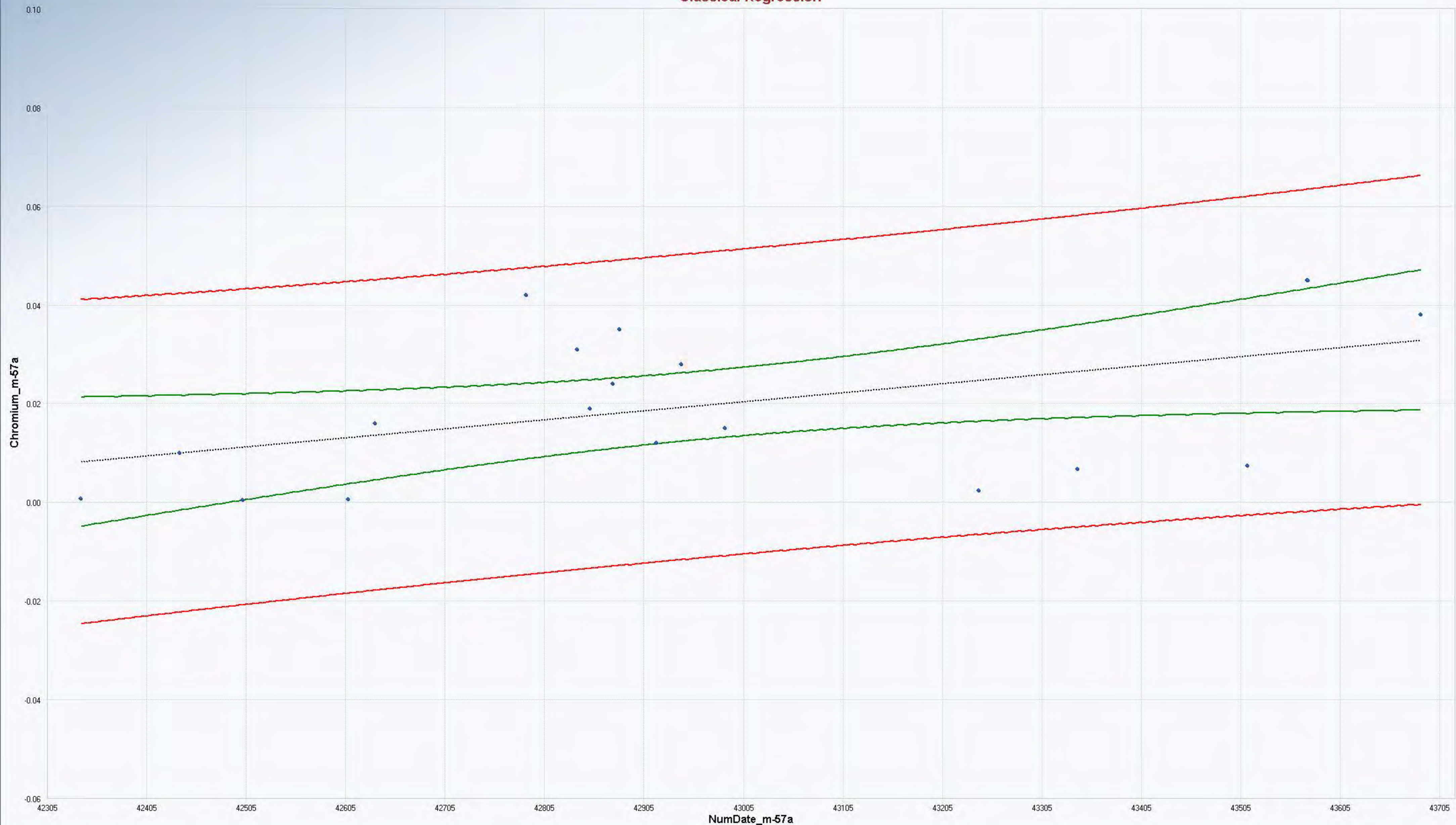
# Classical Regression



OLS	
n	19
Slope	0.0000
Intercept	0.6627
R-sq	0.4513
R	-0.6718
Scale Estimate	0.0066
P-value (Reg)	0.0016
P-value (Slope)	0.0016
Mann-Kendall	
S	-84.0000
SD of S	28.3314
Standardized S	-2.9296
Approximate p-value	0.0017
Confidence Coefficient	0.9500
Red = Prediction Interval	
Green = Confidence Interval	



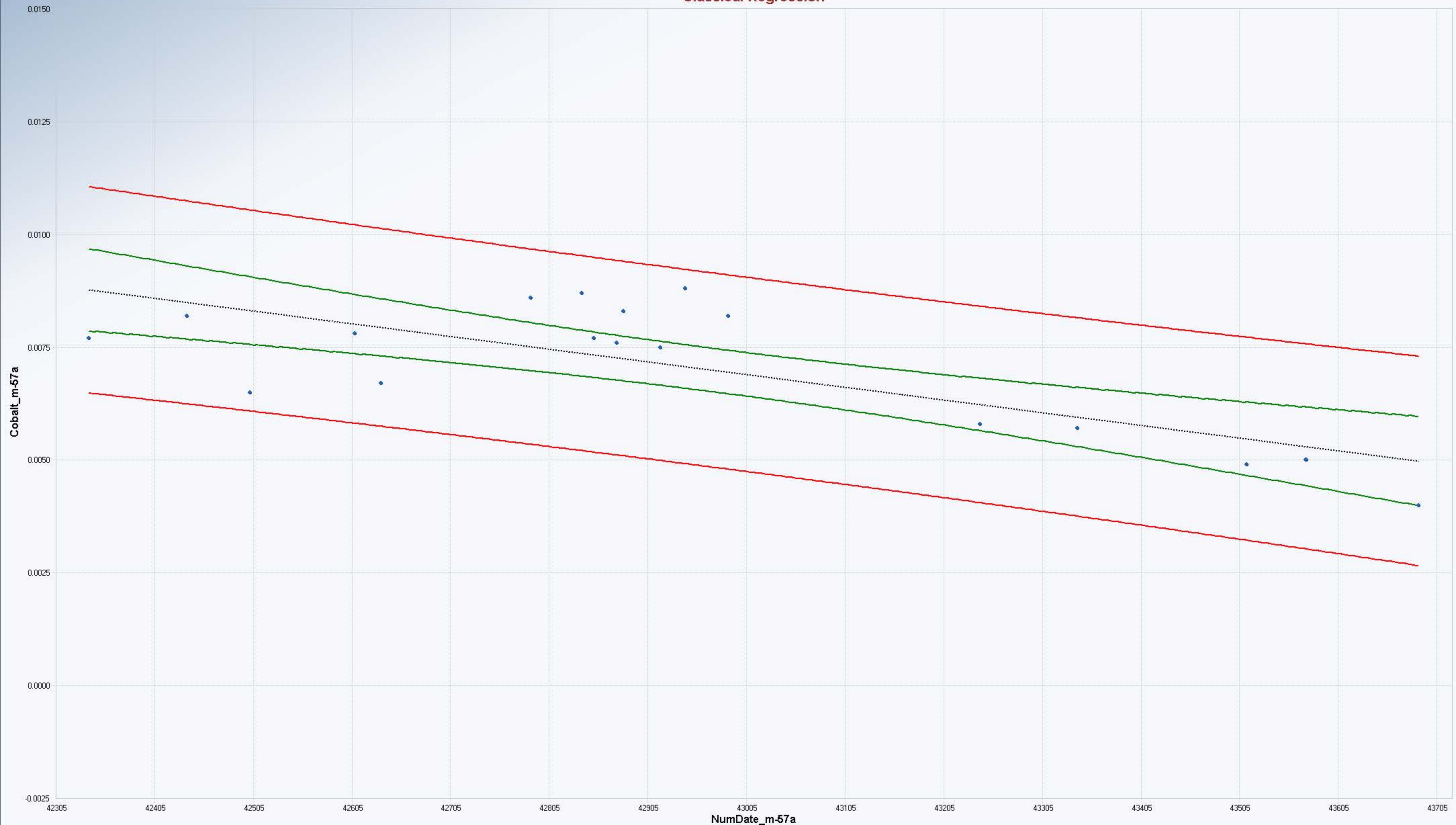
# Classical Regression



OLS	
n	19
Slope	0.0000
Intercept	-0.7665
R-sq	0.2232
R	0.4724
Scale Estimate	0.0143
P-value (Reg)	0.0411
P-value (Slope)	0.0411
Mann-Kendall	
S	52.0000
SD of S	28.5657
Standardized S	1.7854
Approximate p-value	0.0371
Confidence Coefficient	0.9500
Red = Prediction Interval	
Green = Confidence Interval	



# Classical Regression

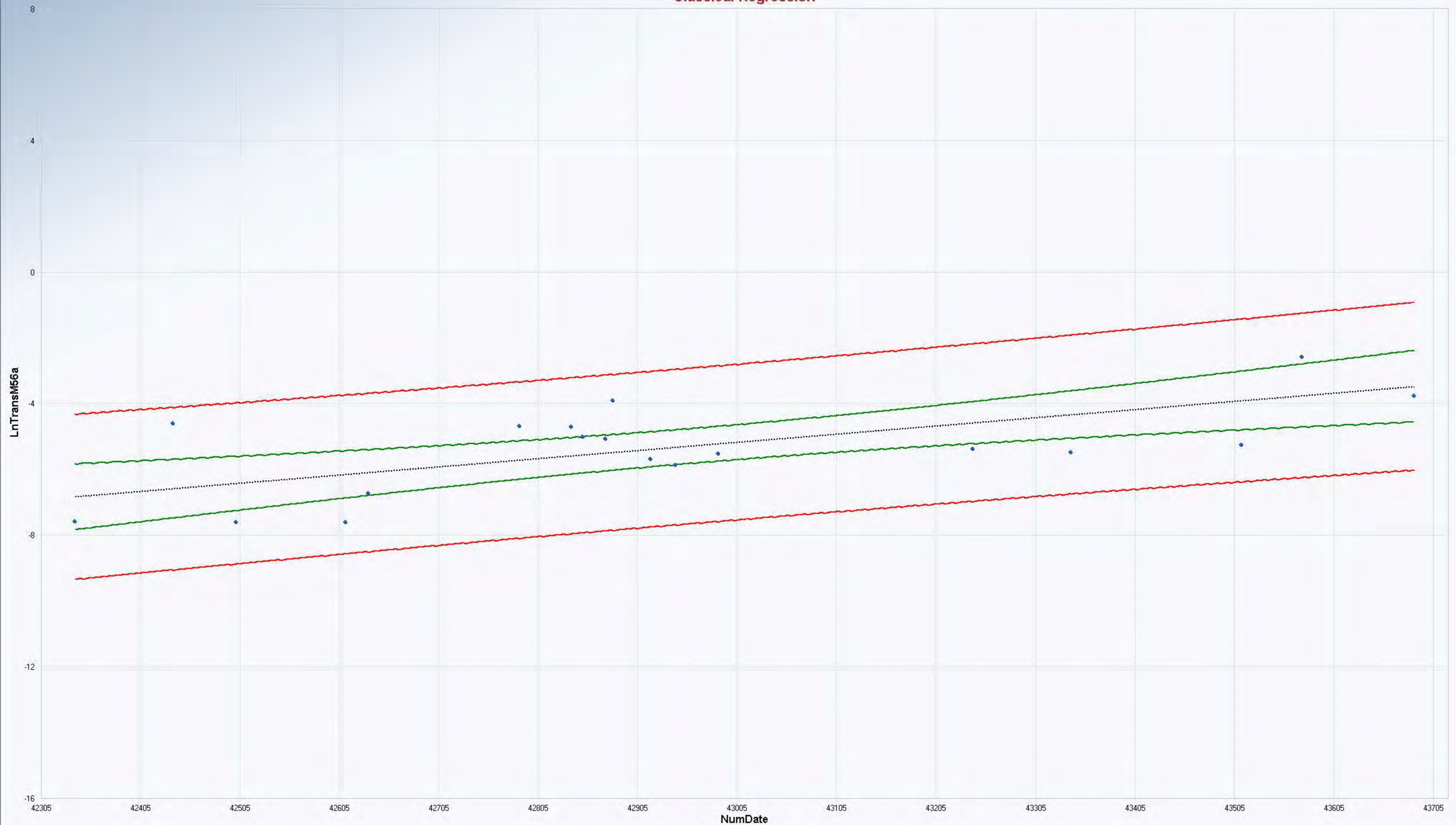


OLS	
n	19
Slope	0.0000
Intercept	0.1279
R-sq	0.5834
R	-0.7638
Scale Estimate	0.0010
P-value (Reg)	0.0001
P-value (Slope)	0.0001
Mann-Kendall	
S	-72.0000
SD of S	28.5307
Standardized S	-2.4885
Approximate p-value	0.0064
Confidence Coefficient	0.9500

Red = Prediction Interval  
Green = Confidence Interval



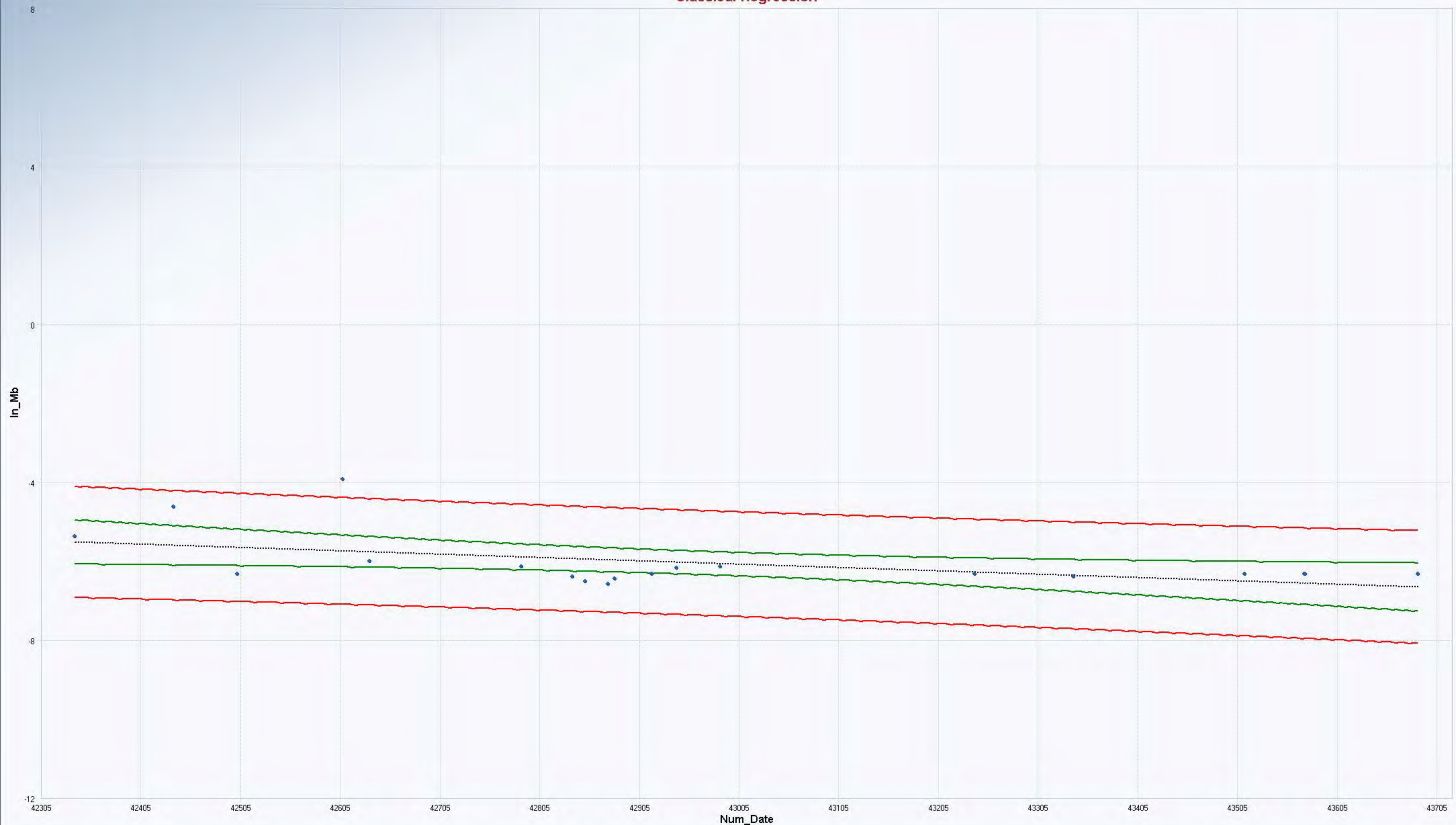
# Classical Regression



OLS	
n	19
Slope	0.0025
Intercept	-112.4046
R-sq	0.4768
R	0.6905
Scale Estimate	1.0926
P-value (Reg)	0.0011
P-value (Slope)	0.0011
Mann-Kendall	
S	59.0000
SD of S	28.5482
Standardized S	2.0317
Approximate p-value	0.0211
Confidence Coefficient	0.9500
Red = Prediction Interval Green = Confidence Interval	



# Classical Regression



OLS	
n	19
Slope	-0.0008
Intercept	30.3863
R-sq	0.2511
R	-0.5011
Scale Estimate	0.6123
P-value (Reg)	0.0288
P-value (Slope)	0.0288
Mann-Kendall	
S	-44.0000
SD of S	27.7609
Standardized S	-1.5489
Approximate p-value	0.0607
Confidence Coefficient	0.9500
Red = Prediction Interval	
Green = Confidence Interval	

A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Goodness-of-Fit Test Statistics for Data Sets with Non-Detects</b>										
2	<b>User Selected Options</b>										
3	Date/Time of Computation	ProUCL 5.112/23/2019 1:47:26 PM									
4	From File	SEDI Pond_Cholla_AssessMonApr2019_Append.xls									
5	Full Precision	OFF									
6	Confidence Coefficient	0.95									
7											
8											
9	<b>Antimony (m-56a)</b>										
10											
11		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
12	Raw Statistics	22	6	16	1	15	93.75%				
13											
14	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>										
15	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>										
16											
17	<b>The data set for variable Antimony (m-56a) was not processed!</b>										
18											
19											
20											
21	<b>Antimony (m-57a)</b>										
22											
23		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
24	Raw Statistics	22	6	16	1	15	93.75%				
25											
26	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>										
27	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>										
28											
29	<b>The data set for variable Antimony (m-57a) was not processed!</b>										
30											
31											
32											
33	<b>Antimony (m-58a)</b>										
34											
35		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
36	Raw Statistics	22	6	16	0	16	100.00%				
37											
38	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
39	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
40	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
41											
42	<b>The data set for variable Antimony (m-58a) was not processed!</b>										
43											
44											
45											
46	<b>Antimony (m-62a)</b>										
47											
48		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
49	Raw Statistics	22	6	16	0	16	100.00%				
50											
51	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
52	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										

A	B	C	D	E	F	G	H	I	J	K	L
53	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
54											
55	The data set for variable Antimony (m-62a) was not processed!										
56											
57											
58											
59	Arsenic (m-56a)										
60											
61			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
62		Raw Statistics	22	3	19	14	5	26.32%			
63											
64			Number	Minimum	Maximum	Mean	Median	SD			
65		Statistics (Non-Detects Only)	5	0.001	0.01	0.00452	0.002	0.00437			
66		Statistics (Non-Detects Only)	14	6.0000E-4	0.0082	0.00143	8.1500E-4	0.00198			
67		Statistics (All: NDs treated as DL value)	19	6.0000E-4	0.01	0.00224	9.3000E-4	0.003			
68		Statistics (All: NDs treated as DL/2 value)	19	5.0000E-4	0.0082	0.00165	8.2000E-4	0.00201			
69		Statistics (Normal ROS Imputed Data)	19	6.0000E-4	0.0082	0.00135	8.8325E-4	0.00169			
70		Statistics (Gamma ROS Imputed Data)	19	6.0000E-4	0.01	0.00369	9.3000E-4	0.00423			
71		Statistics (Lognormal ROS Imputed Data)	19	6.0000E-4	0.0082	0.00129	8.2000E-4	0.0017			
72											
73			K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
74		Statistics (Non-Detects Only)	1.597	1.302	8.9582E-4	-6.894	0.675	-0.0979			
75		Statistics (NDs = DL)	1.093	0.955	0.00205	-6.622	0.905	-0.137			
76		Statistics (NDs = DL/2)	1.402	1.216	0.00118	-6.805	0.79	-0.116			
77		Statistics (Gamma ROS Estimates)	0.855	0.755	0.00431	-6.292	1.184	-0.188			
78		Statistics (Lognormal ROS Estimates)	--	--	--	-6.929	0.578	-0.0835			
79											
80	Normal GOF Test Results										
81											
82			No NDs	NDs = DL	NDs = DL/2	Normal ROS					
83		Correlation Coefficient R	0.629	0.747	0.755	0.607					
84											
85			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
86		Shapiro-Wilk (Detects Only)	0.427	0.874	Data Not Normal						
87		Shapiro-Wilk (NDs = DL)	0.563	0.901	Data Not Normal						
88		Shapiro-Wilk (NDs = DL/2)	0.587	0.901	Data Not Normal						
89		Shapiro-Wilk (Normal ROS Estimates)	0.399	0.901	Data Not Normal						
90		Lilliefors (Detects Only)	0.383	0.226	Data Not Normal						
91		Lilliefors (NDs = DL)	0.374	0.197	Data Not Normal						
92		Lilliefors (NDs = DL/2)	0.359	0.197	Data Not Normal						
93		Lilliefors (Normal ROS Estimates)	0.403	0.197	Data Not Normal						
94											
95	Gamma GOF Test Results										
96											
97			No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
98		Correlation Coefficient R	0.808	0.904	0.922	0.847					
99											
100			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
101		Anderson-Darling (Detects Only)	2.395	0.75	Data Not Gamma Distributed						
102		Kolmogorov-Smirnov (Detects Only)	0.307	0.233	Data Not Gamma Distributed						
103		Anderson-Darling (NDs = DL)	2.834	0.767	Data Not Gamma Distributed						
104		Kolmogorov-Smirnov (NDs = DL)	0.313	0.204	Data Not Gamma Distributed						

A	B	C	D	E	F	G	H	I	J	K	L	
105	Anderson-Darling (NDs = DL/2)			2.358	0.759							
106	Kolmogorov-Smirnov (NDs = DL/2)			0.299	0.203	Data Not Gamma Distributed						
107	Anderson-Darling (Gamma ROS Estimates)			2.618	0.775							
108	Kolmogorov-Smirnov (Gamma ROS Est.)			0.3	0.205	Data Not Gamma Distributed						
109												
110	<b>Lognormal GOF Test Results</b>											
111												
112				No NDs	NDs = DL	NDs = DL/2	Log ROS					
113	Correlation Coefficient R			0.809	0.865	0.889	0.781					
114												
115				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
116	Shapiro-Wilk (Detects Only)			0.678	0.874	Data Not Lognormal						
117	Shapiro-Wilk (NDs = DL)			0.743	0.901	Data Not Lognormal						
118	Shapiro-Wilk (NDs = DL/2)			0.792	0.901	Data Not Lognormal						
119	Shapiro-Wilk (Lognormal ROS Estimates)			0.636	0.901	Data Not Lognormal						
120	Lilliefors (Detects Only)			0.265	0.226	Data Not Lognormal						
121	Lilliefors (NDs = DL)			0.267	0.197	Data Not Lognormal						
122	Lilliefors (NDs = DL/2)			0.241	0.197	Data Not Lognormal						
123	Lilliefors (Lognormal ROS Estimates)			0.3	0.197	Data Not Lognormal						
124												
125	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
126												
127	<b>Arsenic (m-57a)</b>											
128												
129				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
130	Raw Statistics			22	3	19	17	2	10.53%			
131												
132				Number	Minimum	Maximum	Mean	Median	SD			
133	Statistics (Non-Detects Only)			2	0.0019	0.0026	0.00225	0.00225	4.9497E-4			
134	Statistics (Non-Detects Only)			17	0.0017	0.0098	0.00396	0.0038	0.00212			
135	Statistics (All: NDs treated as DL value)			19	0.0017	0.0098	0.00378	0.0027	0.00207			
136	Statistics (All: NDs treated as DL/2 value)			19	9.5000E-4	0.0098	0.00367	0.0027	0.00219			
137	Statistics (Normal ROS Imputed Data)			19	1.0340E-4	0.0098	0.00362	0.0027	0.00225			
138	Statistics (Gamma ROS Imputed Data)			19	0.0017	0.01	0.0046	0.0039	0.00276			
139	Statistics (Lognormal ROS Imputed Data)			19	0.00136	0.0098	0.00372	0.0027	0.00213			
140												
141				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
142	Statistics (Non-Detects Only)			4.435	3.691	8.9405E-4	-5.647	0.488	-0.0865			
143	Statistics (NDs = DL)			4.362	3.708	8.6752E-4	-5.696	0.486	-0.0853			
144	Statistics (NDs = DL/2)			3.279	2.797	0.00112	-5.769	0.589	-0.102			
145	Statistics (Gamma ROS Estimates)			3.365	2.869	0.00137	-5.538	0.566	-0.102			
146	Statistics (Lognormal ROS Estimates)			--	--	--	-5.732	0.527	-0.092			
147												
148	<b>Normal GOF Test Results</b>											
149												
150				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
151	Correlation Coefficient R			0.928	0.915	0.942	0.955					
152												
153				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
154	Shapiro-Wilk (Detects Only)			0.867	0.892	Data Not Normal						
155	Shapiro-Wilk (NDs = DL)			0.843	0.901	Data Not Normal						
156	Shapiro-Wilk (NDs = DL/2)			0.895	0.901	Data Not Normal						

A	B	C	D	E	F	G	H	I	J	K	L
157	Shapiro-Wilk (Normal ROS Estimates)			0.923	0.901	Data Appear Normal					
158	Lilliefors (Detects Only)			0.195	0.207	Data Appear Normal					
159	Lilliefors (NDs = DL)			0.226	0.197	Data Not Normal					
160	Lilliefors (NDs = DL/2)			0.197	0.197	Data Not Normal					
161	Lilliefors (Normal ROS Estimates)			0.185	0.197	Data Appear Normal					
162											
163	<b>Gamma GOF Test Results</b>										
164											
165				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
166	Correlation Coefficient R			0.98	0.974	0.989	0.962				
167											
168				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
169	Anderson-Darling (Detects Only)			0.383	0.742						
170	Kolmogorov-Smirnov (Detects Only)			0.195	0.21	Detected Data Appear Gamma Distributed					
171	Anderson-Darling (NDs = DL)			0.543	0.744						
172	Kolmogorov-Smirnov (NDs = DL)			0.219	0.199	Detected Data appear Approximate Gamma Distr					
173	Anderson-Darling (NDs = DL/2)			0.21	0.747						
174	Kolmogorov-Smirnov (NDs = DL/2)			0.158	0.2	Data Appear Gamma Distributed					
175	Anderson-Darling (Gamma ROS Estimates)			0.586	0.747						
176	Kolmogorov-Smirnov (Gamma ROS Est.)			0.182	0.2	Data Appear Gamma Distributed					
177											
178	<b>Lognormal GOF Test Results</b>										
179											
180				No NDs	NDs = DL	NDs = DL/2	Log ROS				
181	Correlation Coefficient R			0.984	0.976	0.994	0.988				
182											
183				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
184	Shapiro-Wilk (Detects Only)			0.962	0.892	Data Appear Lognormal					
185	Shapiro-Wilk (NDs = DL)			0.947	0.901	Data Appear Lognormal					
186	Shapiro-Wilk (NDs = DL/2)			0.988	0.901	Data Appear Lognormal					
187	Shapiro-Wilk (Lognormal ROS Estimates)			0.971	0.901	Data Appear Lognormal					
188	Lilliefors (Detects Only)			0.179	0.207	Data Appear Lognormal					
189	Lilliefors (NDs = DL)			0.2	0.197	Data Not Lognormal					
190	Lilliefors (NDs = DL/2)			0.124	0.197	Data Appear Lognormal					
191	Lilliefors (Lognormal ROS Estimates)			0.162	0.197	Data Appear Lognormal					
192											
193	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
194											
195	<b>Arsenic (m-58a)</b>										
196											
197				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
198	Raw Statistics			22	3	19	16	3	15.79%		
199											
200				Number	Minimum	Maximum	Mean	Median	SD		
201	Statistics (Non-Detects Only)			3	0.0038	0.01	0.0059	0.0039	0.00355		
202	Statistics (Non-Detects Only)			16	0.0025	0.0057	0.00399	0.00395	8.7137E-4		
203	Statistics (All: NDs treated as DL value)			19	0.0025	0.01	0.00429	0.0039	0.00159		
204	Statistics (All: NDs treated as DL/2 value)			19	0.0019	0.0057	0.00383	0.0039	0.00107		
205	Statistics (Normal ROS Imputed Data)			19	0.0025	0.0057	0.0039	0.0039	8.3832E-4		
206	Statistics (Gamma ROS Imputed Data)			19	0.0025	0.01	0.00494	0.0042	0.00239		
207	Statistics (Lognormal ROS Imputed Data)			19	0.0025	0.0057	0.00389	0.0039	8.4050E-4		
208											

A	B	C	D	E	F	G	H	I	J	K	L
209				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
210	Statistics (Non-Detects Only)			21.45	17.47	1.8617E-4	-5.547	0.228	-0.041		
211	Statistics (NDs = DL)			10.58	8.945	4.0589E-4	-5.498	0.3	-0.0545		
212	Statistics (NDs = DL/2)			11.89	10.05	3.2204E-4	-5.608	0.313	-0.0558		
213	Statistics (Gamma ROS Estimates)			5.849	4.96	8.4497E-4	-5.398	0.409	-0.0758		
214	Statistics (Lognormal ROS Estimates)			--	--	--	-5.571	0.219	-0.0393		
215											
216	<b>Normal GOF Test Results</b>										
217											
218				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
219	Correlation Coefficient R			0.994	0.837	0.988	0.991				
220											
221				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
222	Shapiro-Wilk (Detects Only)			0.984	0.887	Data Appear Normal					
223	Shapiro-Wilk (NDs = DL)			0.729	0.901	Data Not Normal					
224	Shapiro-Wilk (NDs = DL/2)			0.969	0.901	Data Appear Normal					
225	Shapiro-Wilk (Normal ROS Estimates)			0.98	0.901	Data Appear Normal					
226	Lilliefors (Detects Only)			0.118	0.213	Data Appear Normal					
227	Lilliefors (NDs = DL)			0.218	0.197	Data Not Normal					
228	Lilliefors (NDs = DL/2)			0.136	0.197	Data Appear Normal					
229	Lilliefors (Normal ROS Estimates)			0.114	0.197	Data Appear Normal					
230											
231	<b>Gamma GOF Test Results</b>										
232											
233				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
234	Correlation Coefficient R			0.991	0.886	0.971	0.915				
235											
236				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
237	Anderson-Darling (Detects Only)			0.206	0.736						
238	Kolmogorov-Smirnov (Detects Only)			0.141	0.215	Detected Data Appear Gamma Distributed					
239	Anderson-Darling (NDs = DL)			0.833	0.741						
240	Kolmogorov-Smirnov (NDs = DL)			0.161	0.199	Detected Data appear Approximate Gamma Distr					
241	Anderson-Darling (NDs = DL/2)			0.446	0.741						
242	Kolmogorov-Smirnov (NDs = DL/2)			0.176	0.198	Data Appear Gamma Distributed					
243	Anderson-Darling (Gamma ROS Estimates)			1.237	0.742						
244	Kolmogorov-Smirnov (Gamma ROS Est.)			0.21	0.199	Data Not Gamma Distributed					
245											
246	<b>Lognormal GOF Test Results</b>										
247											
248				No NDs	NDs = DL	NDs = DL/2	Log ROS				
249	Correlation Coefficient R			0.986	0.939	0.963	0.993				
250											
251				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
252	Shapiro-Wilk (Detects Only)			0.969	0.887	Data Appear Lognormal					
253	Shapiro-Wilk (NDs = DL)			0.902	0.901	Data Appear Lognormal					
254	Shapiro-Wilk (NDs = DL/2)			0.92	0.901	Data Appear Lognormal					
255	Shapiro-Wilk (Lognormal ROS Estimates)			0.982	0.901	Data Appear Lognormal					
256	Lilliefors (Detects Only)			0.158	0.213	Data Appear Lognormal					
257	Lilliefors (NDs = DL)			0.158	0.197	Data Appear Lognormal					
258	Lilliefors (NDs = DL/2)			0.195	0.197	Data Appear Lognormal					
259	Lilliefors (Lognormal ROS Estimates)			0.133	0.197	Data Appear Lognormal					
260											

A	B	C	D	E	F	G	H	I	J	K	L
261	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
262											
263	<b>Arsenic (m-62a)</b>										
264											
265			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
266	Raw Statistics		22	3	19	16	3	15.79%			
267											
268			Number	Minimum	Maximum	Mean	Median	SD			
269	Statistics (Non-Detects Only)		3	0.0031	0.01	0.00547	0.0033	0.00393			
270	Statistics (Non-Detects Only)		16	0.0016	0.0033	0.00258	0.00285	5.5163E-4			
271	Statistics (All: NDs treated as DL value)		19	0.0016	0.01	0.00304	0.0029	0.00177			
272	Statistics (All: NDs treated as DL/2 value)		19	0.00155	0.005	0.00261	0.0028	8.2780E-4			
273	Statistics (Normal ROS Imputed Data)		19	0.0016	0.0033	0.00257	0.0026	5.0481E-4			
274	Statistics (Gamma ROS Imputed Data)		19	0.0016	0.01	0.00375	0.0029	0.00282			
275	Statistics (Lognormal ROS Imputed Data)		19	0.0016	0.0033	0.00256	0.0026	5.0674E-4			
276											
277			K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
278	Statistics (Non-Detects Only)		20.88	17.01	1.2360E-4	-5.984	0.234	-0.0391			
279	Statistics (NDs = DL)		5.778	4.901	5.2557E-4	-5.886	0.384	-0.0653			
280	Statistics (NDs = DL/2)		11.23	9.493	2.3197E-4	-5.995	0.308	-0.0513			
281	Statistics (Gamma ROS Estimates)		2.924	2.497	0.00128	-5.766	0.559	-0.0969			
282	Statistics (Lognormal ROS Estimates)		--	--	--	-5.989	0.214	-0.0357			
283											
284	<b>Normal GOF Test Results</b>										
285											
286			No NDs	NDs = DL	NDs = DL/2	Normal ROS					
287	Correlation Coefficient R		0.952	0.702	0.931	0.971					
288											
289			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
290	Shapiro-Wilk (Detects Only)		0.891	0.887	Data Appear Normal						
291	Shapiro-Wilk (NDs = DL)		0.525	0.901	Data Not Normal						
292	Shapiro-Wilk (NDs = DL/2)		0.877	0.901	Data Not Normal						
293	Shapiro-Wilk (Normal ROS Estimates)		0.933	0.901	Data Appear Normal						
294	Lilliefors (Detects Only)		0.218	0.213	Data Not Normal						
295	Lilliefors (NDs = DL)		0.388	0.197	Data Not Normal						
296	Lilliefors (NDs = DL/2)		0.17	0.197	Data Appear Normal						
297	Lilliefors (Normal ROS Estimates)		0.165	0.197	Data Appear Normal						
298											
299	<b>Gamma GOF Test Results</b>										
300											
301			No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
302	Correlation Coefficient R		0.928	0.775	0.949	0.864					
303											
304			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
305	Anderson-Darling (Detects Only)		0.915	0.736							
306	Kolmogorov-Smirnov (Detects Only)		0.236	0.215	Data Not Gamma Distributed						
307	Anderson-Darling (NDs = DL)		1.805	0.742							
308	Kolmogorov-Smirnov (NDs = DL)		0.314	0.199	Data Not Gamma Distributed						
309	Anderson-Darling (NDs = DL/2)		0.642	0.741							
310	Kolmogorov-Smirnov (NDs = DL/2)		0.161	0.199	Data Appear Gamma Distributed						
311	Anderson-Darling (Gamma ROS Estimates)		2.373	0.748							
312	Kolmogorov-Smirnov (Gamma ROS Est.)		0.349	0.2	Data Not Gamma Distributed						



A	B	C	D	E	F	G	H	I	J	K	L
313											
314	<b>Lognormal GOF Test Results</b>										
315											
316			No NDs	NDs = DL	NDs = DL/2	Log ROS					
317	Correlation Coefficient R		0.938	0.869	0.961	0.959					
318											
319		Test value	Crit. (0.05)	Conclusion with Alpha(0.05)							
320	Shapiro-Wilk (Detects Only)		0.867	0.887	Data Not Lognormal						
321	Shapiro-Wilk (NDs = DL)		0.782	0.901	Data Not Lognormal						
322	Shapiro-Wilk (NDs = DL/2)		0.923	0.901	Data Appear Lognormal						
323	Shapiro-Wilk (Lognormal ROS Estimates)		0.91	0.901	Data Appear Lognormal						
324	Lilliefors (Detects Only)		0.236	0.213	Data Not Lognormal						
325	Lilliefors (NDs = DL)		0.274	0.197	Data Not Lognormal						
326	Lilliefors (NDs = DL/2)		0.175	0.197	Data Appear Lognormal						
327	Lilliefors (Lognormal ROS Estimates)		0.173	0.197	Data Appear Lognormal						
328											
329	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
330											
331	<b>Barium (m-56a)</b>										
332											
333		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
334	Raw Statistics		22	3	19	17	2	10.53%			
335											
336		Number	Minimum	Maximum	Mean	Median	SD				
337	Statistics (Non-Detects Only)		2	0.055	0.078	0.0665	0.0665	0.0163			
338	Statistics (Non-Detects Only)		17	0.055	0.086	0.0713	0.07	0.0086			
339	Statistics (All: NDs treated as DL value)		19	0.055	0.086	0.0708	0.07	0.0091			
340	Statistics (All: NDs treated as DL/2 value)		19	0.0275	0.086	0.0673	0.07	0.0146			
341	Statistics (Normal ROS Imputed Data)		19	0.0508	0.086	0.07	0.07	0.0094			
342	Statistics (Gamma ROS Imputed Data)		19	0.0523	0.086	0.0701	0.07	0.00923			
343	Statistics (Lognormal ROS Imputed Data)		19	0.053	0.086	0.0701	0.07	0.00915			
344											
345		K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV				
346	Statistics (Non-Detects Only)		72.47	59.72	9.8384E-4	-2.648	0.122	-0.0459			
347	Statistics (NDs = DL)		62.59	52.74	0.00113	-2.656	0.131	-0.0493			
348	Statistics (NDs = DL/2)		16.69	14.09	0.00403	-2.729	0.275	-0.101			
349	Statistics (Gamma ROS Estimates)		59.55	50.18	0.00118	-2.667	0.134	-0.0504			
350	Statistics (Lognormal ROS Estimates)		--	--	--	-2.666	0.133	-0.0498			
351											
352	<b>Normal GOF Test Results</b>										
353											
354		No NDs	NDs = DL	NDs = DL/2	Normal ROS						
355	Correlation Coefficient R		0.991	0.992	0.936	0.99					
356											
357		Test value	Crit. (0.05)	Conclusion with Alpha(0.05)							
358	Shapiro-Wilk (Detects Only)		0.977	0.892	Data Appear Normal						
359	Shapiro-Wilk (NDs = DL)		0.972	0.901	Data Appear Normal						
360	Shapiro-Wilk (NDs = DL/2)		0.883	0.901	Data Not Normal						
361	Shapiro-Wilk (Normal ROS Estimates)		0.977	0.901	Data Appear Normal						
362	Lilliefors (Detects Only)		0.106	0.207	Data Appear Normal						
363	Lilliefors (NDs = DL)		0.0797	0.197	Data Appear Normal						
364	Lilliefors (NDs = DL/2)		0.175	0.197	Data Appear Normal						



A	B	C	D	E	F	G	H	I	J	K	L
365	Lilliefors (Normal ROS Estimates)			0.0896	0.197	Data Appear Normal					
366											
367	<b>Gamma GOF Test Results</b>										
368											
369		No NDs	NDs = DL	NDs = DL/2	Gamma ROS						
370	Correlation Coefficient R		0.99	0.988	0.902	0.988					
371											
372		Test value	Crit. (0.05)	Conclusion with Alpha(0.05)							
373	Anderson-Darling (Detects Only)		0.173	0.736							
374	Kolmogorov-Smirnov (Detects Only)		0.11	0.208	Detected Data Appear Gamma Distributed						
375	Anderson-Darling (NDs = DL)		0.179	0.74							
376	Kolmogorov-Smirnov (NDs = DL)		0.0817	0.198	Data Appear Gamma Distributed						
377	Anderson-Darling (NDs = DL/2)		1.234	0.741							
378	Kolmogorov-Smirnov (NDs = DL/2)		0.22	0.198	Data Not Gamma Distributed						
379	Anderson-Darling (Gamma ROS Estimates)		0.206	0.74							
380	Kolmogorov-Smirnov (Gamma ROS Est.)		0.0932	0.198	Data Appear Gamma Distributed						
381											
382	<b>Lognormal GOF Test Results</b>										
383											
384		No NDs	NDs = DL	NDs = DL/2	Log ROS						
385	Correlation Coefficient R		0.991	0.988	0.867	0.988					
386											
387		Test value	Crit. (0.05)	Conclusion with Alpha(0.05)							
388	Shapiro-Wilk (Detects Only)		0.978	0.892	Data Appear Lognormal						
389	Shapiro-Wilk (NDs = DL)		0.965	0.901	Data Appear Lognormal						
390	Shapiro-Wilk (NDs = DL/2)		0.767	0.901	Data Not Lognormal						
391	Shapiro-Wilk (Lognormal ROS Estimates)		0.97	0.901	Data Appear Lognormal						
392	Lilliefors (Detects Only)		0.101	0.207	Data Appear Lognormal						
393	Lilliefors (NDs = DL)		0.0743	0.197	Data Appear Lognormal						
394	Lilliefors (NDs = DL/2)		0.245	0.197	Data Not Lognormal						
395	Lilliefors (Lognormal ROS Estimates)		0.0954	0.197	Data Appear Lognormal						
396											
397	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
398											
399	<b>Barium (m-57a)</b>										
400											
401		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
402	Raw Statistics		22	3	19	17	2	10.53%			
403											
404		Number	Minimum	Maximum	Mean	Median	SD				
405	Statistics (Non-Detects Only)		2	0.039	0.041	0.04	0.04	0.00141			
406	Statistics (Non-Detects Only)		17	0.038	0.072	0.0468	0.043	0.00892			
407	Statistics (All: NDs treated as DL value)		19	0.038	0.072	0.0461	0.043	0.00868			
408	Statistics (All: NDs treated as DL/2 value)		19	0.0195	0.072	0.0439	0.043	0.0119			
409	Statistics (Normal ROS Imputed Data)		19	0.0316	0.072	0.0452	0.043	0.00968			
410	Statistics (Gamma ROS Imputed Data)		19	0.0323	0.072	0.0452	0.043	0.00957			
411	Statistics (Lognormal ROS Imputed Data)		19	0.0342	0.072	0.0454	0.043	0.00929			
412											
413		K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV				
414	Statistics (Non-Detects Only)		34.6	28.53	0.00135	-3.077	0.169	-0.0548			
415	Statistics (NDs = DL)		35.55	29.98	0.0013	-3.092	0.166	-0.0535			
416	Statistics (NDs = DL/2)		12.57	10.62	0.0035	-3.165	0.308	-0.0972			

A	B	C	D	E	F	G	H	I	J	K	L	
417	Statistics (Gamma ROS Estimates)			26.63	22.46	0.0017	-3.115	0.195	-0.0626			
418	Statistics (Lognormal ROS Estimates)			--	--	--	-3.109	0.185	-0.0594			
419												
420	<b>Normal GOF Test Results</b>											
421												
422				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
423	Correlation Coefficient R			0.862	0.853	0.926	0.917					
424												
425				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
426	Shapiro-Wilk (Detects Only)			0.754	0.892	Data Not Normal						
427	Shapiro-Wilk (NDs = DL)			0.739	0.901	Data Not Normal						
428	Shapiro-Wilk (NDs = DL/2)			0.876	0.901	Data Not Normal						
429	Shapiro-Wilk (Normal ROS Estimates)			0.853	0.901	Data Not Normal						
430	Lilliefors (Detects Only)			0.284	0.207	Data Not Normal						
431	Lilliefors (NDs = DL)			0.285	0.197	Data Not Normal						
432	Lilliefors (NDs = DL/2)			0.244	0.197	Data Not Normal						
433	Lilliefors (Normal ROS Estimates)			0.244	0.197	Data Not Normal						
434												
435	<b>Gamma GOF Test Results</b>											
436												
437				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
438	Correlation Coefficient R			0.895	0.887	0.931	0.939					
439												
440				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
441	Anderson-Darling (Detects Only)			1.493	0.737							
442	Kolmogorov-Smirnov (Detects Only)			0.273	0.209	Data Not Gamma Distributed						
443	Anderson-Darling (NDs = DL)			1.696	0.74							
444	Kolmogorov-Smirnov (NDs = DL)			0.269	0.198	Data Not Gamma Distributed						
445	Anderson-Darling (NDs = DL/2)			1.435	0.741							
446	Kolmogorov-Smirnov (NDs = DL/2)			0.283	0.198	Data Not Gamma Distributed						
447	Anderson-Darling (Gamma ROS Estimates)			0.959	0.74							
448	Kolmogorov-Smirnov (Gamma ROS Est.)			0.222	0.198	Data Not Gamma Distributed						
449												
450	<b>Lognormal GOF Test Results</b>											
451												
452				No NDs	NDs = DL	NDs = DL/2	Log ROS					
453	Correlation Coefficient R			0.894	0.888	0.89	0.938					
454												
455				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
456	Shapiro-Wilk (Detects Only)			0.808	0.892	Data Not Lognormal						
457	Shapiro-Wilk (NDs = DL)			0.797	0.901	Data Not Lognormal						
458	Shapiro-Wilk (NDs = DL/2)			0.809	0.901	Data Not Lognormal						
459	Shapiro-Wilk (Lognormal ROS Estimates)			0.888	0.901	Data Not Lognormal						
460	Lilliefors (Detects Only)			0.262	0.207	Data Not Lognormal						
461	Lilliefors (NDs = DL)			0.259	0.197	Data Not Lognormal						
462	Lilliefors (NDs = DL/2)			0.304	0.197	Data Not Lognormal						
463	Lilliefors (Lognormal ROS Estimates)			0.221	0.197	Data Not Lognormal						
464												
465	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
466												
467	<b>Barium (m-58a)</b>											
468												

A	B	C	D	E	F	G	H	I	J	K	L
469				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
470			Raw Statistics	22	3	19	17	2	10.53%		
471											
472				Number	Minimum	Maximum	Mean	Median	SD		
473			Statistics (Non-Detects Only)	2	0.059	0.066	0.0625	0.0625	0.00495		
474			Statistics (Non-Detects Only)	17	0.043	0.11	0.0699	0.064	0.0192		
475			Statistics (All: NDs treated as DL value)	19	0.043	0.11	0.0692	0.064	0.0182		
476			Statistics (All: NDs treated as DL/2 value)	19	0.0295	0.11	0.0659	0.063	0.0218		
477			Statistics (Normal ROS Imputed Data)	19	0.043	0.11	0.0681	0.063	0.0189		
478			Statistics (Gamma ROS Imputed Data)	19	0.043	0.11	0.0681	0.063	0.0189		
479			Statistics (Lognormal ROS Imputed Data)	19	0.043	0.11	0.0681	0.063	0.0189		
480											
481				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
482			Statistics (Non-Detects Only)	14.8	12.23	0.00473	-2.694	0.268	-0.0995		
483			Statistics (NDs = DL)	16.13	13.62	0.00429	-2.703	0.255	-0.0943		
484			Statistics (NDs = DL/2)	9.166	7.753	0.00719	-2.776	0.352	-0.127		
485			Statistics (Gamma ROS Estimates)	14.67	12.39	0.00464	-2.721	0.267	-0.0979		
486			Statistics (Lognormal ROS Estimates)	--	--	--	-2.72	0.265	-0.0975		
487											
488			<b>Normal GOF Test Results</b>								
489											
490				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
491			Correlation Coefficient R	0.976	0.971	0.99	0.966				
492											
493				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
494			Shapiro-Wilk (Detects Only)	0.946	0.892	Data Appear Normal					
495			Shapiro-Wilk (NDs = DL)	0.938	0.901	Data Appear Normal					
496			Shapiro-Wilk (NDs = DL/2)	0.976	0.901	Data Appear Normal					
497			Shapiro-Wilk (Normal ROS Estimates)	0.927	0.901	Data Appear Normal					
498			Lilliefors (Detects Only)	0.151	0.207	Data Appear Normal					
499			Lilliefors (NDs = DL)	0.148	0.197	Data Appear Normal					
500			Lilliefors (NDs = DL/2)	0.113	0.197	Data Appear Normal					
501			Lilliefors (Normal ROS Estimates)	0.165	0.197	Data Appear Normal					
502											
503			<b>Gamma GOF Test Results</b>								
504											
505				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
506			Correlation Coefficient R	0.989	0.987	0.992	0.984				
507											
508				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
509			Anderson-Darling (Detects Only)	0.23	0.738						
510			Kolmogorov-Smirnov (Detects Only)	0.128	0.209	Detected Data Appear Gamma Distributed					
511			Anderson-Darling (NDs = DL)	0.267	0.741						
512			Kolmogorov-Smirnov (NDs = DL)	0.12	0.198	Data Appear Gamma Distributed					
513			Anderson-Darling (NDs = DL/2)	0.158	0.741						
514			Kolmogorov-Smirnov (NDs = DL/2)	0.0748	0.199	Data Appear Gamma Distributed					
515			Anderson-Darling (Gamma ROS Estimates)	0.348	0.741						
516			Kolmogorov-Smirnov (Gamma ROS Est.)	0.137	0.198	Data Appear Gamma Distributed					
517											
518			<b>Lognormal GOF Test Results</b>								
519											
520				No NDs	NDs = DL	NDs = DL/2	Log ROS				

A	B	C	D	E	F	G	H	I	J	K	L	
521	Correlation Coefficient R			0.992	0.991	0.986	0.987					
522												
523				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
524	Shapiro-Wilk (Detects Only)			0.975	0.892	Data Appear Lognormal						
525	Shapiro-Wilk (NDs = DL)			0.977	0.901	Data Appear Lognormal						
526	Shapiro-Wilk (NDs = DL/2)			0.97	0.901	Data Appear Lognormal						
527	Shapiro-Wilk (Lognormal ROS Estimates)			0.965	0.901	Data Appear Lognormal						
528	Lilliefors (Detects Only)			0.11	0.207	Data Appear Lognormal						
529	Lilliefors (NDs = DL)			0.103	0.197	Data Appear Lognormal						
530	Lilliefors (NDs = DL/2)			0.0982	0.197	Data Appear Lognormal						
531	Lilliefors (Lognormal ROS Estimates)			0.122	0.197	Data Appear Lognormal						
532												
533	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
534												
535	<b>Barium (m-62a)</b>											
536												
537				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
538	Raw Statistics			22	4	18	16	2	11.11%			
539												
540				Number	Minimum	Maximum	Mean	Median	SD			
541	Statistics (Non-Detects Only)			2	0.067	0.068	0.0675	0.0675	7.0711E-4			
542	Statistics (Non-Detects Only)			16	0.064	0.16	0.0808	0.0755	0.0217			
543	Statistics (All: NDs treated as DL value)			18	0.064	0.16	0.0793	0.075	0.0209			
544	Statistics (All: NDs treated as DL/2 value)			18	0.0335	0.16	0.0756	0.075	0.0255			
545	Statistics (Normal ROS Imputed Data)			18	0.0521	0.16	0.0776	0.075	0.0224			
546	Statistics (Gamma ROS Imputed Data)			18	0.0533	0.16	0.0778	0.075	0.0223			
547	Statistics (Lognormal ROS Imputed Data)			18	0.0588	0.16	0.0784	0.075	0.0216			
548												
549				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
550	Statistics (Non-Detects Only)			22	17.92	0.00367	-2.539	0.201	-0.0791			
551	Statistics (NDs = DL)			23.01	19.21	0.00345	-2.556	0.195	-0.0764			
552	Statistics (NDs = DL/2)			10.07	8.428	0.00751	-2.633	0.333	-0.127			
553	Statistics (Gamma ROS Estimates)			18	15.04	0.00432	-2.582	0.227	-0.0881			
554	Statistics (Lognormal ROS Estimates)			--	--	--	-2.571	0.211	-0.0822			
555												
556	<b>Normal GOF Test Results</b>											
557												
558				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
559	Correlation Coefficient R			0.683	0.687	0.814	0.765					
560												
561				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
562	Shapiro-Wilk (Detects Only)			0.501	0.887	Data Not Normal						
563	Shapiro-Wilk (NDs = DL)			0.505	0.897	Data Not Normal						
564	Shapiro-Wilk (NDs = DL/2)			0.699	0.897	Data Not Normal						
565	Shapiro-Wilk (Normal ROS Estimates)			0.62	0.897	Data Not Normal						
566	Lilliefors (Detects Only)			0.379	0.213	Data Not Normal						
567	Lilliefors (NDs = DL)			0.356	0.202	Data Not Normal						
568	Lilliefors (NDs = DL/2)			0.315	0.202	Data Not Normal						
569	Lilliefors (Normal ROS Estimates)			0.332	0.202	Data Not Normal						
570												
571	<b>Gamma GOF Test Results</b>											
572												



A	B	C	D	E	F	G	H	I	J	K	L
625	The data set for variable Beryllium (m-57a) was not processed!										
626											
627											
628											
629	Beryllium (m-58a)										
630											
631			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
632	Raw Statistics	22	6	16	0	16	100.00%				
633											
634	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!										
635	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!										
636	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
637											
638	The data set for variable Beryllium (m-58a) was not processed!										
639											
640											
641											
642	Beryllium (m-62a)										
643											
644			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
645	Raw Statistics	22	6	16	0	16	100.00%				
646											
647	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!										
648	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!										
649	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
650											
651	The data set for variable Beryllium (m-62a) was not processed!										
652											
653											
654											
655	Cadmium (m-56a)										
656											
657			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
658	Raw Statistics	22	6	16	0	16	100.00%				
659											
660	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!										
661	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!										
662	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
663											
664	The data set for variable Cadmium (m-56a) was not processed!										
665											
666											
667											
668	Cadmium (m-57a)										
669											
670			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
671	Raw Statistics	22	6	16	0	16	100.00%				
672											
673	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!										
674	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!										
675	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
676											

A	B	C	D	E	F	G	H	I	J	K	L
677	The data set for variable Cadmium (m-57a) was not processed!										
678											
679											
680											
681	Cadmium (m-58a)										
682											
683			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
684	Raw Statistics		22	6	16	0	16	100.00%			
685											
686	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!										
687	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!										
688	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
689											
690	The data set for variable Cadmium (m-58a) was not processed!										
691											
692											
693											
694	Cadmium (m-62a)										
695											
696			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
697	Raw Statistics		22	6	16	0	16	100.00%			
698											
699	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!										
700	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!										
701	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
702											
703	The data set for variable Cadmium (m-62a) was not processed!										
704											
705											
706											
707	Chromium (m-56a)										
708											
709			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
710	Raw Statistics		22	3	19	13	6	31.58%			
711											
712			Number	Minimum	Maximum	Mean	Median	SD			
713	Statistics (Non-Detects Only)		6	5.0000E-4	0.076	0.019	0.007	0.0292			
714	Statistics (Non-Detects Only)		13	5.1000E-4	0.076	0.0115	0.0052	0.02			
715	Statistics (All: NDs treated as DL value)		19	5.0000E-4	0.076	0.0139	0.0052	0.0227			
716	Statistics (All: NDs treated as DL/2 value)		19	2.5000E-4	0.076	0.0109	0.005	0.0181			
717	Statistics (Normal ROS Imputed Data)		19	-0.0261	0.076	0.00553	0.00395	0.0199			
718	Statistics (Gamma ROS Imputed Data)		19	5.1000E-4	0.076	0.011	0.0091	0.0163			
719	Statistics (Lognormal ROS Imputed Data)		19	2.9561E-4	0.076	0.00842	0.0034	0.017			
720											
721			K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
722	Statistics (Non-Detects Only)		0.785	0.655	0.0146	-5.225	1.222	-0.234			
723	Statistics (NDs = DL)		0.636	0.571	0.0218	-5.242	1.468	-0.28			
724	Statistics (NDs = DL/2)		0.651	0.583	0.0167	-5.461	1.511	-0.277			
725	Statistics (Gamma ROS Estimates)		1.097	0.959	0.01	-5.029	1.04	-0.207			
726	Statistics (Lognormal ROS Estimates)		--	--	--	-5.684	1.326	-0.233			
727											
728	Normal GOF Test Results										

A	B	C	D	E	F	G	H	I	J	K	L
729											
730				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
731		Correlation Coefficient R		0.694	0.752	0.744	0.807				
732											
733			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
734		Shapiro-Wilk (Detects Only)	0.513	0.866	Data Not Normal						
735		Shapiro-Wilk (NDs = DL)	0.573	0.901	Data Not Normal						
736		Shapiro-Wilk (NDs = DL/2)	0.576	0.901	Data Not Normal						
737		Shapiro-Wilk (Normal ROS Estimates)	0.689	0.901	Data Not Normal						
738		Lilliefors (Detects Only)	0.39	0.234	Data Not Normal						
739		Lilliefors (NDs = DL)	0.357	0.197	Data Not Normal						
740		Lilliefors (NDs = DL/2)	0.328	0.197	Data Not Normal						
741		Lilliefors (Normal ROS Estimates)	0.32	0.197	Data Not Normal						
742											
743		<b>Gamma GOF Test Results</b>									
744											
745			No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
746		Correlation Coefficient R	0.901	0.929	0.952	0.838					
747											
748			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
749		Anderson-Darling (Detects Only)	0.841	0.769							
750		Kolmogorov-Smirnov (Detects Only)	0.265	0.245	Data Not Gamma Distributed						
751		Anderson-Darling (NDs = DL)	0.864	0.79							
752		Kolmogorov-Smirnov (NDs = DL)	0.217	0.208	Data Not Gamma Distributed						
753		Anderson-Darling (NDs = DL/2)	0.568	0.788							
754		Kolmogorov-Smirnov (NDs = DL/2)	0.172	0.208	Data Appear Gamma Distributed						
755		Anderson-Darling (Gamma ROS Estimates)	1.176	0.767							
756		Kolmogorov-Smirnov (Gamma ROS Est.)	0.306	0.204	Data Not Gamma Distributed						
757											
758		<b>Lognormal GOF Test Results</b>									
759											
760			No NDs	NDs = DL	NDs = DL/2	Log ROS					
761		Correlation Coefficient R	0.969	0.975	0.979	0.978					
762											
763			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
764		Shapiro-Wilk (Detects Only)	0.958	0.866	Data Appear Lognormal						
765		Shapiro-Wilk (NDs = DL)	0.942	0.901	Data Appear Lognormal						
766		Shapiro-Wilk (NDs = DL/2)	0.957	0.901	Data Appear Lognormal						
767		Shapiro-Wilk (Lognormal ROS Estimates)	0.964	0.901	Data Appear Lognormal						
768		Lilliefors (Detects Only)	0.173	0.234	Data Appear Lognormal						
769		Lilliefors (NDs = DL)	0.122	0.197	Data Appear Lognormal						
770		Lilliefors (NDs = DL/2)	0.128	0.197	Data Appear Lognormal						
771		Lilliefors (Lognormal ROS Estimates)	0.168	0.197	Data Appear Lognormal						
772											
773		<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>									
774											
775		<b>Chromium (m-57a)</b>									
776											
777			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
778		Raw Statistics	22	3	19	15	4	21.05%			
779											
780			Number	Minimum	Maximum	Mean	Median	SD			



A	B	C	D	E	F	G	H	I	J	K	L
781	Statistics (Non-Detects Only)			4	5.0000E-4	0.045	0.0234	0.024	0.0215		
782	Statistics (Non-Detects Only)			15	6.6000E-4	0.045	0.019	0.016	0.0147		
783	Statistics (All: NDs treated as DL value)			19	5.0000E-4	0.045	0.0199	0.016	0.0157		
784	Statistics (All: NDs treated as DL/2 value)			19	2.5000E-4	0.045	0.0175	0.016	0.014		
785	Statistics (Normal ROS Imputed Data)			19	-0.0149	0.045	0.0158	0.0144	0.0155		
786	Statistics (Gamma ROS Imputed Data)			19	6.6000E-4	0.045	0.0173	0.0123	0.0134		
787	Statistics (Lognormal ROS Imputed Data)			19	6.1549E-4	0.045	0.0159	0.012	0.0144		
788											
789				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
790	Statistics (Non-Detects Only)			1.052	0.886	0.018	-4.51	1.37	-0.304		
791	Statistics (NDs = DL)			0.936	0.824	0.0213	-4.538	1.478	-0.326		
792	Statistics (NDs = DL/2)			0.918	0.808	0.019	-4.684	1.517	-0.324		
793	Statistics (Gamma ROS Estimates)			1.242	1.081	0.0139	-4.511	1.209	-0.268		
794	Statistics (Lognormal ROS Estimates)			--	--	--	-4.784	1.407	-0.294		
795											
796	<b>Normal GOF Test Results</b>										
797											
798				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
799	Correlation Coefficient R			0.978	0.967	0.975	0.986				
800											
801				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
802	Shapiro-Wilk (Detects Only)			0.938	0.881	Data Appear Normal					
803	Shapiro-Wilk (NDs = DL)			0.912	0.901	Data Appear Normal					
804	Shapiro-Wilk (NDs = DL/2)			0.935	0.901	Data Appear Normal					
805	Shapiro-Wilk (Normal ROS Estimates)			0.971	0.901	Data Appear Normal					
806	Lilliefors (Detects Only)			0.118	0.22	Data Appear Normal					
807	Lilliefors (NDs = DL)			0.124	0.197	Data Appear Normal					
808	Lilliefors (NDs = DL/2)			0.132	0.197	Data Appear Normal					
809	Lilliefors (Normal ROS Estimates)			0.125	0.197	Data Appear Normal					
810											
811	<b>Gamma GOF Test Results</b>										
812											
813				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
814	Correlation Coefficient R			0.944	0.91	0.947	0.973				
815											
816				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
817	Anderson-Darling (Detects Only)			0.435	0.762						
818	Kolmogorov-Smirnov (Detects Only)			0.14	0.228	Detected Data Appear Gamma Distributed					
819	Anderson-Darling (NDs = DL)			0.625	0.772						
820	Kolmogorov-Smirnov (NDs = DL)			0.123	0.205	Data Appear Gamma Distributed					
821	Anderson-Darling (NDs = DL/2)			0.537	0.772						
822	Kolmogorov-Smirnov (NDs = DL/2)			0.164	0.205	Data Appear Gamma Distributed					
823	Anderson-Darling (Gamma ROS Estimates)			0.375	0.763						
824	Kolmogorov-Smirnov (Gamma ROS Est.)			0.14	0.203	Data Appear Gamma Distributed					
825											
826	<b>Lognormal GOF Test Results</b>										
827											
828				No NDs	NDs = DL	NDs = DL/2	Log ROS				
829	Correlation Coefficient R			0.928	0.922	0.926	0.954				
830											
831				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
832	Shapiro-Wilk (Detects Only)			0.851	0.881	Data Not Lognormal					

A	B	C	D	E	F	G	H	I	J	K	L
833	Shapiro-Wilk (NDs = DL)			0.837	0.901	Data Not Lognormal					
834	Shapiro-Wilk (NDs = DL/2)			0.853	0.901	Data Not Lognormal					
835	Shapiro-Wilk (Lognormal ROS Estimates)			0.895	0.901	Data Not Lognormal					
836	Lilliefors (Detects Only)			0.192	0.22	Data Appear Lognormal					
837	Lilliefors (NDs = DL)			0.169	0.197	Data Appear Lognormal					
838	Lilliefors (NDs = DL/2)			0.204	0.197	Data Not Lognormal					
839	Lilliefors (Lognormal ROS Estimates)			0.174	0.197	Data Appear Lognormal					
840											
841	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
842											
843	<b>Chromium (m-58a)</b>										
844											
845				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
846	Raw Statistics			22	3	19	8	11	57.89%		
847											
848				Number	Minimum	Maximum	Mean	Median	SD		
849	Statistics (Non-Detects Only)			11	5.0000E-4	0.01	0.00205	0.001	0.00282		
850	Statistics (Non-Detects Only)			8	5.2000E-4	0.0033	0.00151	9.8500E-4	0.00109		
851	Statistics (All: NDs treated as DL value)			19	5.0000E-4	0.01	0.00182	0.001	0.00223		
852	Statistics (All: NDs treated as DL/2 value)			19	2.5000E-4	0.005	0.00123	5.5000E-4	0.00128		
853	Statistics (Normal ROS Imputed Data)			19	-0.00155	0.0033	5.4033E-4	5.2000E-4	0.00125		
854	Statistics (Gamma ROS Imputed Data)			19	5.2000E-4	0.01	0.00642	0.01	0.00436		
855	Statistics (Lognormal ROS Imputed Data)			19	1.5716E-4	0.0033	8.9471E-4	6.2021E-4	8.8137E-4		
856											
857				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
858	Statistics (Non-Detects Only)			2.409	1.589	6.2517E-4	-6.72	0.706	-0.105		
859	Statistics (NDs = DL)			1.401	1.215	0.0013	-6.707	0.822	-0.123		
860	Statistics (NDs = DL/2)			1.378	1.195	8.9024E-4	-7.109	0.89	-0.125		
861	Statistics (Gamma ROS Estimates)			1.257	1.094	0.00511	-5.496	1.16	-0.211		
862	Statistics (Lognormal ROS Estimates)			--	--	--	-7.364	0.824	-0.112		
863											
864	<b>Normal GOF Test Results</b>										
865											
866				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
867	Correlation Coefficient R			0.915	0.755	0.854	0.966				
868											
869				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
870	Shapiro-Wilk (Detects Only)			0.821	0.818	Data Appear Normal					
871	Shapiro-Wilk (NDs = DL)			0.593	0.901	Data Not Normal					
872	Shapiro-Wilk (NDs = DL/2)			0.736	0.901	Data Not Normal					
873	Shapiro-Wilk (Normal ROS Estimates)			0.936	0.901	Data Appear Normal					
874	Lilliefors (Detects Only)			0.304	0.283	Data Not Normal					
875	Lilliefors (NDs = DL)			0.327	0.197	Data Not Normal					
876	Lilliefors (NDs = DL/2)			0.307	0.197	Data Not Normal					
877	Lilliefors (Normal ROS Estimates)			0.198	0.197	Data Not Normal					
878											
879	<b>Gamma GOF Test Results</b>										
880											
881				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
882	Correlation Coefficient R			0.958	0.916	0.975	0.696				
883											
884				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					

A	B	C	D	E	F	G	H	I	J	K	L	
885	Anderson-Darling (Detects Only)			0.492	0.723							
886	Kolmogorov-Smirnov (Detects Only)			0.27	0.297	Detected Data Appear Gamma Distributed						
887	Anderson-Darling (NDs = DL)			1.431	0.759							
888	Kolmogorov-Smirnov (NDs = DL)			0.32	0.203	Data Not Gamma Distributed						
889	Anderson-Darling (NDs = DL/2)			1.002	0.76							
890	Kolmogorov-Smirnov (NDs = DL/2)			0.228	0.203	Data Not Gamma Distributed						
891	Anderson-Darling (Gamma ROS Estimates)			2.46	0.763							
892	Kolmogorov-Smirnov (Gamma ROS Est.)			0.374	0.203	Data Not Gamma Distributed						
893												
894	<b>Lognormal GOF Test Results</b>											
895												
896				No NDs	NDs = DL	NDs = DL/2	Log ROS					
897	Correlation Coefficient R			0.962	0.935	0.963	0.981					
898												
899				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
900	Shapiro-Wilk (Detects Only)			0.903	0.818	Data Appear Lognormal						
901	Shapiro-Wilk (NDs = DL)			0.873	0.901	Data Not Lognormal						
902	Shapiro-Wilk (NDs = DL/2)			0.918	0.901	Data Appear Lognormal						
903	Shapiro-Wilk (Lognormal ROS Estimates)			0.959	0.901	Data Appear Lognormal						
904	Lilliefors (Detects Only)			0.23	0.283	Data Appear Lognormal						
905	Lilliefors (NDs = DL)			0.281	0.197	Data Not Lognormal						
906	Lilliefors (NDs = DL/2)			0.199	0.197	Data Not Lognormal						
907	Lilliefors (Lognormal ROS Estimates)			0.137	0.197	Data Appear Lognormal						
908												
909	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
910												
911	<b>Chromium (m-62a)</b>											
912												
913				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
914	Raw Statistics			22	3	19	9	10	52.63%			
915												
916				Number	Minimum	Maximum	Mean	Median	SD			
917	Statistics (Non-Detects Only)			10	5.0000E-4	0.01	0.00252	0.001	0.0029			
918	Statistics (Non-Detects Only)			9	6.3000E-4	0.002	0.00123	0.0011	4.5076E-4			
919	Statistics (All: NDs treated as DL value)			19	5.0000E-4	0.01	0.00191	0.001	0.00217			
920	Statistics (All: NDs treated as DL/2 value)			19	2.5000E-4	0.005	0.00125	9.9000E-4	0.00107			
921	Statistics (Normal ROS Imputed Data)			19	1.5639E-4	0.002	9.7867E-4	9.6877E-4	4.4507E-4			
922	Statistics (Gamma ROS Imputed Data)			19	6.3000E-4	0.01	0.00585	0.01	0.00451			
923	Statistics (Lognormal ROS Imputed Data)			19	4.7114E-4	0.002	0.001	9.2946E-4	3.9481E-4			
924												
925				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
926	Statistics (Non-Detects Only)			8.266	5.585	1.4866E-4	-6.763	0.377	-0.0558			
927	Statistics (NDs = DL)			1.736	1.497	0.0011	-6.576	0.712	-0.108			
928	Statistics (NDs = DL/2)			2.13	1.829	5.8465E-4	-6.941	0.71	-0.102			
929	Statistics (Gamma ROS Estimates)			1.169	1.019	0.005	-5.627	1.135	-0.202			
930	Statistics (Lognormal ROS Estimates)			--	--	--	-6.973	0.372	-0.0534			
931												
932	<b>Normal GOF Test Results</b>											
933												
934				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
935	Correlation Coefficient R			0.985	0.737	0.837	0.971					
936												

A	B	C	D	E	F	G	H	I	J	K	L
937				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
938	Shapiro-Wilk (Detects Only)			0.962	0.829	Data Appear Normal					
939	Shapiro-Wilk (NDs = DL)			0.568	0.901	Data Not Normal					
940	Shapiro-Wilk (NDs = DL/2)			0.722	0.901	Data Not Normal					
941	Shapiro-Wilk (Normal ROS Estimates)			0.951	0.901	Data Appear Normal					
942	Lilliefors (Detects Only)			0.168	0.274	Data Appear Normal					
943	Lilliefors (NDs = DL)			0.325	0.197	Data Not Normal					
944	Lilliefors (NDs = DL/2)			0.19	0.197	Data Appear Normal					
945	Lilliefors (Normal ROS Estimates)			0.182	0.197	Data Appear Normal					
946											
947	<b>Gamma GOF Test Results</b>										
948											
949				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
950	Correlation Coefficient R			0.992	0.889	0.935	0.725				
951											
952				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
953	Anderson-Darling (Detects Only)			0.184	0.722						
954	Kolmogorov-Smirnov (Detects Only)			0.135	0.28	Detected Data Appear Gamma Distributed					
955	Anderson-Darling (NDs = DL)			1.591	0.755						
956	Kolmogorov-Smirnov (NDs = DL)			0.234	0.201	Data Not Gamma Distributed					
957	Anderson-Darling (NDs = DL/2)			0.521	0.751						
958	Kolmogorov-Smirnov (NDs = DL/2)			0.135	0.201	Data Appear Gamma Distributed					
959	Anderson-Darling (Gamma ROS Estimates)			2.511	0.765						
960	Kolmogorov-Smirnov (Gamma ROS Est.)			0.352	0.204	Data Not Gamma Distributed					
961											
962	<b>Lognormal GOF Test Results</b>										
963											
964				No NDs	NDs = DL	NDs = DL/2	Log ROS				
965	Correlation Coefficient R			0.992	0.931	0.975	0.982				
966											
967				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
968	Shapiro-Wilk (Detects Only)			0.976	0.829	Data Appear Lognormal					
969	Shapiro-Wilk (NDs = DL)			0.878	0.901	Data Not Lognormal					
970	Shapiro-Wilk (NDs = DL/2)			0.959	0.901	Data Appear Lognormal					
971	Shapiro-Wilk (Lognormal ROS Estimates)			0.965	0.901	Data Appear Lognormal					
972	Lilliefors (Detects Only)			0.139	0.274	Data Appear Lognormal					
973	Lilliefors (NDs = DL)			0.209	0.197	Data Not Lognormal					
974	Lilliefors (NDs = DL/2)			0.139	0.197	Data Appear Lognormal					
975	Lilliefors (Lognormal ROS Estimates)			0.175	0.197	Data Appear Lognormal					
976											
977	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
978											
979	<b>Cobalt (m-56a)</b>										
980											
981				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
982	Raw Statistics			22	3	19	11	8	42.11%		
983											
984				Number	Minimum	Maximum	Mean	Median	SD		
985	Statistics (Non-Detects Only)			8	5.0000E-4	0.002	9.3750E-4	7.5000E-4	5.4756E-4		
986	Statistics (Non-Detects Only)			11	6.1000E-4	0.002	0.00107	0.0012	4.1872E-4		
987	Statistics (All: NDs treated as DL value)			19	5.0000E-4	0.002	0.00102	0.001	4.6773E-4		
988	Statistics (All: NDs treated as DL/2 value)			19	2.5000E-4	0.002	8.1895E-4	7.3000E-4	4.6979E-4		

A	B	C	D	E	F	G	H	I	J	K	L
989	Statistics (Normal ROS Imputed Data)			19	-1.334E-4	0.002	7.7160E-4	7.1884E-4	5.1119E-4		
990	Statistics (Gamma ROS Imputed Data)			19	6.1000E-4	0.01	0.00483	0.0013	0.00454		
991	Statistics (Lognormal ROS Imputed Data)			19	3.3706E-4	0.002	8.4890E-4	7.2901E-4	4.2117E-4		
992											
993				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
994	Statistics (Non-Detects Only)			7.744	5.692	1.3865E-4	-6.903	0.379	-0.0548		
995	Statistics (NDs = DL)			5.197	4.412	1.9554E-4	-6.991	0.46	-0.0658		
996	Statistics (NDs = DL/2)			3.01	2.57	2.7206E-4	-7.283	0.64	-0.0879		
997	Statistics (Gamma ROS Estimates)			0.962	0.845	0.00502	-5.935	1.199	-0.202		
998	Statistics (Lognormal ROS Estimates)			--	--	--	-7.176	0.463	-0.0645		
999											
1000	<b>Normal GOF Test Results</b>										
1001											
1002				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
1003	Correlation Coefficient R			0.928	0.941	0.956	0.974				
1004											
1005				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1006	Shapiro-Wilk (Detects Only)			0.865	0.85	Data Appear Normal					
1007	Shapiro-Wilk (NDs = DL)			0.875	0.901	Data Not Normal					
1008	Shapiro-Wilk (NDs = DL/2)			0.912	0.901	Data Appear Normal					
1009	Shapiro-Wilk (Normal ROS Estimates)			0.955	0.901	Data Appear Normal					
1010	Lilliefors (Detects Only)			0.22	0.251	Data Appear Normal					
1011	Lilliefors (NDs = DL)			0.174	0.197	Data Appear Normal					
1012	Lilliefors (NDs = DL/2)			0.173	0.197	Data Appear Normal					
1013	Lilliefors (Normal ROS Estimates)			0.185	0.197	Data Appear Normal					
1014											
1015	<b>Gamma GOF Test Results</b>										
1016											
1017				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
1018	Correlation Coefficient R			0.952	0.962	0.975	0.778				
1019											
1020				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1021	Anderson-Darling (Detects Only)			0.628	0.73						
1022	Kolmogorov-Smirnov (Detects Only)			0.229	0.256	Detected Data Appear Gamma Distributed					
1023	Anderson-Darling (NDs = DL)			0.696	0.742						
1024	Kolmogorov-Smirnov (NDs = DL)			0.177	0.199	Data Appear Gamma Distributed					
1025	Anderson-Darling (NDs = DL/2)			0.526	0.748						
1026	Kolmogorov-Smirnov (NDs = DL/2)			0.145	0.2	Data Appear Gamma Distributed					
1027	Anderson-Darling (Gamma ROS Estimates)			2.326	0.771						
1028	Kolmogorov-Smirnov (Gamma ROS Est.)			0.293	0.205	Data Not Gamma Distributed					
1029											
1030	<b>Lognormal GOF Test Results</b>										
1031											
1032				No NDs	NDs = DL	NDs = DL/2	Log ROS				
1033	Correlation Coefficient R			0.951	0.961	0.959	0.976				
1034											
1035				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1036	Shapiro-Wilk (Detects Only)			0.898	0.85	Data Appear Lognormal					
1037	Shapiro-Wilk (NDs = DL)			0.906	0.901	Data Appear Lognormal					
1038	Shapiro-Wilk (NDs = DL/2)			0.907	0.901	Data Appear Lognormal					
1039	Shapiro-Wilk (Lognormal ROS Estimates)			0.953	0.901	Data Appear Lognormal					
1040	Lilliefors (Detects Only)			0.226	0.251	Data Appear Lognormal					

A	B	C	D	E	F	G	H	I	J	K	L
1041	Lilliefors (NDs = DL)			0.192	0.197	Data Appear Lognormal					
1042	Lilliefors (NDs = DL/2)			0.153	0.197	Data Appear Lognormal					
1043	Lilliefors (Lognormal ROS Estimates)			0.178	0.197	Data Appear Lognormal					
1044											
1045	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
1046											
1047	<b>Cobalt (m-57a)</b>										
1048											
1049				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
1050	Raw Statistics			22	3	19	17	2	10.53%		
1051											
1052				Number	Minimum	Maximum	Mean	Median	SD		
1053	Statistics (Non-Detects Only)			2	0.004	0.005	0.0045	0.0045	7.0711E-4		
1054	Statistics (Non-Detects Only)			17	0.0049	0.0088	0.00728	0.0077	0.00128		
1055	Statistics (All: NDs treated as DL value)			19	0.004	0.0088	0.00698	0.0076	0.0015		
1056	Statistics (All: NDs treated as DL/2 value)			19	0.002	0.0088	0.00675	0.0076	0.00199		
1057	Statistics (Normal ROS Imputed Data)			19	0.00427	0.0088	0.00699	0.0076	0.00148		
1058	Statistics (Gamma ROS Imputed Data)			19	0.0049	0.01	0.00756	0.0077	0.00148		
1059	Statistics (Lognormal ROS Imputed Data)			19	0.00462	0.0088	0.00702	0.0076	0.00143		
1060											
1061				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
1062	Statistics (Non-Detects Only)			31.18	25.71	2.3340E-4	-4.939	0.19	-0.0385		
1063	Statistics (NDs = DL)			20.43	17.24	3.4184E-4	-4.989	0.236	-0.0473		
1064	Statistics (NDs = DL/2)			8.083	6.841	8.3481E-4	-5.062	0.41	-0.081		
1065	Statistics (Gamma ROS Estimates)			25.67	21.65	2.9459E-4	-4.904	0.208	-0.0424		
1066	Statistics (Lognormal ROS Estimates)			--	--	--	-4.981	0.219	-0.0441		
1067											
1068	<b>Normal GOF Test Results</b>										
1069											
1070				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
1071	Correlation Coefficient R			0.955	0.958	0.926	0.957				
1072											
1073				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1074	Shapiro-Wilk (Detects Only)			0.896	0.892	Data Appear Normal					
1075	Shapiro-Wilk (NDs = DL)			0.904	0.901	Data Appear Normal					
1076	Shapiro-Wilk (NDs = DL/2)			0.853	0.901	Data Not Normal					
1077	Shapiro-Wilk (Normal ROS Estimates)			0.898	0.901	Data Not Normal					
1078	Lilliefors (Detects Only)			0.217	0.207	Data Not Normal					
1079	Lilliefors (NDs = DL)			0.214	0.197	Data Not Normal					
1080	Lilliefors (NDs = DL/2)			0.226	0.197	Data Not Normal					
1081	Lilliefors (Normal ROS Estimates)			0.214	0.197	Data Not Normal					
1082											
1083	<b>Gamma GOF Test Results</b>										
1084											
1085				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
1086	Correlation Coefficient R			0.934	0.933	0.864	0.969				
1087											
1088				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1089	Anderson-Darling (Detects Only)			0.849	0.737	Data Not Gamma Distributed					
1090	Kolmogorov-Smirnov (Detects Only)			0.238	0.209	Data Not Gamma Distributed					
1091	Anderson-Darling (NDs = DL)			0.891	0.74	Data Not Gamma Distributed					
1092	Kolmogorov-Smirnov (NDs = DL)			0.234	0.198	Data Not Gamma Distributed					

A	B	C	D	E	F	G	H	I	J	K	L	
1093	Anderson-Darling (NDs = DL/2)			1.542	0.742							
1094	Kolmogorov-Smirnov (NDs = DL/2)			0.243	0.199	Data Not Gamma Distributed						
1095	Anderson-Darling (Gamma ROS Estimates)			0.533	0.74							
1096	Kolmogorov-Smirnov (Gamma ROS Est.)			0.194	0.198	Data Appear Gamma Distributed						
1097												
1098	<b>Lognormal GOF Test Results</b>											
1099												
1100				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1101	Correlation Coefficient R			0.939	0.942	0.855	0.943					
1102												
1103				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1104	Shapiro-Wilk (Detects Only)			0.868	0.892	Data Not Lognormal						
1105	Shapiro-Wilk (NDs = DL)			0.879	0.901	Data Not Lognormal						
1106	Shapiro-Wilk (NDs = DL/2)			0.737	0.901	Data Not Lognormal						
1107	Shapiro-Wilk (Lognormal ROS Estimates)			0.87	0.901	Data Not Lognormal						
1108	Lilliefors (Detects Only)			0.243	0.207	Data Not Lognormal						
1109	Lilliefors (NDs = DL)			0.237	0.197	Data Not Lognormal						
1110	Lilliefors (NDs = DL/2)			0.239	0.197	Data Not Lognormal						
1111	Lilliefors (Lognormal ROS Estimates)			0.235	0.197	Data Not Lognormal						
1112												
1113	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1114												
1115	<b>Cobalt (m-58a)</b>											
1116												
1117				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1118	Raw Statistics			22	3	19	6	13	68.42%			
1119												
1120				Number	Minimum	Maximum	Mean	Median	SD			
1121	Statistics (Non-Detects Only)			13	5.0000E-4	0.01	0.00138	5.0000E-4	0.00262			
1122	Statistics (Non-Detects Only)			6	5.1000E-4	0.0011	8.2333E-4	8.8000E-4	2.4196E-4			
1123	Statistics (All: NDs treated as DL value)			19	5.0000E-4	0.01	0.00121	5.0000E-4	0.00216			
1124	Statistics (All: NDs treated as DL/2 value)			19	2.5000E-4	0.005	7.3368E-4	2.5000E-4	0.00108			
1125	Statistics (Normal ROS Imputed Data)			19	-3.272E-4	0.0011	3.8371E-4	3.7699E-4	3.8592E-4			
1126	Statistics (Gamma ROS Imputed Data)			19	5.1000E-4	0.01	0.0071	0.01	0.00438			
1127	Statistics (Lognormal ROS Imputed Data)			19	1.8273E-4	0.0011	5.0845E-4	4.4806E-4	2.6647E-4			
1128												
1129				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1130	Statistics (Non-Detects Only)			12.67	6.444	6.5004E-5	-7.142	0.318	-0.0445			
1131	Statistics (NDs = DL)			1.204	1.049	0.001	-7.189	0.742	-0.103			
1132	Statistics (NDs = DL/2)			1.262	1.098	5.8121E-4	-7.663	0.826	-0.108			
1133	Statistics (Gamma ROS Estimates)			1.229	1.07	0.00578	-5.406	1.223	-0.226			
1134	Statistics (Lognormal ROS Estimates)			--	--	--	-7.702	0.493	-0.064			
1135												
1136	<b>Normal GOF Test Results</b>											
1137												
1138				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1139	Correlation Coefficient R			0.965	0.573	0.666	0.986					
1140												
1141				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1142	Shapiro-Wilk (Detects Only)			0.909	0.788	Data Appear Normal						
1143	Shapiro-Wilk (NDs = DL)			0.357	0.901	Data Not Normal						
1144	Shapiro-Wilk (NDs = DL/2)			0.471	0.901	Data Not Normal						

A	B	C	D	E	F	G	H	I	J	K	L
1145	Shapiro-Wilk (Normal ROS Estimates)			0.969	0.901	Data Appear Normal					
1146	Lilliefors (Detects Only)			0.228	0.325	Data Appear Normal					
1147	Lilliefors (NDs = DL)			0.415	0.197	Data Not Normal					
1148	Lilliefors (NDs = DL/2)			0.327	0.197	Data Not Normal					
1149	Lilliefors (Normal ROS Estimates)			0.12	0.197	Data Appear Normal					
1150											
1151	<b>Gamma GOF Test Results</b>										
1152											
1153				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
1154	Correlation Coefficient R			0.944	0.781	0.847	0.603				
1155											
1156				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1157	Anderson-Darling (Detects Only)			0.407	0.698						
1158	Kolmogorov-Smirnov (Detects Only)			0.256	0.332	Detected Data Appear Gamma Distributed					
1159	Anderson-Darling (NDs = DL)			3.543	0.764						
1160	Kolmogorov-Smirnov (NDs = DL)			0.312	0.203	Data Not Gamma Distributed					
1161	Anderson-Darling (NDs = DL/2)			2.037	0.763						
1162	Kolmogorov-Smirnov (NDs = DL/2)			0.287	0.203	Data Not Gamma Distributed					
1163	Anderson-Darling (Gamma ROS Estimates)			3.767	0.764						
1164	Kolmogorov-Smirnov (Gamma ROS Est.)			0.442	0.203	Data Not Gamma Distributed					
1165											
1166	<b>Lognormal GOF Test Results</b>										
1167											
1168				No NDs	NDs = DL	NDs = DL/2	Log ROS				
1169	Correlation Coefficient R			0.954	0.777	0.875	0.983				
1170											
1171				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1172	Shapiro-Wilk (Detects Only)			0.888	0.788	Data Appear Lognormal					
1173	Shapiro-Wilk (NDs = DL)			0.621	0.901	Data Not Lognormal					
1174	Shapiro-Wilk (NDs = DL/2)			0.767	0.901	Data Not Lognormal					
1175	Shapiro-Wilk (Lognormal ROS Estimates)			0.961	0.901	Data Appear Lognormal					
1176	Lilliefors (Detects Only)			0.239	0.325	Data Appear Lognormal					
1177	Lilliefors (NDs = DL)			0.289	0.197	Data Not Lognormal					
1178	Lilliefors (NDs = DL/2)			0.304	0.197	Data Not Lognormal					
1179	Lilliefors (Lognormal ROS Estimates)			0.14	0.197	Data Appear Lognormal					
1180											
1181	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
1182											
1183	<b>Cobalt (m-62a)</b>										
1184											
1185				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
1186	Raw Statistics			22	3	19	4	15	78.95%		
1187											
1188				Number	Minimum	Maximum	Mean	Median	SD		
1189	Statistics (Non-Detects Only)			15	5.0000E-4	0.002	6.6667E-4	5.0000E-4	4.0825E-4		
1190	Statistics (Non-Detects Only)			4	4.6000E-4	0.0022	0.0011	8.7000E-4	8.0482E-4		
1191	Statistics (All: NDs treated as DL value)			19	4.6000E-4	0.0022	7.5789E-4	5.0000E-4	5.2012E-4		
1192	Statistics (All: NDs treated as DL/2 value)			19	2.5000E-4	0.0022	4.9474E-4	2.5000E-4	4.9344E-4		
1193	Statistics (Normal ROS Imputed Data)			19	-7.466E-4	0.0022	3.6716E-4	3.6380E-4	6.4642E-4		
1194	Statistics (Gamma ROS Imputed Data)			19	4.6000E-4	0.01	0.00813	0.01	0.00374		
1195	Statistics (Lognormal ROS Imputed Data)			19	1.5347E-4	0.0022	5.4846E-4	4.4456E-4	4.6223E-4		
1196											



A	B	C	D	E	F	G	H	I	J	K	L
1197				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
1198	Statistics (Non-Detects Only)			2.645	0.828	4.1589E-4	-7.013	0.729	-0.104		
1199	Statistics (NDs = DL)			3.576	3.046	2.1194E-4	-7.331	0.499	-0.068		
1200	Statistics (NDs = DL/2)			2.024	1.739	2.4449E-4	-7.878	0.656	-0.0833		
1201	Statistics (Gamma ROS Estimates)			1.818	1.566	0.00447	-5.112	1.052	-0.206		
1202	Statistics (Lognormal ROS Estimates)			--	--	--	-7.715	0.611	-0.0791		
1203											
1204	<b>Normal GOF Test Results</b>										
1205											
1206				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
1207	Correlation Coefficient R			0.941	0.762	0.747	0.957				
1208											
1209				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1210	Shapiro-Wilk (Detects Only)			0.878	0.748	Data Appear Normal					
1211	Shapiro-Wilk (NDs = DL)			0.587	0.901	Data Not Normal					
1212	Shapiro-Wilk (NDs = DL/2)			0.576	0.901	Data Not Normal					
1213	Shapiro-Wilk (Normal ROS Estimates)			0.934	0.901	Data Appear Normal					
1214	Lilliefors (Detects Only)			0.257	0.375	Data Appear Normal					
1215	Lilliefors (NDs = DL)			0.399	0.197	Data Not Normal					
1216	Lilliefors (NDs = DL/2)			0.322	0.197	Data Not Normal					
1217	Lilliefors (Normal ROS Estimates)			0.15	0.197	Data Appear Normal					
1218											
1219	<b>Gamma GOF Test Results</b>										
1220											
1221				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
1222	Correlation Coefficient R			0.993	0.873	0.9	0.541				
1223											
1224				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1225	Anderson-Darling (Detects Only)			0.346	0.66						
1226	Kolmogorov-Smirnov (Detects Only)			0.293	0.397	Detected Data Appear Gamma Distributed					
1227	Anderson-Darling (NDs = DL)			3.437	0.746						
1228	Kolmogorov-Smirnov (NDs = DL)			0.401	0.2	Data Not Gamma Distributed					
1229	Anderson-Darling (NDs = DL/2)			2.746	0.752						
1230	Kolmogorov-Smirnov (NDs = DL/2)			0.366	0.201	Data Not Gamma Distributed					
1231	Anderson-Darling (Gamma ROS Estimates)			4.663	0.754						
1232	Kolmogorov-Smirnov (Gamma ROS Est.)			0.493	0.201	Data Not Gamma Distributed					
1233											
1234	<b>Lognormal GOF Test Results</b>										
1235											
1236				No NDs	NDs = DL	NDs = DL/2	Log ROS				
1237	Correlation Coefficient R			0.966	0.799	0.835	0.969				
1238											
1239				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1240	Shapiro-Wilk (Detects Only)			0.918	0.748	Data Appear Lognormal					
1241	Shapiro-Wilk (NDs = DL)			0.639	0.901	Data Not Lognormal					
1242	Shapiro-Wilk (NDs = DL/2)			0.697	0.901	Data Not Lognormal					
1243	Shapiro-Wilk (Lognormal ROS Estimates)			0.951	0.901	Data Appear Lognormal					
1244	Lilliefors (Detects Only)			0.258	0.375	Data Appear Lognormal					
1245	Lilliefors (NDs = DL)			0.39	0.197	Data Not Lognormal					
1246	Lilliefors (NDs = DL/2)			0.368	0.197	Data Not Lognormal					
1247	Lilliefors (Lognormal ROS Estimates)			0.148	0.197	Data Appear Lognormal					
1248											

A	B	C	D	E	F	G	H	I	J	K	L
1249	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
1250											
1251	<b>Fluoride (m-56a)</b>										
1252											
1253			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1254	Raw Statistics		22	3	19	8	11	57.89%			
1255											
1256			Number	Minimum	Maximum	Mean	Median	SD			
1257	Statistics (Non-Detects Only)		11	0.4	0.8	0.473	0.4	0.162			
1258	Statistics (Non-Detects Only)		8	0.4	0.49	0.435	0.425	0.0342			
1259	Statistics (All: NDs treated as DL value)		19	0.4	0.8	0.457	0.4	0.124			
1260	Statistics (All: NDs treated as DL/2 value)		19	0.2	0.49	0.32	0.4	0.119			
1261	Statistics (Normal ROS Imputed Data)		19	0.266	0.49	0.379	0.375	0.0612			
1262	Statistics (Gamma ROS Imputed Data)		19	0.276	0.49	0.381	0.376	0.0587			
1263	Statistics (Lognormal ROS Imputed Data)		19	0.295	0.49	0.386	0.379	0.0536			
1264											
1265			K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1266	Statistics (Non-Detects Only)		188.2	117.7	0.00231	-0.835	0.0776	-0.0929			
1267	Statistics (NDs = DL)		19.61	16.55	0.0233	-0.809	0.216	-0.267			
1268	Statistics (NDs = DL/2)		7.206	6.103	0.0444	-1.21	0.393	-0.324			
1269	Statistics (Gamma ROS Estimates)		44	37.09	0.00867	-0.976	0.156	-0.16			
1270	Statistics (Lognormal ROS Estimates)		--	--	--	-0.962	0.139	-0.144			
1271											
1272	<b>Normal GOF Test Results</b>										
1273											
1274			No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1275	Correlation Coefficient R		0.96	0.707	0.883	0.996					
1276											
1277			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1278	Shapiro-Wilk (Detects Only)		0.9	0.818	Data Appear Normal						
1279	Shapiro-Wilk (NDs = DL)		0.509	0.901	Data Not Normal						
1280	Shapiro-Wilk (NDs = DL/2)		0.756	0.901	Data Not Normal						
1281	Shapiro-Wilk (Normal ROS Estimates)		0.985	0.901	Data Appear Normal						
1282	Lilliefors (Detects Only)		0.183	0.283	Data Appear Normal						
1283	Lilliefors (NDs = DL)		0.323	0.197	Data Not Normal						
1284	Lilliefors (NDs = DL/2)		0.316	0.197	Data Not Normal						
1285	Lilliefors (Normal ROS Estimates)		0.107	0.197	Data Appear Normal						
1286											
1287	<b>Gamma GOF Test Results</b>										
1288											
1289			No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
1290	Correlation Coefficient R		0.963	0.763	0.881	0.994					
1291											
1292			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1293	Anderson-Darling (Detects Only)		0.405	0.715							
1294	Kolmogorov-Smirnov (Detects Only)		0.178	0.294	Detected Data Appear Gamma Distributed						
1295	Anderson-Darling (NDs = DL)		3.806	0.74							
1296	Kolmogorov-Smirnov (NDs = DL)		0.312	0.198	Data Not Gamma Distributed						
1297	Anderson-Darling (NDs = DL/2)		2.468	0.742							
1298	Kolmogorov-Smirnov (NDs = DL/2)		0.325	0.199	Data Not Gamma Distributed						
1299	Anderson-Darling (Gamma ROS Estimates)		0.139	0.74							
1300	Kolmogorov-Smirnov (Gamma ROS Est.)		0.118	0.198	Data Appear Gamma Distributed						

A	B	C	D	E	F	G	H	I	J	K	L	
1301												
1302	<b>Lognormal GOF Test Results</b>											
1303												
1304				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1305	Correlation Coefficient R			0.962	0.74	0.866	0.996					
1306												
1307				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1308	Shapiro-Wilk (Detects Only)			0.904	0.818	Data Appear Lognormal						
1309	Shapiro-Wilk (NDs = DL)			0.553	0.901	Data Not Lognormal						
1310	Shapiro-Wilk (NDs = DL/2)			0.725	0.901	Data Not Lognormal						
1311	Shapiro-Wilk (Lognormal ROS Estimates)			0.985	0.901	Data Appear Lognormal						
1312	Lilliefors (Detects Only)			0.171	0.283	Data Appear Lognormal						
1313	Lilliefors (NDs = DL)			0.31	0.197	Data Not Lognormal						
1314	Lilliefors (NDs = DL/2)			0.319	0.197	Data Not Lognormal						
1315	Lilliefors (Lognormal ROS Estimates)			0.102	0.197	Data Appear Lognormal						
1316												
1317	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1318												
1319	<b>Fluoride (m-57a)</b>											
1320												
1321				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1322	Raw Statistics			22	3	19	2	17	89.47%			
1323												
1324				Number	Minimum	Maximum	Mean	Median	SD			
1325	Statistics (Non-Detects Only)			17	0.4	0.8	0.431	0.4	0.1			
1326	Statistics (Non-Detects Only)			2	0.42	0.53	0.475	0.475	0.0778			
1327	Statistics (All: NDs treated as DL value)			19	0.4	0.8	0.436	0.4	0.0971			
1328	Statistics (All: NDs treated as DL/2 value)			19	0.2	0.53	0.243	0.2	0.0962			
1329	Statistics (Normal ROS Imputed Data)			19	-0.181	0.53	0.145	0.141	0.178			
1330	Statistics (Gamma ROS Imputed Data)			19	N/A	N/A	N/A	N/A	N/A			
1331	Statistics (Lognormal ROS Imputed Data)			19	0.118	0.53	0.252	0.233	0.101			
1332												
1333				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1334	Statistics (Non-Detects Only)			N/A	N/A	N/A	N/A	N/A	N/A			
1335	Statistics (NDs = DL)			29.54	24.91	0.0148	-0.848	0.175	-0.207			
1336	Statistics (NDs = DL/2)			9.656	8.166	0.0252	-1.468	0.305	-0.208			
1337	Statistics (Gamma ROS Estimates)			N/A	N/A	N/A	N/A	N/A	N/A			
1338	Statistics (Lognormal ROS Estimates)			--	--	--	-1.448	0.376	-0.26			
1339												
1340	<b>Normal GOF Test Results</b>											
1341												
1342				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1343	Correlation Coefficient R			1	0.641	0.714	0.995					
1344												
1345				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1346	Shapiro-Wilk (NDs = DL)			0.435	0.901	Data Not Normal						
1347	Shapiro-Wilk (NDs = DL/2)			0.52	0.901	Data Not Normal						
1348	Shapiro-Wilk (Normal ROS Estimates)			0.991	0.901	Data Appear Normal						
1349	Lilliefors (Detects Only)			N/A	N/A							
1350	Lilliefors (NDs = DL)			0.433	0.197	Data Not Normal						
1351	Lilliefors (NDs = DL/2)			0.462	0.197	Data Not Normal						
1352	Lilliefors (Normal ROS Estimates)			0.0867	0.197	Data Appear Normal						

A	B	C	D	E	F	G	H	I	J	K	L
1353											
1354	<b>Gamma GOF Test Results</b>										
1355											
1356		No NDs	NDs = DL	NDs = DL/2	Gamma ROS						
1357	Correlation Coefficient R	N/A	0.695	0.793	0.984						
1358											
1359		Test value	Crit. (0.05)	Conclusion with Alpha(0.05)							
1360	Anderson-Darling (Detects Only)	N/A	N/A								
1361	Kolmogorov-Smirnov (Detects Only)	N/A	N/A								
1362	Anderson-Darling (NDs = DL)	4.659	0.74								
1363	Kolmogorov-Smirnov (NDs = DL)	0.444	0.198	Data Not Gamma Distributed							
1364	Anderson-Darling (NDs = DL/2)	4.519	0.741								
1365	Kolmogorov-Smirnov (NDs = DL/2)	0.472	0.199	Data Not Gamma Distributed							
1366	Anderson-Darling (Gamma ROS Estimates)	N/A	0.738								
1367	Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.198								
1368											
1369	<b>Lognormal GOF Test Results</b>										
1370											
1371		No NDs	NDs = DL	NDs = DL/2	Log ROS						
1372	Correlation Coefficient R	1	0.666	0.724	N/A						
1373											
1374		Test value	Crit. (0.05)	Conclusion with Alpha(0.05)							
1375	Shapiro-Wilk (NDs = DL)	0.465	0.901	Data Not Lognormal							
1376	Shapiro-Wilk (NDs = DL/2)	0.531	0.901	Data Not Lognormal							
1377	Shapiro-Wilk (Lognormal ROS Estimates)	0.991	0.901	Data Appear Lognormal							
1378	Lilliefors (Detects Only)	N/A	N/A								
1379	Lilliefors (NDs = DL)	0.442	0.197	Data Not Lognormal							
1380	Lilliefors (NDs = DL/2)	0.468	0.197	Data Not Lognormal							
1381	Lilliefors (Lognormal ROS Estimates)	0.0867	0.197	Data Appear Lognormal							
1382											
1383	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
1384											
1385	<b>Fluoride (m-58a)</b>										
1386											
1387		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
1388	Raw Statistics	22	3	19	1	18	94.74%				
1389											
1390	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>										
1391	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>										
1392											
1393	<b>The data set for variable Fluoride (m-58a) was not processed!</b>										
1394											
1395											
1396											
1397	<b>Fluoride (m-62a)</b>										
1398											
1399		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
1400	Raw Statistics	22	3	19	1	18	94.74%				
1401											
1402	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>										
1403	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>										
1404											

A	B	C	D	E	F	G	H	I	J	K	L
1405	The data set for variable Fluoride (m-62a) was not processed!										
1406											
1407											
1408											
1409	Lead (m-56a)										
1410											
1411			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1412	Raw Statistics		22	6	16	0	16	100.00%			
1413											
1414	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!										
1415	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!										
1416	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).										
1417											
1418	The data set for variable Lead (m-56a) was not processed!										
1419											
1420											
1421											
1422	Lead (m-57a)										
1423											
1424			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1425	Raw Statistics		22	6	16	2	14	87.50%			
1426											
1427			Number	Minimum	Maximum	Mean	Median	SD			
1428	Statistics (Non-Detects Only)		14	5.0000E-4	0.01	0.00136	5.0000E-4	0.00252			
1429	Statistics (Non-Detects Only)		2	2.1000E-4	8.6000E-4	5.3500E-4	5.3500E-4	4.5962E-4			
1430	Statistics (All: NDs treated as DL value)		16	2.1000E-4	0.01	0.00125	5.0000E-4	0.00237			
1431	Statistics (All: NDs treated as DL/2 value)		16	2.1000E-4	0.005	6.6063E-4	2.5000E-4	0.00118			
1432	Statistics (Normal ROS Imputed Data)		16	-2.425E-4	8.6000E-4	2.5244E-4	2.4704E-4	2.6695E-4			
1433	Statistics (Gamma ROS Imputed Data)		16	N/A	N/A	N/A	N/A	N/A			
1434	Statistics (Lognormal ROS Imputed Data)		16	7.8700E-5	8.6000E-4	2.7232E-4	2.2757E-4	1.8738E-4			
1435											
1436			K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1437	Statistics (Non-Detects Only)		N/A	N/A	N/A	N/A	N/A	N/A			
1438	Statistics (NDs = DL)		0.996	0.851	0.00126	-7.261	0.858	-0.118			
1439	Statistics (NDs = DL/2)		1.053	0.897	6.2736E-4	-7.867	0.837	-0.106			
1440	Statistics (Gamma ROS Estimates)		N/A	N/A	N/A	N/A	N/A	N/A			
1441	Statistics (Lognormal ROS Estimates)		--	--	--	-8.376	0.579	-0.0691			
1442											
1443	Normal GOF Test Results										
1444											
1445			No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1446	Correlation Coefficient R		1	0.598	0.612	0.985					
1447											
1448			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1449	Shapiro-Wilk (NDs = DL)		0.389	0.887	Data Not Normal						
1450	Shapiro-Wilk (NDs = DL/2)		0.404	0.887	Data Not Normal						
1451	Shapiro-Wilk (Normal ROS Estimates)		0.98	0.887	Data Appear Normal						
1452	Lilliefors (Detects Only)		N/A	N/A							
1453	Lilliefors (NDs = DL)		0.418	0.213	Data Not Normal						
1454	Lilliefors (NDs = DL/2)		0.367	0.213	Data Not Normal						
1455	Lilliefors (Normal ROS Estimates)		0.133	0.213	Data Appear Normal						
1456											

A	B	C	D	E	F	G	H	I	J	K	L	
1457	<b>Gamma GOF Test Results</b>											
1458												
1459				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
1460	Correlation Coefficient R			N/A	0.816	0.828	0.437					
1461												
1462				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1463	Anderson-Darling (Detects Only)			N/A	N/A							
1464	Kolmogorov-Smirnov (Detects Only)			N/A	N/A							
1465	Anderson-Darling (NDs = DL)			2.908	0.763							
1466	Kolmogorov-Smirnov (NDs = DL)			0.358	0.221	Data Not Gamma Distributed						
1467	Anderson-Darling (NDs = DL/2)			2.974	0.762							
1468	Kolmogorov-Smirnov (NDs = DL/2)			0.383	0.221	Data Not Gamma Distributed						
1469	Anderson-Darling (Gamma ROS Estimates)			N/A	0.736							
1470	Kolmogorov-Smirnov (Gamma ROS Est.)			N/A	0.214							
1471												
1472	<b>Lognormal GOF Test Results</b>											
1473												
1474				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1475	Correlation Coefficient R			1	0.822	0.793	N/A					
1476												
1477				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1478	Shapiro-Wilk (NDs = DL)			0.708	0.887	Data Not Lognormal						
1479	Shapiro-Wilk (NDs = DL/2)			0.646	0.887	Data Not Lognormal						
1480	Shapiro-Wilk (Lognormal ROS Estimates)			0.98	0.887	Data Appear Lognormal						
1481	Lilliefors (Detects Only)			N/A	N/A							
1482	Lilliefors (NDs = DL)			0.342	0.213	Data Not Lognormal						
1483	Lilliefors (NDs = DL/2)			0.383	0.213	Data Not Lognormal						
1484	Lilliefors (Lognormal ROS Estimates)			0.133	0.213	Data Appear Lognormal						
1485												
1486	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1487												
1488	<b>Lead (m-58a)</b>											
1489												
1490				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1491	Raw Statistics			22	6	16	4	12	75.00%			
1492												
1493				Number	Minimum	Maximum	Mean	Median	SD			
1494	Statistics (Non-Detects Only)			12	1.0000E-4	0.01	0.00143	5.0000E-4	0.00274			
1495	Statistics (Non-Detects Only)			4	5.6000E-4	0.0011	7.5750E-4	6.8500E-4	2.4824E-4			
1496	Statistics (All: NDs treated as DL value)			16	1.0000E-4	0.01	0.00126	5.0000E-4	0.00237			
1497	Statistics (All: NDs treated as DL/2 value)			16	5.0000E-5	0.005	7.2375E-4	2.5000E-4	0.00118			
1498	Statistics (Normal ROS Imputed Data)			16	-5.357E-4	0.0011	1.9835E-4	1.6326E-4	4.1374E-4			
1499	Statistics (Gamma ROS Imputed Data)			16	5.6000E-4	0.01	0.00769	0.01	0.00413			
1500	Statistics (Lognormal ROS Imputed Data)			16	1.4666E-4	0.0011	4.1567E-4	3.4922E-4	2.4305E-4			
1501												
1502				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1503	Statistics (Non-Detects Only)			13.53	3.548	5.6000E-5	-7.223	0.31	-0.0429			
1504	Statistics (NDs = DL)			0.95	0.813	0.00133	-7.29	0.941	-0.129			
1505	Statistics (NDs = DL/2)			0.998	0.852	7.2529E-4	-7.81	1.003	-0.128			
1506	Statistics (Gamma ROS Estimates)			1.42	1.196	0.00541	-5.26	1.179	-0.224			
1507	Statistics (Lognormal ROS Estimates)			--	--	--	-7.917	0.514	-0.0649			
1508												

A	B	C	D	E	F	G	H	I	J	K	L	
1509	<b>Normal GOF Test Results</b>											
1510												
1511				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1512	Correlation Coefficient R			0.94	0.606	0.671	0.985					
1513												
1514				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1515	Shapiro-Wilk (Detects Only)			0.878	0.748	Data Appear Normal						
1516	Shapiro-Wilk (NDs = DL)			0.4	0.887	Data Not Normal						
1517	Shapiro-Wilk (NDs = DL/2)			0.482	0.887	Data Not Normal						
1518	Shapiro-Wilk (Normal ROS Estimates)			0.976	0.887	Data Appear Normal						
1519	Lilliefors (Detects Only)			0.25	0.375	Data Appear Normal						
1520	Lilliefors (NDs = DL)			0.402	0.213	Data Not Normal						
1521	Lilliefors (NDs = DL/2)			0.312	0.213	Data Not Normal						
1522	Lilliefors (Normal ROS Estimates)			0.148	0.213	Data Appear Normal						
1523												
1524	<b>Gamma GOF Test Results</b>											
1525												
1526				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
1527	Correlation Coefficient R			0.975	0.825	0.867	0.557					
1528												
1529				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1530	Anderson-Darling (Detects Only)			0.366	0.657							
1531	Kolmogorov-Smirnov (Detects Only)			0.285	0.395	Detected Data Appear Gamma Distributed						
1532	Anderson-Darling (NDs = DL)			2.52	0.766							
1533	Kolmogorov-Smirnov (NDs = DL)			0.303	0.222	Data Not Gamma Distributed						
1534	Anderson-Darling (NDs = DL/2)			1.492	0.763							
1535	Kolmogorov-Smirnov (NDs = DL/2)			0.27	0.221	Data Not Gamma Distributed						
1536	Anderson-Darling (Gamma ROS Estimates)			3.752	0.756							
1537	Kolmogorov-Smirnov (Gamma ROS Est.)			0.477	0.219	Data Not Gamma Distributed						
1538												
1539	<b>Lognormal GOF Test Results</b>											
1540												
1541				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1542	Correlation Coefficient R			0.956	0.857	0.92	0.985					
1543												
1544				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1545	Shapiro-Wilk (Detects Only)			0.905	0.748	Data Appear Lognormal						
1546	Shapiro-Wilk (NDs = DL)			0.774	0.887	Data Not Lognormal						
1547	Shapiro-Wilk (NDs = DL/2)			0.874	0.887	Data Not Lognormal						
1548	Shapiro-Wilk (Lognormal ROS Estimates)			0.976	0.887	Data Appear Lognormal						
1549	Lilliefors (Detects Only)			0.254	0.375	Data Appear Lognormal						
1550	Lilliefors (NDs = DL)			0.308	0.213	Data Not Lognormal						
1551	Lilliefors (NDs = DL/2)			0.252	0.213	Data Not Lognormal						
1552	Lilliefors (Lognormal ROS Estimates)			0.148	0.213	Data Appear Lognormal						
1553												
1554	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1555												
1556	<b>Lead (m-62a)</b>											
1557												
1558				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1559	Raw Statistics			22	6	16	0	16	100.00%			
1560												

A	B	C	D	E	F	G	H	I	J	K	L
1561	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1562	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1563	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1564											
1565	<b>The data set for variable Lead (m-62a) was not processed!</b>										
1566											
1567											
1568											
1569	<b>Lithium (m-56a)</b>										
1570											
1571			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1572	Raw Statistics	22	5	17	0	17	100.00%				
1573											
1574	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1575	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1576	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1577											
1578	<b>The data set for variable Lithium (m-56a) was not processed!</b>										
1579											
1580											
1581											
1582	<b>Lithium (m-57a)</b>										
1583											
1584			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1585	Raw Statistics	22	5	17	0	17	100.00%				
1586											
1587	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1588	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1589	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1590											
1591	<b>The data set for variable Lithium (m-57a) was not processed!</b>										
1592											
1593											
1594											
1595	<b>Lithium (m-58a)</b>										
1596											
1597			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1598	Raw Statistics	22	5	17	0	17	100.00%				
1599											
1600	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1601	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1602	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1603											
1604	<b>The data set for variable Lithium (m-58a) was not processed!</b>										
1605											
1606											
1607											
1608	<b>Lithium (m-62a)</b>										
1609											
1610			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1611	Raw Statistics	22	5	17	0	17	100.00%				
1612											



A	B	C	D	E	F	G	H	I	J	K	L
1613	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1614	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1615	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1616											
1617	<b>The data set for variable Lithium (m-62a) was not processed!</b>										
1618											
1619											
1620											
1621	<b>Mercury (m-56a)</b>										
1622											
1623		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
1624	Raw Statistics	22	6	16	0	16	100.00%				
1625											
1626	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1627	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1628	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1629											
1630	<b>The data set for variable Mercury (m-56a) was not processed!</b>										
1631											
1632											
1633											
1634	<b>Mercury (m-57a)</b>										
1635											
1636		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
1637	Raw Statistics	22	6	16	0	16	100.00%				
1638											
1639	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1640	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1641	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1642											
1643	<b>The data set for variable Mercury (m-57a) was not processed!</b>										
1644											
1645											
1646											
1647	<b>Mercury (m-58a)</b>										
1648											
1649		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
1650	Raw Statistics	22	6	16	0	16	100.00%				
1651											
1652	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1653	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1654	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1655											
1656	<b>The data set for variable Mercury (m-58a) was not processed!</b>										
1657											
1658											
1659											
1660	<b>Mercury (m-62a)</b>										
1661											
1662		Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs				
1663	Raw Statistics	22	6	16	0	16	100.00%				
1664											

A	B	C	D	E	F	G	H	I	J	K	L
1665	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>										
1666	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>										
1667	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>										
1668											
1669	<b>The data set for variable Mercury (m-62a) was not processed!</b>										
1670											
1671											
1672											
1673	<b>Molybdenum (m-56a)</b>										
1674											
1675			Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1676	Raw Statistics		22	3	19	17	2	10.53%			
1677											
1678			Number	Minimum	Maximum	Mean	Median	SD			
1679	Statistics (Non-Detects Only)		2	0.011	0.014	0.0125	0.0125	0.00212			
1680	Statistics (Non-Detects Only)		17	0.0057	0.029	0.0129	0.011	0.00619			
1681	Statistics (All: NDs treated as DL value)		19	0.0057	0.029	0.0129	0.011	0.00585			
1682	Statistics (All: NDs treated as DL/2 value)		19	0.0055	0.029	0.0122	0.0098	0.0062			
1683	Statistics (Normal ROS Imputed Data)		19	0.0057	0.029	0.0125	0.0104	0.00594			
1684	Statistics (Gamma ROS Imputed Data)		19	0.0057	0.029	0.0126	0.01	0.0059			
1685	Statistics (Lognormal ROS Imputed Data)		19	0.0057	0.029	0.0125	0.0098	0.00595			
1686											
1687			K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1688	Statistics (Non-Detects Only)		5.649	4.691	0.00228	-4.442	0.426	-0.0958			
1689	Statistics (NDs = DL)		6.235	5.285	0.00206	-4.437	0.404	-0.091			
1690	Statistics (NDs = DL/2)		5.027	4.268	0.00243	-4.51	0.451	-0.1			
1691	Statistics (Gamma ROS Estimates)		6.088	5.162	0.00207	-4.459	0.405	-0.0907			
1692	Statistics (Lognormal ROS Estimates)		--	--	--	-4.469	0.41	-0.0917			
1693											
1694	<b>Normal GOF Test Results</b>										
1695											
1696			No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1697	Correlation Coefficient R		0.918	0.917	0.919	0.904					
1698											
1699			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1700	Shapiro-Wilk (Detects Only)		0.849	0.892	Data Not Normal						
1701	Shapiro-Wilk (NDs = DL)		0.85	0.901	Data Not Normal						
1702	Shapiro-Wilk (NDs = DL/2)		0.848	0.901	Data Not Normal						
1703	Shapiro-Wilk (Normal ROS Estimates)		0.824	0.901	Data Not Normal						
1704	Lilliefors (Detects Only)		0.209	0.207	Data Not Normal						
1705	Lilliefors (NDs = DL)		0.212	0.197	Data Not Normal						
1706	Lilliefors (NDs = DL/2)		0.208	0.197	Data Not Normal						
1707	Lilliefors (Normal ROS Estimates)		0.233	0.197	Data Not Normal						
1708											
1709	<b>Gamma GOF Test Results</b>										
1710											
1711			No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
1712	Correlation Coefficient R		0.969	0.967	0.973	0.956					
1713											
1714			Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1715	Anderson-Darling (Detects Only)		0.571	0.741							
1716	Kolmogorov-Smirnov (Detects Only)		0.177	0.21	Detected Data Appear Gamma Distributed						

A	B	C	D	E	F	G	H	I	J	K	L	
1717	Anderson-Darling (NDs = DL)			0.569	0.742							
1718	Kolmogorov-Smirnov (NDs = DL)			0.175	0.199	Data Appear Gamma Distributed						
1719	Anderson-Darling (NDs = DL/2)			0.507	0.742							
1720	Kolmogorov-Smirnov (NDs = DL/2)			0.162	0.199	Data Appear Gamma Distributed						
1721	Anderson-Darling (Gamma ROS Estimates)			0.829	0.742							
1722	Kolmogorov-Smirnov (Gamma ROS Est.)			0.206	0.199	Data Not Gamma Distributed						
1723												
1724	<b>Lognormal GOF Test Results</b>											
1725												
1726				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1727	Correlation Coefficient R			0.977	0.979	0.982	0.967					
1728												
1729				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1730	Shapiro-Wilk (Detects Only)			0.957	0.892	Data Appear Lognormal						
1731	Shapiro-Wilk (NDs = DL)			0.962	0.901	Data Appear Lognormal						
1732	Shapiro-Wilk (NDs = DL/2)			0.96	0.901	Data Appear Lognormal						
1733	Shapiro-Wilk (Lognormal ROS Estimates)			0.939	0.901	Data Appear Lognormal						
1734	Lilliefors (Detects Only)			0.151	0.207	Data Appear Lognormal						
1735	Lilliefors (NDs = DL)			0.151	0.197	Data Appear Lognormal						
1736	Lilliefors (NDs = DL/2)			0.132	0.197	Data Appear Lognormal						
1737	Lilliefors (Lognormal ROS Estimates)			0.175	0.197	Data Appear Lognormal						
1738												
1739	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1740												
1741	<b>Molybdenum (m-57a)</b>											
1742												
1743				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1744	Raw Statistics			22	3	19	17	2	10.53%			
1745												
1746				Number	Minimum	Maximum	Mean	Median	SD			
1747	Statistics (Non-Detects Only)			2	0.0068	0.0078	0.0073	0.0073	7.0711E-4			
1748	Statistics (Non-Detects Only)			17	0.0011	0.022	0.00544	0.0042	0.00463			
1749	Statistics (All: NDs treated as DL value)			19	0.0011	0.022	0.00564	0.0046	0.00441			
1750	Statistics (All: NDs treated as DL/2 value)			19	0.0011	0.022	0.00525	0.0041	0.0044			
1751	Statistics (Normal ROS Imputed Data)			19	0.0011	0.022	0.00534	0.00451	0.00438			
1752	Statistics (Gamma ROS Imputed Data)			19	0.0011	0.022	0.00592	0.0046	0.0046			
1753	Statistics (Lognormal ROS Imputed Data)			19	0.0011	0.022	0.00527	0.0041	0.0044			
1754												
1755				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1756	Statistics (Non-Detects Only)			2.574	2.159	0.00211	-5.42	0.624	-0.115			
1757	Statistics (NDs = DL)			2.793	2.387	0.00202	-5.368	0.609	-0.114			
1758	Statistics (NDs = DL/2)			2.761	2.36	0.0019	-5.441	0.592	-0.109			
1759	Statistics (Gamma ROS Estimates)			2.589	2.216	0.00229	-5.335	0.642	-0.12			
1760	Statistics (Lognormal ROS Estimates)			--	--	--	-5.437	0.59	-0.109			
1761												
1762	<b>Normal GOF Test Results</b>											
1763												
1764				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1765	Correlation Coefficient R			0.773	0.796	0.757	0.758					
1766												
1767				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1768	Shapiro-Wilk (Detects Only)			0.629	0.892	Data Not Normal						

A	B	C	D	E	F	G	H	I	J	K	L	
1769	Shapiro-Wilk (NDs = DL)			0.664	0.901	Data Not Normal						
1770	Shapiro-Wilk (NDs = DL/2)			0.605	0.901	Data Not Normal						
1771	Shapiro-Wilk (Normal ROS Estimates)			0.606	0.901	Data Not Normal						
1772	Lilliefors (Detects Only)			0.261	0.207	Data Not Normal						
1773	Lilliefors (NDs = DL)			0.243	0.197	Data Not Normal						
1774	Lilliefors (NDs = DL/2)			0.278	0.197	Data Not Normal						
1775	Lilliefors (Normal ROS Estimates)			0.286	0.197	Data Not Normal						
1776												
1777	<b>Gamma GOF Test Results</b>											
1778												
1779				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
1780	Correlation Coefficient R			0.88	0.89	0.866	0.934					
1781												
1782				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1783	Anderson-Darling (Detects Only)			0.832	0.747							
1784	Kolmogorov-Smirnov (Detects Only)			0.2	0.211	Detected Data appear Approximate Gamma Distr						
1785	Anderson-Darling (NDs = DL)			0.665	0.749							
1786	Kolmogorov-Smirnov (NDs = DL)			0.155	0.2	Data Appear Gamma Distributed						
1787	Anderson-Darling (NDs = DL/2)			1.034	0.749							
1788	Kolmogorov-Smirnov (NDs = DL/2)			0.215	0.2	Data Not Gamma Distributed						
1789	Anderson-Darling (Gamma ROS Estimates)			0.553	0.75							
1790	Kolmogorov-Smirnov (Gamma ROS Est.)			0.177	0.2	Data Appear Gamma Distributed						
1791												
1792	<b>Lognormal GOF Test Results</b>											
1793												
1794				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1795	Correlation Coefficient R			0.949	0.958	0.941	0.939					
1796												
1797				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1798	Shapiro-Wilk (Detects Only)			0.929	0.892	Data Appear Lognormal						
1799	Shapiro-Wilk (NDs = DL)			0.942	0.901	Data Appear Lognormal						
1800	Shapiro-Wilk (NDs = DL/2)			0.915	0.901	Data Appear Lognormal						
1801	Shapiro-Wilk (Lognormal ROS Estimates)			0.911	0.901	Data Appear Lognormal						
1802	Lilliefors (Detects Only)			0.154	0.207	Data Appear Lognormal						
1803	Lilliefors (NDs = DL)			0.135	0.197	Data Appear Lognormal						
1804	Lilliefors (NDs = DL/2)			0.169	0.197	Data Appear Lognormal						
1805	Lilliefors (Lognormal ROS Estimates)			0.171	0.197	Data Appear Lognormal						
1806												
1807	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1808												
1809	<b>Molybdenum (m-58a)</b>											
1810												
1811				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1812	Raw Statistics			22	3	19	15	4	21.05%			
1813												
1814				Number	Minimum	Maximum	Mean	Median	SD			
1815	Statistics (Non-Detects Only)			4	0.0018	0.01	0.00385	0.0018	0.0041			
1816	Statistics (Non-Detects Only)			15	0.0014	0.02	0.00325	0.0018	0.0047			
1817	Statistics (All: NDs treated as DL value)			19	0.0014	0.02	0.00338	0.0018	0.00448			
1818	Statistics (All: NDs treated as DL/2 value)			19	9.0000E-4	0.02	0.00297	0.0018	0.00426			
1819	Statistics (Normal ROS Imputed Data)			19	-0.00128	0.02	0.00271	0.0018	0.00433			
1820	Statistics (Gamma ROS Imputed Data)			19	0.0014	0.02	0.00467	0.0021	0.00502			

A	B	C	D	E	F	G	H	I	J	K	L
1821	Statistics (Lognormal ROS Imputed Data)			19	0.00103	0.02	0.00288	0.0018	0.00421		
1822											
1823				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
1824	Statistics (Non-Detects Only)			1.563	1.295	0.00208	-6.081	0.665	-0.109		
1825	Statistics (NDs = DL)			1.571	1.358	0.00215	-6.041	0.688	-0.114		
1826	Statistics (NDs = DL/2)			1.5	1.298	0.00198	-6.187	0.715	-0.116		
1827	Statistics (Gamma ROS Estimates)			1.379	1.197	0.00339	-5.77	0.852	-0.148		
1828	Statistics (Lognormal ROS Estimates)			--	--	--	-6.178	0.628	-0.102		
1829											
1830	<b>Normal GOF Test Results</b>										
1831											
1832				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
1833	Correlation Coefficient R			0.603	0.656	0.637	0.65				
1834											
1835				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1836	Shapiro-Wilk (Detects Only)			0.395	0.881	Data Not Normal					
1837	Shapiro-Wilk (NDs = DL)			0.455	0.901	Data Not Normal					
1838	Shapiro-Wilk (NDs = DL/2)			0.436	0.901	Data Not Normal					
1839	Shapiro-Wilk (Normal ROS Estimates)			0.459	0.901	Data Not Normal					
1840	Lilliefors (Detects Only)			0.43	0.22	Data Not Normal					
1841	Lilliefors (NDs = DL)			0.42	0.197	Data Not Normal					
1842	Lilliefors (NDs = DL/2)			0.386	0.197	Data Not Normal					
1843	Lilliefors (Normal ROS Estimates)			0.414	0.197	Data Not Normal					
1844											
1845	<b>Gamma GOF Test Results</b>										
1846											
1847				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
1848	Correlation Coefficient R			0.787	0.841	0.812	0.94				
1849											
1850				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1851	Anderson-Darling (Detects Only)			2.99	0.753						
1852	Kolmogorov-Smirnov (Detects Only)			0.383	0.225	Data Not Gamma Distributed					
1853	Anderson-Darling (NDs = DL)			3.637	0.756						
1854	Kolmogorov-Smirnov (NDs = DL)			0.379	0.202	Data Not Gamma Distributed					
1855	Anderson-Darling (NDs = DL/2)			2.287	0.757						
1856	Kolmogorov-Smirnov (NDs = DL/2)			0.318	0.202	Data Not Gamma Distributed					
1857	Anderson-Darling (Gamma ROS Estimates)			2.287	0.76						
1858	Kolmogorov-Smirnov (Gamma ROS Est.)			0.327	0.203	Data Not Gamma Distributed					
1859											
1860	<b>Lognormal GOF Test Results</b>										
1861											
1862				No NDs	NDs = DL	NDs = DL/2	Log ROS				
1863	Correlation Coefficient R			0.769	0.789	0.885	0.795				
1864											
1865				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
1866	Shapiro-Wilk (Detects Only)			0.618	0.881	Data Not Lognormal					
1867	Shapiro-Wilk (NDs = DL)			0.638	0.901	Data Not Lognormal					
1868	Shapiro-Wilk (NDs = DL/2)			0.801	0.901	Data Not Lognormal					
1869	Shapiro-Wilk (Lognormal ROS Estimates)			0.662	0.901	Data Not Lognormal					
1870	Lilliefors (Detects Only)			0.323	0.22	Data Not Lognormal					
1871	Lilliefors (NDs = DL)			0.335	0.197	Data Not Lognormal					
1872	Lilliefors (NDs = DL/2)			0.252	0.197	Data Not Lognormal					

A	B	C	D	E	F	G	H	I	J	K	L	
1873	Lilliefors (Lognormal ROS Estimates)			0.305	0.197	Data Not Lognormal						
1874												
1875	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1876												
1877	<b>Molybdenum (m-62a)</b>											
1878												
1879				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1880	Raw Statistics			22	3	19	17	2	10.53%			
1881												
1882				Number	Minimum	Maximum	Mean	Median	SD			
1883	Statistics (Non-Detects Only)			2	0.0026	0.0028	0.0027	0.0027	1.4142E-4			
1884	Statistics (Non-Detects Only)			17	0.0019	0.011	0.00295	0.0023	0.00215			
1885	Statistics (All: NDs treated as DL value)			19	0.0019	0.011	0.00292	0.0023	0.00203			
1886	Statistics (All: NDs treated as DL/2 value)			19	0.0013	0.011	0.00278	0.0023	0.00209			
1887	Statistics (Normal ROS Imputed Data)			19	0.0019	0.011	0.0029	0.0023	0.00203			
1888	Statistics (Gamma ROS Imputed Data)			19	0.0019	0.011	0.00369	0.0023	0.00301			
1889	Statistics (Lognormal ROS Imputed Data)			19	0.0019	0.011	0.00288	0.0023	0.00204			
1890												
1891				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
1892	Statistics (Non-Detects Only)			4.401	3.664	6.6964E-4	-5.945	0.415	-0.0699			
1893	Statistics (NDs = DL)			4.882	4.146	5.9838E-4	-5.942	0.392	-0.0659			
1894	Statistics (NDs = DL/2)			4.035	3.433	6.8868E-4	-6.015	0.444	-0.0738			
1895	Statistics (Gamma ROS Estimates)			2.636	2.254	0.0014	-5.804	0.576	-0.0992			
1896	Statistics (Lognormal ROS Estimates)			--	--	--	-5.956	0.393	-0.066			
1897												
1898	<b>Normal GOF Test Results</b>											
1899												
1900				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1901	Correlation Coefficient R			0.641	0.635	0.673	0.626					
1902												
1903				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1904	Shapiro-Wilk (Detects Only)			0.441	0.892	Data Not Normal						
1905	Shapiro-Wilk (NDs = DL)			0.433	0.901	Data Not Normal						
1906	Shapiro-Wilk (NDs = DL/2)			0.485	0.901	Data Not Normal						
1907	Shapiro-Wilk (Normal ROS Estimates)			0.422	0.901	Data Not Normal						
1908	Lilliefors (Detects Only)			0.388	0.207	Data Not Normal						
1909	Lilliefors (NDs = DL)			0.379	0.197	Data Not Normal						
1910	Lilliefors (NDs = DL/2)			0.376	0.197	Data Not Normal						
1911	Lilliefors (Normal ROS Estimates)			0.4	0.197	Data Not Normal						
1912												
1913	<b>Gamma GOF Test Results</b>											
1914												
1915				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
1916	Correlation Coefficient R			0.757	0.745	0.78	0.866					
1917												
1918				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1919	Anderson-Darling (Detects Only)			3.052	0.742							
1920	Kolmogorov-Smirnov (Detects Only)			0.362	0.21	Data Not Gamma Distributed						
1921	Anderson-Darling (NDs = DL)			3.178	0.743							
1922	Kolmogorov-Smirnov (NDs = DL)			0.329	0.199	Data Not Gamma Distributed						
1923	Anderson-Darling (NDs = DL/2)			2.467	0.745							
1924	Kolmogorov-Smirnov (NDs = DL/2)			0.328	0.199	Data Not Gamma Distributed						

A	B	C	D	E	F	G	H	I	J	K	L	
1925	Anderson-Darling (Gamma ROS Estimates)			3.307	0.749							
1926	Kolmogorov-Smirnov (Gamma ROS Est.)			0.364	0.2	Data Not Gamma Distributed						
1927												
1928	<b>Lognormal GOF Test Results</b>											
1929												
1930				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1931	Correlation Coefficient R			0.763	0.77	0.845	0.746					
1932												
1933				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1934	Shapiro-Wilk (Detects Only)			0.608	0.892	Data Not Lognormal						
1935	Shapiro-Wilk (NDs = DL)			0.619	0.901	Data Not Lognormal						
1936	Shapiro-Wilk (NDs = DL/2)			0.745	0.901	Data Not Lognormal						
1937	Shapiro-Wilk (Lognormal ROS Estimates)			0.584	0.901	Data Not Lognormal						
1938	Lilliefors (Detects Only)			0.331	0.207	Data Not Lognormal						
1939	Lilliefors (NDs = DL)			0.3	0.197	Data Not Lognormal						
1940	Lilliefors (NDs = DL/2)			0.286	0.197	Data Not Lognormal						
1941	Lilliefors (Lognormal ROS Estimates)			0.338	0.197	Data Not Lognormal						
1942												
1943	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
1944												
1945	<b>Radium (m-56a)</b>											
1946												
1947				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
1948	Raw Statistics			22	5	17	11	6	35.29%			
1949												
1950				Number	Minimum	Maximum	Mean	Median	SD			
1951	Statistics (Non-Detects Only)			6	0.4	1.2	0.75	0.7	0.274			
1952	Statistics (Non-Detects Only)			11	0.5	1.9	1.209	1.4	0.556			
1953	Statistics (All: NDs treated as DL value)			17	0.4	1.9	1.047	0.9	0.517			
1954	Statistics (All: NDs treated as DL/2 value)			17	0.2	1.9	0.915	0.6	0.606			
1955	Statistics (Normal ROS Imputed Data)			17	-0.194	1.9	0.903	0.6	0.636			
1956	Statistics (Gamma ROS Imputed Data)			17	0.148	1.9	0.945	0.6	0.583			
1957	Statistics (Lognormal ROS Imputed Data)			17	0.275	1.9	0.951	0.6	0.573			
1958												
1959				K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV			
1960	Statistics (Non-Detects Only)			4.258	3.157	0.284	0.0679	0.548	8.074			
1961	Statistics (NDs = DL)			4.21	3.506	0.249	-0.0775	0.521	-6.732			
1962	Statistics (NDs = DL/2)			2.299	1.933	0.398	-0.322	0.726	-2.254			
1963	Statistics (Gamma ROS Estimates)			2.549	2.138	0.371	-0.265	0.706	-2.66			
1964	Statistics (Lognormal ROS Estimates)			--	--	--	-0.229	0.622	-2.719			
1965												
1966	<b>Normal GOF Test Results</b>											
1967												
1968				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
1969	Correlation Coefficient R			0.941	0.955	0.933	0.959					
1970												
1971				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1972	Shapiro-Wilk (Detects Only)			0.857	0.85	Data Appear Normal						
1973	Shapiro-Wilk (NDs = DL)			0.892	0.892	Data Not Normal						
1974	Shapiro-Wilk (NDs = DL/2)			0.851	0.892	Data Not Normal						
1975	Shapiro-Wilk (Normal ROS Estimates)			0.908	0.892	Data Appear Normal						
1976	Lilliefors (Detects Only)			0.227	0.251	Data Appear Normal						

A	B	C	D	E	F	G	H	I	J	K	L	
1977	Lilliefors (NDs = DL)			0.219	0.207	Data Not Normal						
1978	Lilliefors (NDs = DL/2)			0.286	0.207	Data Not Normal						
1979	Lilliefors (Normal ROS Estimates)			0.218	0.207	Data Not Normal						
1980												
1981	<b>Gamma GOF Test Results</b>											
1982												
1983				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
1984	Correlation Coefficient R			0.906	0.957	0.935	0.939					
1985												
1986				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
1987	Anderson-Darling (Detects Only)			0.89	0.732							
1988	Kolmogorov-Smirnov (Detects Only)			0.233	0.256	Detected Data appear Approximate Gamma Distr						
1989	Anderson-Darling (NDs = DL)			0.685	0.743							
1990	Kolmogorov-Smirnov (NDs = DL)			0.198	0.21	Data Appear Gamma Distributed						
1991	Anderson-Darling (NDs = DL/2)			0.828	0.748							
1992	Kolmogorov-Smirnov (NDs = DL/2)			0.232	0.211	Data Not Gamma Distributed						
1993	Anderson-Darling (Gamma ROS Estimates)			0.779	0.747							
1994	Kolmogorov-Smirnov (Gamma ROS Est.)			0.206	0.211	Detected Data appear Approximate Gamma Distr						
1995												
1996	<b>Lognormal GOF Test Results</b>											
1997												
1998				No NDs	NDs = DL	NDs = DL/2	Log ROS					
1999	Correlation Coefficient R			0.917	0.965	0.962	0.948					
2000												
2001				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2002	Shapiro-Wilk (Detects Only)			0.814	0.85	Data Not Lognormal						
2003	Shapiro-Wilk (NDs = DL)			0.911	0.892	Data Appear Lognormal						
2004	Shapiro-Wilk (NDs = DL/2)			0.91	0.892	Data Appear Lognormal						
2005	Shapiro-Wilk (Lognormal ROS Estimates)			0.885	0.892	Data Not Lognormal						
2006	Lilliefors (Detects Only)			0.233	0.251	Data Appear Lognormal						
2007	Lilliefors (NDs = DL)			0.174	0.207	Data Appear Lognormal						
2008	Lilliefors (NDs = DL/2)			0.191	0.207	Data Appear Lognormal						
2009	Lilliefors (Lognormal ROS Estimates)			0.217	0.207	Data Not Lognormal						
2010												
2011	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
2012												
2013	<b>Radium (m-57a)</b>											
2014												
2015				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
2016	Raw Statistics			22	5	17	5	12	70.59%			
2017												
2018				Number	Minimum	Maximum	Mean	Median	SD			
2019	Statistics (Non-Detects Only)			12	0.4	0.9	0.658	0.7	0.116			
2020	Statistics (Non-Detects Only)			5	0.5	1.5	0.88	0.7	0.415			
2021	Statistics (All: NDs treated as DL value)			17	0.4	1.5	0.724	0.7	0.251			
2022	Statistics (All: NDs treated as DL/2 value)			17	0.2	1.5	0.491	0.35	0.335			
2023	Statistics (Normal ROS Imputed Data)			17	-0.391	1.5	0.32	0.254	0.5			
2024	Statistics (Gamma ROS Imputed Data)			17	0.01	1.5	0.402	0.282	0.412			
2025	Statistics (Lognormal ROS Imputed Data)			17	0.191	1.5	0.504	0.397	0.34			
2026												
2027				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
2028	Statistics (Non-Detects Only)			6.104	2.575	0.144	-0.212	0.452	-2.133			



A	B	C	D	E	F	G	H	I	J	K	L	
2029	Statistics (NDs = DL)			11.3	9.343	0.064	-0.369	0.295	-0.8			
2030	Statistics (NDs = DL/2)			3.563	2.973	0.138	-0.858	0.511	-0.595			
2031	Statistics (Gamma ROS Estimates)			0.695	0.611	0.578	-1.783	1.74	-0.976			
2032	Statistics (Lognormal ROS Estimates)			--	--	--	-0.849	0.565	-0.666			
2033												
2034	<b>Normal GOF Test Results</b>											
2035												
2036				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
2037	Correlation Coefficient R			0.951	0.853	0.819	0.978					
2038												
2039				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2040	Shapiro-Wilk (Detects Only)			0.896	0.762	Data Appear Normal						
2041	Shapiro-Wilk (NDs = DL)			0.753	0.892	Data Not Normal						
2042	Shapiro-Wilk (NDs = DL/2)			0.687	0.892	Data Not Normal						
2043	Shapiro-Wilk (Normal ROS Estimates)			0.957	0.892	Data Appear Normal						
2044	Lilliefors (Detects Only)			0.268	0.343	Data Appear Normal						
2045	Lilliefors (NDs = DL)			0.361	0.207	Data Not Normal						
2046	Lilliefors (NDs = DL/2)			0.31	0.207	Data Not Normal						
2047	Lilliefors (Normal ROS Estimates)			0.106	0.207	Data Appear Normal						
2048												
2049	<b>Gamma GOF Test Results</b>											
2050												
2051				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
2052	Correlation Coefficient R			0.985	0.9	0.918	0.986					
2053												
2054				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2055	Anderson-Darling (Detects Only)			0.317	0.68							
2056	Kolmogorov-Smirnov (Detects Only)			0.258	0.358	Detected Data Appear Gamma Distributed						
2057	Anderson-Darling (NDs = DL)			1.285	0.739							
2058	Kolmogorov-Smirnov (NDs = DL)			0.328	0.209	Data Not Gamma Distributed						
2059	Anderson-Darling (NDs = DL/2)			1.513	0.744							
2060	Kolmogorov-Smirnov (NDs = DL/2)			0.311	0.21	Data Not Gamma Distributed						
2061	Anderson-Darling (Gamma ROS Estimates)			0.534	0.781							
2062	Kolmogorov-Smirnov (Gamma ROS Est.)			0.161	0.218	Data Appear Gamma Distributed						
2063												
2064	<b>Lognormal GOF Test Results</b>											
2065												
2066				No NDs	NDs = DL	NDs = DL/2	Log ROS					
2067	Correlation Coefficient R			0.976	0.92	0.917	0.981					
2068												
2069				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2070	Shapiro-Wilk (Detects Only)			0.94	0.762	Data Appear Lognormal						
2071	Shapiro-Wilk (NDs = DL)			0.87	0.892	Data Not Lognormal						
2072	Shapiro-Wilk (NDs = DL/2)			0.852	0.892	Data Not Lognormal						
2073	Shapiro-Wilk (Lognormal ROS Estimates)			0.96	0.892	Data Appear Lognormal						
2074	Lilliefors (Detects Only)			0.226	0.343	Data Appear Lognormal						
2075	Lilliefors (NDs = DL)			0.308	0.207	Data Not Lognormal						
2076	Lilliefors (NDs = DL/2)			0.294	0.207	Data Not Lognormal						
2077	Lilliefors (Lognormal ROS Estimates)			0.0985	0.207	Data Appear Lognormal						
2078												
2079	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
2080												

A	B	C	D	E	F	G	H	I	J	K	L
2081	<b>Radium (m-58a)</b>										
2082											
2083				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
2084	Raw Statistics			22	5	17	8	9	52.94%		
2085											
2086				Number	Minimum	Maximum	Mean	Median	SD		
2087	Statistics (Non-Detects Only)			9	0.6	0.9	0.689	0.7	0.0928		
2088	Statistics (Non-Detects Only)			8	0.7	2.6	1.4	1.05	0.729		
2089	Statistics (All: NDs treated as DL value)			17	0.6	2.6	1.024	0.7	0.609		
2090	Statistics (All: NDs treated as DL/2 value)			17	0.3	2.6	0.841	0.45	0.727		
2091	Statistics (Normal ROS Imputed Data)			17	-1.592	2.6	0.323	0.0561	1.217		
2092	Statistics (Gamma ROS Imputed Data)			17	0.01	2.6	0.681	0.21	0.85		
2093	Statistics (Lognormal ROS Imputed Data)			17	0.155	2.6	0.829	0.489	0.74		
2094											
2095				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
2096	Statistics (Non-Detects Only)			4.536	2.918	0.309	0.222	0.505	2.272		
2097	Statistics (NDs = DL)			4.328	3.604	0.236	-0.0967	0.464	-4.803		
2098	Statistics (NDs = DL/2)			1.869	1.579	0.45	-0.464	0.751	-1.62		
2099	Statistics (Gamma ROS Estimates)			0.402	0.37	1.694	-2.019	2.36	-1.169		
2100	Statistics (Lognormal ROS Estimates)			--	--	--	-0.529	0.848	-1.603		
2101											
2102	<b>Normal GOF Test Results</b>										
2103											
2104				No NDs	NDs = DL	NDs = DL/2	Normal ROS				
2105	Correlation Coefficient R			0.934	0.827	0.872	0.988				
2106											
2107				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
2108	Shapiro-Wilk (Detects Only)			0.856	0.818	Data Appear Normal					
2109	Shapiro-Wilk (NDs = DL)			0.686	0.892	Data Not Normal					
2110	Shapiro-Wilk (NDs = DL/2)			0.757	0.892	Data Not Normal					
2111	Shapiro-Wilk (Normal ROS Estimates)			0.966	0.892	Data Appear Normal					
2112	Lilliefors (Detects Only)			0.254	0.283	Data Appear Normal					
2113	Lilliefors (NDs = DL)			0.345	0.207	Data Not Normal					
2114	Lilliefors (NDs = DL/2)			0.234	0.207	Data Not Normal					
2115	Lilliefors (Normal ROS Estimates)			0.116	0.207	Data Appear Normal					
2116											
2117	<b>Gamma GOF Test Results</b>										
2118											
2119				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
2120	Correlation Coefficient R			0.965	0.912	0.966	0.943				
2121											
2122				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
2123	Anderson-Darling (Detects Only)			0.531	0.719						
2124	Kolmogorov-Smirnov (Detects Only)			0.262	0.295	Detected Data Appear Gamma Distributed					
2125	Anderson-Darling (NDs = DL)			1.877	0.742						
2126	Kolmogorov-Smirnov (NDs = DL)			0.304	0.21	Data Not Gamma Distributed					
2127	Anderson-Darling (NDs = DL/2)			1.189	0.751						
2128	Kolmogorov-Smirnov (NDs = DL/2)			0.255	0.212	Data Not Gamma Distributed					
2129	Anderson-Darling (Gamma ROS Estimates)			1.193	0.819						
2130	Kolmogorov-Smirnov (Gamma ROS Est.)			0.269	0.224	Data Not Gamma Distributed					
2131											
2132	<b>Lognormal GOF Test Results</b>										



A	B	C	D	E	F	G	H	I	J	K	L	
2185	<b>Gamma GOF Test Results</b>											
2186												
2187				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
2188	Correlation Coefficient R			0.988	0.985	0.983	0.99					
2189												
2190				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2191	Anderson-Darling (Detects Only)			0.245	0.735							
2192	Kolmogorov-Smirnov (Detects Only)			0.14	0.237	Detected Data Appear Gamma Distributed						
2193	Anderson-Darling (NDs = DL)			0.321	0.74							
2194	Kolmogorov-Smirnov (NDs = DL)			0.144	0.209	Data Appear Gamma Distributed						
2195	Anderson-Darling (NDs = DL/2)			0.462	0.744							
2196	Kolmogorov-Smirnov (NDs = DL/2)			0.157	0.21	Data Appear Gamma Distributed						
2197	Anderson-Darling (Gamma ROS Estimates)			0.305	0.742							
2198	Kolmogorov-Smirnov (Gamma ROS Est.)			0.13	0.21	Data Appear Gamma Distributed						
2199												
2200	<b>Lognormal GOF Test Results</b>											
2201												
2202				No NDs	NDs = DL	NDs = DL/2	Log ROS					
2203	Correlation Coefficient R			0.978	0.985	0.968	0.982					
2204												
2205				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2206	Shapiro-Wilk (Detects Only)			0.952	0.866	Data Appear Lognormal						
2207	Shapiro-Wilk (NDs = DL)			0.965	0.892	Data Appear Lognormal						
2208	Shapiro-Wilk (NDs = DL/2)			0.92	0.892	Data Appear Lognormal						
2209	Shapiro-Wilk (Lognormal ROS Estimates)			0.954	0.892	Data Appear Lognormal						
2210	Lilliefors (Detects Only)			0.168	0.234	Data Appear Lognormal						
2211	Lilliefors (NDs = DL)			0.121	0.207	Data Appear Lognormal						
2212	Lilliefors (NDs = DL/2)			0.181	0.207	Data Appear Lognormal						
2213	Lilliefors (Lognormal ROS Estimates)			0.128	0.207	Data Appear Lognormal						
2214												
2215	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
2216												
2217	<b>Selenium (m-56a)</b>											
2218												
2219				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
2220	Raw Statistics			22	6	16	4	12	75.00%			
2221												
2222				Number	Minimum	Maximum	Mean	Median	SD			
2223	Statistics (Non-Detects Only)			12	5.0000E-4	0.01	0.00148	5.0000E-4	0.00272			
2224	Statistics (Non-Detects Only)			4	3.3000E-4	6.2000E-4	5.2000E-4	5.6500E-4	1.2936E-4			
2225	Statistics (All: NDs treated as DL value)			16	3.3000E-4	0.01	0.00124	5.3000E-4	0.00237			
2226	Statistics (All: NDs treated as DL/2 value)			16	2.5000E-4	0.005	6.8375E-4	3.0500E-4	0.00117			
2227	Statistics (Normal ROS Imputed Data)			16	2.1080E-4	6.2000E-4	4.0391E-4	3.9316E-4	1.0737E-4			
2228	Statistics (Gamma ROS Imputed Data)			16	3.3000E-4	0.01	0.00763	0.01	0.00424			
2229	Statistics (Lognormal ROS Imputed Data)			16	2.5659E-4	6.2000E-4	4.0263E-4	3.8281E-4	1.0047E-4			
2230												
2231				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
2232	Statistics (Non-Detects Only)			17.88	4.635	2.9091E-5	-7.59	0.288	-0.0379			
2233	Statistics (NDs = DL)			1.025	0.875	0.00121	-7.256	0.808	-0.111			
2234	Statistics (NDs = DL/2)			1.163	0.986	5.8801E-4	-7.776	0.791	-0.102			
2235	Statistics (Gamma ROS Estimates)			1.19	1.009	0.00641	-5.351	1.341	-0.251			
2236	Statistics (Lognormal ROS Estimates)			--	--	--	-7.845	0.236	-0.0301			

A	B	C	D	E	F	G	H	I	J	K	L	
2237												
2238	<b>Normal GOF Test Results</b>											
2239												
2240				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
2241	Correlation Coefficient R			0.889	0.581	0.611	0.966					
2242												
2243				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2244	Shapiro-Wilk (Detects Only)			0.805	0.748	Data Appear Normal						
2245	Shapiro-Wilk (NDs = DL)			0.368	0.887	Data Not Normal						
2246	Shapiro-Wilk (NDs = DL/2)			0.404	0.887	Data Not Normal						
2247	Shapiro-Wilk (Normal ROS Estimates)			0.938	0.887	Data Appear Normal						
2248	Lilliefors (Detects Only)			0.371	0.375	Data Appear Normal						
2249	Lilliefors (NDs = DL)			0.415	0.213	Data Not Normal						
2250	Lilliefors (NDs = DL/2)			0.397	0.213	Data Not Normal						
2251	Lilliefors (Normal ROS Estimates)			0.202	0.213	Data Appear Normal						
2252												
2253	<b>Gamma GOF Test Results</b>											
2254												
2255				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
2256	Correlation Coefficient R			0.839	0.802	0.816	0.536					
2257												
2258				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2259	Anderson-Darling (Detects Only)			0.634	0.657							
2260	Kolmogorov-Smirnov (Detects Only)			0.404	0.394	Detected Data appear Approximate Gamma Distr						
2261	Anderson-Darling (NDs = DL)			3.449	0.763							
2262	Kolmogorov-Smirnov (NDs = DL)			0.423	0.221	Data Not Gamma Distributed						
2263	Anderson-Darling (NDs = DL/2)			2.496	0.76							
2264	Kolmogorov-Smirnov (NDs = DL/2)			0.291	0.22	Data Not Gamma Distributed						
2265	Anderson-Darling (Gamma ROS Estimates)			3.832	0.76							
2266	Kolmogorov-Smirnov (Gamma ROS Est.)			0.48	0.22	Data Not Gamma Distributed						
2267												
2268	<b>Lognormal GOF Test Results</b>											
2269												
2270				No NDs	NDs = DL	NDs = DL/2	Log ROS					
2271	Correlation Coefficient R			0.867	0.766	0.828	0.965					
2272												
2273				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2274	Shapiro-Wilk (Detects Only)			0.766	0.748	Data Appear Lognormal						
2275	Shapiro-Wilk (NDs = DL)			0.616	0.887	Data Not Lognormal						
2276	Shapiro-Wilk (NDs = DL/2)			0.699	0.887	Data Not Lognormal						
2277	Shapiro-Wilk (Lognormal ROS Estimates)			0.933	0.887	Data Appear Lognormal						
2278	Lilliefors (Detects Only)			0.389	0.375	Data Not Lognormal						
2279	Lilliefors (NDs = DL)			0.376	0.213	Data Not Lognormal						
2280	Lilliefors (NDs = DL/2)			0.256	0.213	Data Not Lognormal						
2281	Lilliefors (Lognormal ROS Estimates)			0.202	0.213	Data Appear Lognormal						
2282												
2283	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
2284												
2285	<b>Selenium (m-57a)</b>											
2286												
2287				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
2288	Raw Statistics			22	6	16	2	14	87.50%			

A	B	C	D	E	F	G	H	I	J	K	L	
2289												
2290				Number	Minimum	Maximum	Mean	Median	SD			
2291		Statistics (Non-Detects Only)		14	5.0000E-4	0.01	0.00138	5.0000E-4	0.00252			
2292		Statistics (Non-Detects Only)		2	2.9000E-4	6.9000E-4	4.9000E-4	4.9000E-4	2.8284E-4			
2293		Statistics (All: NDs treated as DL value)		16	2.9000E-4	0.01	0.00127	5.0000E-4	0.00236			
2294		Statistics (All: NDs treated as DL/2 value)		16	2.5000E-4	0.005	6.6406E-4	2.7000E-4	0.00118			
2295		Statistics (Normal ROS Imputed Data)		16	3.5916E-5	6.9000E-4	3.1740E-4	3.0140E-4	1.5101E-4			
2296		Statistics (Gamma ROS Imputed Data)		16	N/A	N/A	N/A	N/A	N/A			
2297		Statistics (Lognormal ROS Imputed Data)		16	1.6721E-4	6.9000E-4	3.2472E-4	2.9734E-4	1.2127E-4			
2298												
2299				K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV			
2300		Statistics (Non-Detects Only)		N/A	N/A	N/A	N/A	N/A	N/A			
2301		Statistics (NDs = DL)		1.042	0.888	0.00122	-7.223	0.821	-0.114			
2302		Statistics (NDs = DL/2)		1.113	0.946	5.9644E-4	-7.829	0.8	-0.102			
2303		Statistics (Gamma ROS Estimates)		N/A	N/A	N/A	N/A	N/A	N/A			
2304		Statistics (Lognormal ROS Estimates)		--	--	--	-8.086	0.327	-0.0405			
2305												
2306		<b>Normal GOF Test Results</b>										
2307												
2308				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
2309		Correlation Coefficient R		1	0.595	0.604	0.966					
2310												
2311				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2312		Shapiro-Wilk (NDs = DL)		0.385	0.887	Data Not Normal						
2313		Shapiro-Wilk (NDs = DL/2)		0.394	0.887	Data Not Normal						
2314		Shapiro-Wilk (Normal ROS Estimates)		0.951	0.887	Data Appear Normal						
2315		Lilliefors (Detects Only)		N/A	N/A							
2316		Lilliefors (NDs = DL)		0.42	0.213	Data Not Normal						
2317		Lilliefors (NDs = DL/2)		0.368	0.213	Data Not Normal						
2318		Lilliefors (Normal ROS Estimates)		0.186	0.213	Data Appear Normal						
2319												
2320		<b>Gamma GOF Test Results</b>										
2321												
2322				No NDs	NDs = DL	NDs = DL/2	Gamma ROS					
2323		Correlation Coefficient R		N/A	0.811	0.816	0.439					
2324												
2325				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2326		Anderson-Darling (Detects Only)		N/A	N/A							
2327		Kolmogorov-Smirnov (Detects Only)		N/A	N/A							
2328		Anderson-Darling (NDs = DL)		2.918	0.763							
2329		Kolmogorov-Smirnov (NDs = DL)		0.337	0.221	Data Not Gamma Distributed						
2330		Anderson-Darling (NDs = DL/2)		2.835	0.761							
2331		Kolmogorov-Smirnov (NDs = DL/2)		0.302	0.221	Data Not Gamma Distributed						
2332		Anderson-Darling (Gamma ROS Estimates)		N/A	0.736							
2333		Kolmogorov-Smirnov (Gamma ROS Est.)		N/A	0.214							
2334												
2335		<b>Lognormal GOF Test Results</b>										
2336												
2337				No NDs	NDs = DL	NDs = DL/2	Log ROS					
2338		Correlation Coefficient R		1	0.815	0.8	N/A					
2339												
2340				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						

A	B	C	D	E	F	G	H	I	J	K	L	
2341	Shapiro-Wilk (NDs = DL)			0.692	0.887	Data Not Lognormal						
2342	Shapiro-Wilk (NDs = DL/2)			0.656	0.887	Data Not Lognormal						
2343	Shapiro-Wilk (Lognormal ROS Estimates)			0.951	0.887	Data Appear Lognormal						
2344	Lilliefors (Detects Only)			N/A	N/A							
2345	Lilliefors (NDs = DL)			0.277	0.213	Data Not Lognormal						
2346	Lilliefors (NDs = DL/2)			0.281	0.213	Data Not Lognormal						
2347	Lilliefors (Lognormal ROS Estimates)			0.186	0.213	Data Appear Lognormal						
2348												
2349	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>											
2350												
2351	<b>Selenium (m-58a)</b>											
2352												
2353				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
2354	Raw Statistics			22	6	16	1	15	93.75%			
2355												
2356	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>											
2357	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>											
2358												
2359	<b>The data set for variable Selenium (m-58a) was not processed!</b>											
2360												
2361												
2362												
2363	<b>Selenium (m-62a)</b>											
2364												
2365				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
2366	Raw Statistics			22	6	16	2	14	87.50%			
2367												
2368				Number	Minimum	Maximum	Mean	Median	SD			
2369	Statistics (Non-Detects Only)			14	5.0000E-4	0.01	0.00136	5.0000E-4	0.00252			
2370	Statistics (Non-Detects Only)			2	7.1000E-4	7.8000E-4	7.4500E-4	7.4500E-4	4.9497E-5			
2371	Statistics (All: NDs treated as DL value)			16	5.0000E-4	0.01	0.00128	5.0000E-4	0.00236			
2372	Statistics (All: NDs treated as DL/2 value)			16	2.5000E-4	0.005	6.8688E-4	2.5000E-4	0.00117			
2373	Statistics (Normal ROS Imputed Data)			16	2.1121E-4	7.8000E-4	4.8278E-4	4.8067E-4	1.4745E-4			
2374	Statistics (Gamma ROS Imputed Data)			16	N/A	N/A	N/A	N/A	N/A			
2375	Statistics (Lognormal ROS Imputed Data)			16	3.6331E-4	7.8000E-4	5.3307E-4	5.2176E-4	1.0823E-4			
2376												
2377				K hat	K Star	Theta hat	Log Mean	Log Stdev	Log CV			
2378	Statistics (Non-Detects Only)			N/A	N/A	N/A	N/A	N/A	N/A			
2379	Statistics (NDs = DL)			1.079	0.918	0.00119	-7.191	0.795	-0.111			
2380	Statistics (NDs = DL/2)			1.11	0.944	6.1875E-4	-7.797	0.828	-0.106			
2381	Statistics (Gamma ROS Estimates)			N/A	N/A	N/A	N/A	N/A	N/A			
2382	Statistics (Lognormal ROS Estimates)			--	--	--	-7.555	0.198	-0.0262			
2383												
2384	<b>Normal GOF Test Results</b>											
2385												
2386				No NDs	NDs = DL	NDs = DL/2	Normal ROS					
2387	Correlation Coefficient R			1	0.586	0.622	0.993					
2388												
2389				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)						
2390	Shapiro-Wilk (NDs = DL)			0.374	0.887	Data Not Normal						
2391	Shapiro-Wilk (NDs = DL/2)			0.416	0.887	Data Not Normal						
2392	Shapiro-Wilk (Normal ROS Estimates)			0.988	0.887	Data Appear Normal						

A	B	C	D	E	G	H	I	J	K	L	
2393	Lilliefors (Detects Only)			N/A	N/A						
2394	Lilliefors (NDs = DL)			0.422	0.213	Data Not Normal					
2395	Lilliefors (NDs = DL/2)			0.355	0.213	Data Not Normal					
2396	Lilliefors (Normal ROS Estimates)			0.0921	0.213	Data Appear Normal					
2397											
2398	<b>Gamma GOF Test Results</b>										
2399											
2400				No NDs	NDs = DL	NDs = DL/2	Gamma ROS				
2401	Correlation Coefficient R			N/A	0.805	0.83	0.461				
2402											
2403				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
2404	Anderson-Darling (Detects Only)			N/A	N/A						
2405	Kolmogorov-Smirnov (Detects Only)			N/A	N/A						
2406	Anderson-Darling (NDs = DL)			3.294	0.762						
2407	Kolmogorov-Smirnov (NDs = DL)			0.342	0.221	Data Not Gamma Distributed					
2408	Anderson-Darling (NDs = DL/2)			2.625	0.761						
2409	Kolmogorov-Smirnov (NDs = DL/2)			0.342	0.221	Data Not Gamma Distributed					
2410	Anderson-Darling (Gamma ROS Estimates)			N/A	0.736						
2411	Kolmogorov-Smirnov (Gamma ROS Est.)			N/A	0.214						
2412											
2413	<b>Lognormal GOF Test Results</b>										
2414											
2415				No NDs	NDs = DL	NDs = DL/2	Log ROS				
2416	Correlation Coefficient R			1	0.76	0.813	N/A				
2417											
2418				Test value	Crit. (0.05)	Conclusion with Alpha(0.05)					
2419	Shapiro-Wilk (NDs = DL)			0.597	0.887	Data Not Lognormal					
2420	Shapiro-Wilk (NDs = DL/2)			0.672	0.887	Data Not Lognormal					
2421	Shapiro-Wilk (Lognormal ROS Estimates)			0.988	0.887	Data Appear Lognormal					
2422	Lilliefors (Detects Only)			N/A	N/A						
2423	Lilliefors (NDs = DL)			0.322	0.213	Data Not Lognormal					
2424	Lilliefors (NDs = DL/2)			0.351	0.213	Data Not Lognormal					
2425	Lilliefors (Lognormal ROS Estimates)			0.0921	0.213	Data Appear Lognormal					
2426											
2427	<b>Note: Substitution methods such as DL or DL/2 are not recommended.</b>										
2428											
2429	<b>Thallium (m-56a)</b>										
2430											
2431				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
2432	Raw Statistics			22	3	19	1	18	94.74%		
2433											
2434	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>										
2435	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>										
2436											
2437	<b>The data set for variable Thallium (m-56a) was not processed!</b>										
2438											
2439											
2440											
2441	<b>Thallium (m-57a)</b>										
2442											
2443				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
2444	Raw Statistics			22	3	19	0	19	100.00%		



	A	B	C	D	E	F	G	H	I	J	K	L
2445												
2446	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>											
2447	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>											
2448	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>											
2449												
2450	<b>The data set for variable Thallium (m-57a) was not processed!</b>											
2451												
2452												
2453												
2454	<b>Thallium (m-58a)</b>											
2455												
2456				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
2457			Raw Statistics	22	3	19	0	19	100.00%			
2458												
2459	<b>Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</b>											
2460	<b>Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</b>											
2461	<b>The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</b>											
2462												
2463	<b>The data set for variable Thallium (m-58a) was not processed!</b>											
2464												
2465												
2466												
2467	<b>Thallium (m-62a)</b>											
2468												
2469				Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs			
2470			Raw Statistics	22	3	19	1	18	94.74%			
2471												
2472	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>											
2473	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>											
2474												
2475	<b>The data set for variable Thallium (m-62a) was not processed!</b>											
2476												
2477												

**APPENDIX K**  
**WOOD REPORT DOCUMENTING THE HYDROGEOLOGIC INVESTIGATION OF THE**  
**FAP AND THE BAP**





**HYDROGEOLOGIC INVESTIGATION OF THE FLY ASH POND AND BOTTOM ASH POND  
Coal Combustion Residuals Rule Groundwater Monitoring System Compliance  
Arizona Public Service Company  
Cholla Power Plant  
Navajo County, Arizona**

**Submitted to:**

**Arizona Public Service Company  
400 North 5th Street  
Phoenix, Arizona 85004**

**Submitted by:**

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Phoenix, Arizona**

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### List of Acronyms and Abbreviations

§	Section
Amec Foster Wheeler	Amec Foster Wheeler, Environment & Infrastructure, Inc.
amsl	above mean sea level
APN	assessor's parcel number
APP	Aquifer Protection Permit
APS	Arizona Public Service
ASD	Alternative Source Demonstration
BAM	Bottom Ash Monofill
BAP	Bottom Ash Pond
bgs	below ground surface
CCR	coal combustion residuals
CFR	Code of Federal Regulations
Cholla	Cholla Power Plant
CMA	Corrective Measures Assessment
COC	constituent of concern
CSM	Conceptual Site Model
FAP	Fly Ash Pond
ft	foot, feet
GWPS(s)	Groundwater Protection Standard(s)
I-40	Interstate 40
in	inch
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
NTUs	nephelometric turbidity units
PVC	polyvinyl chloride
SAP	Sampling and Analysis Plan
SEDI	Sedimentation Pond
Site	Cholla Power Plant Site
SSI(s)	statistically significant increase(s)
SSL(s)	statistically significant level(s)
TDS	total dissolved solids
TestAmerica	TestAmerica Laboratories, Inc.
Wood	Wood Environment & Infrastructure Solutions, Inc.

## 1.0 Introduction

On behalf of Arizona Public Service (APS), Wood Environment & Infrastructure Solutions, Inc. (Wood) prepared this *Hydrogeologic Investigation of the Fly Ash Pond (FAP) and the Bottom Ash Pond (BAP)* to characterize the nature and extent of potential contaminant releases from coal combustion residuals (CCR) units located at the Cholla Power Plant (Cholla or the Site) in Navajo County, Arizona. The report documents investigation activities required by 40 Code of Federal Regulations (CFR) Part 257 (herein referred to as the CCR Rule [Federal Register 2018]) to support a future assessment of corrective measures for identified groundwater impacts.

The CCR Rule became effective on October 19, 2015 and established standards for the disposal of CCR in landfills and surface impoundments (CCR units) at applicable sites. In particular, the rule set forth groundwater monitoring and corrective action requirements for CCR units in 40 CFR Sections (§) 257.90 through 257.95. APS has initiated CCR Rule groundwater compliance activities at Cholla and conducted statistical assessments of collected groundwater data (Wood 2018b and Wood 2018c). Based on these statistical assessments, there is evidence to suggest that releases from the subject CCR units (i.e., the FAP and BAP) have occurred and require additional investigation.

The remainder of this section (Section 1.0) provides a summary description of the power generating facility site CCR units, the facility's environmental setting, and groundwater compliance activities conducted at the Site which form the basis for this hydrogeological investigation. Section 2.0 documents field activities conducted as part of the investigation, and Section 3.0 presents an evaluation of collected data from the investigation. Results of the hydrogeological investigation are summarized in Section 4.0. Section 5.0 presents report references.

### 1.1 Site Background

#### 1.1.1 Facility and CCR Unit Description

*Facility Description.* Cholla is an operating power plant owned by APS and PacifiCorp. The plant burns coal in three electrical generating units (Units 1, 3, and 4) and has a net generating capacity of 767 megawatts. Unit 2 was retired in October of 2015.

Coal burned at the plant was previously sourced from the McKinley Mine in New Mexico. When the McKinley Mine closed in 2009, the source of coal switched to the Lee Ranch and El Segundo mines near Grants, New Mexico.

*Facility Location.* The plant and associated infrastructure are located on land owned/leased by APS adjacent to Interstate 40 (I-40) between the City of Winslow and the City of Holbrook in Navajo County, Arizona (Figure 1-1). The plant sits next to the Cholla Reservoir, a cooling pond and water storage reservoir that was originally constructed in the early 1900s by the Joseph City Irrigation Company (Shilling, 2005). Now used by APS for cooling water, Cholla Reservoir receives deliveries of groundwater pumped from the nearby Cholla Well Field extracting from the Coconino Sandstone Aquifer. The typical water surface elevation of Cholla Reservoir is 5,022 feet (ft) above mean sea level (amsl).

*CCR Unit Descriptions.* Plant infrastructure includes four single CCR units referred to as the FAP, BAP, Bottom Ash Monofill (BAM), and Sedimentation Pond (SEDI). All the CCR units except the SEDI are located north of I-40 (Figure 1-2). The SEDI was the first of the CCR units placed into service in 1976. The FAP and BAP dams were completed in 1978, and the BAM came into operation in the late 1990s. Table 1-1 summarizes the

location, function, operation, size/construction, and history of each unit. The boundaries of the CCR units depicted in Figure 1-2 are based on available historical plans for the units.

Multiple monitoring well systems (which consist of background wells and downgradient waste boundary wells for each unit) are in place at Cholla to monitor groundwater conditions associated with the site CCR units (Table 1-2). The installation of these networks is documented in the system certification report titled *Cholla Power Plant Coal Combustion Residuals Program – Design, Installation, and Evaluation of Completeness of Groundwater Monitoring Networks* and is identified as compliant with 40 CFR §257.91(a) through (e) (Montgomery & Associates 2017). Land ownership in the vicinity of the CCR units is shown in Figure 1-3.

### **1.1.2 Environmental Setting**

Unless otherwise noted, the following information is abstracted from Montgomery & Associates (2011), Montgomery & Associates (2017), and AMEC Environment & Infrastructure, Inc. (AMEC, 2012).

*Climate.* The plant is located in an arid climate within the Little Colorado River Basin. The area receives an average of 6 to 12 inches of precipitation annually. The evaporation rate exceeds the rate of precipitation by an order of magnitude.

*Topography.* Cholla is located at an elevation of approximately 5,025 ft amsl in the Colorado Plateau physiographic province of northeastern Arizona. This area is characterized by canyons, high elevations, and narrow, widely-spaced riverbeds. The topography of the plant area is characterized by rolling terrain, open vistas, and incised drainages/arroyos. In the vicinity of the plant, the ground surface gently slopes toward the Little Colorado River to the south at approximately 60 ft per mile; however, surface drainage immediately near Cholla Reservoir flows towards the reservoir. About two miles north and south of the plant, the ground surface rises out of the alluvial floodplain to an elevation of 5,100 to 5,200 ft amsl.

*Surface Water Hydrology.* The plant is located north of the Little Colorado River within the Middle Little Colorado watershed. The Little Colorado River is a meandering, intermittent stream with a large alluvial floodplain.

Two of the site CCR units, the FAP and BAP, are located within ephemeral tributaries to the Little Colorado River (Figure 1-2). An unnamed wash system with a drainage basin of approximately 1,200 acres discharges into the FAP. The BAP is located within a tributary to Tanner Wash.

*Site Geology.* The Colorado Plateau, on which the plant is located, is typified by horizontal layered sequences of sedimentary rock, primarily sandstones, siltstones, and claystones. At the plant and nearby CCR units, the geologic units that are expected to influence groundwater flow and contribute to variations in naturally-occurring constituent concentrations across the Site are as follows (in descending order):

- *Little Colorado River and Tanner Wash Alluviums:* These quaternary surface alluviums overlie the bedrock formations in localized areas at Cholla and surrounding CCR units. The alluvium is unconsolidated, heterogeneous, and consists of clay, silt, sand, and gravel. In general, the Tanner Wash Alluvium is finer-grained than the Little Colorado River Alluvium. The alluvium ranges in thickness from non-existent to approximately 200 ft, and in general is thickest underneath the plant and Cholla Reservoir. A lower-permeability layer of fine-grained alluvial materials underlies the Cholla Reservoir and limits leakage from the reservoir to the underlying alluvial aquifer. Around the CCR units, the alluvium ranges from approximately 50 ft thick in the vicinity of the FAP dam to 100 ft thick in the vicinity of the BAP dam.



- *Chinle Formation:* An outcropping of the Chinle Formation of Triassic age is present in the vicinity of the BAP. The Chinle is divided into the Shinarump and Petrified Forest Members. In this area, the Shinarump Member is present and mostly a yellowish-orange to yellowish-gray sandstone that is composed of very fine to very coarse quartz grains and rounded to well-rounded pebbles. The member is, for the most part, weakly cemented and forms slopes. Typically, the surface is soft and covered with well-rounded pebbles of quartzite, jasper, and chert.
- *Moenkopi Formation:* The Moenkopi Formation is the uppermost geologic unit beneath the plant and the CCR units and is present at land surface in areas where the alluvium is non-existent. The thickness of the Moenkopi Formation near the plant ranges from non-existent to over 300 ft thick; where it is sufficiently thick, the Moenkopi Formation acts as an aquitard between the shallow alluvial aquifer and the underlying Coconino Sandstone Aquifer. The Moenkopi Formation consists of three members, described below:
  - *Holbrook Member:* This member is composed of pale red, thin to thick bedded sandstone. It is made up of medium to very fine poorly sorted sand and contains considerable silt. It is relatively permeable. In the area northwest of Tanner Wash near the BAP (which is the only region it is known to be present near the plant), the sandstone is overlain by about 30 ft of reddish-brown, thin-bedded mudstone and siltstone. This unit is generally a 40- to 50-ft thick member of the Moenkopi.
  - *Moqui Member:* This member is composed of pale-brown to reddish-brown gypsiferous mudstone and siltstone beds. It contains an abundance of gypsum nodules, stringers, and layers. It contains thin bands composed of greenish-gray and dark yellow siltstone. The beds are lenticular and sharply defined channels are present. This unit is generally a 250- to 300-ft thick member of the Moenkopi, although it is observed to be only 22 ft thick on the south side of the FAP at W-125.
  - *Wupatki Member:* This member consists of a lower sequence of pale-reddish-brown, thin-bedded siltstone with a few feet of yellowish-gray to almost white thin-bedded sandstone and mudstone at the base. An upper sequence consists of grayish red to reddish-brown, very fine to fine-grained sandstone with minor amounts of silt. The sandstone in this unit can be in hydraulic connection with the underlying Coconino Sandstone. The Wupatki member is generally a 30- to 50-ft thick member of the Moenkopi.
- *Coconino Sandstone:* The Permian-age Coconino Sandstone is the principal lithologic unit of the C-aquifer, a regionally important aquifer for water supply. It is composed of very fine- to medium-grained, well-sorted, rounded to subangular quartz grains cemented commonly with silicious cement. The sandstone has variable permeability depending on the degree of fracturing and cementation. It is a very pale orange to almost pure white in color. The unit is approximately 375 to 400 ft thick in the vicinity of the plant.
- *Schnebly Hill Formation:* The Schnebly Hill Formation is a very fine-grained, reddish sandstone that is about 300 to 350 ft thick near the plant. It is part of the C-aquifer, but its hydraulic conductivity is about 10 to 28 percent that of the Coconino Sandstone.
- *Supai Formation:* The Pennsylvanian to Lower Permian Supai Formation underlies the Coconino Sandstone. It has minimal impact on the surface operations of Cholla, other than containing an approximately 600-ft thick deposit of halite and anhydrite in the Cholla well field area that impacts groundwater quality both regionally and in the vicinity of the plant.

*Applicable Hydrostratigraphy.* Two important hydrostratigraphic units are conceptualized beneath the plant and associated CCR units. These units form the basis for the hydrogeologic Conceptual Site Model (CSM) that was developed by Montgomery & Associates (2011 and 2017) for the purpose of evaluating point of compliance wells for Cholla's Aquifer Protection Permit (APP) and CCR Groundwater Monitoring System.

The first hydrogeologic unit, the Little Colorado River and Tanner Wash Alluvial Aquifers, is present under the plant area, Cholla Reservoir, and the Tanner Wash and Little Colorado River drainage channels. The alluvial aquifer in this area receives recharge from the Little Colorado River and any leakage through anthropogenic features such as the reservoir and the nearby Joseph City Canal. The alluvial aquifer is not used as a drinking water supply but does support a riparian habitat. Depth to water in the alluvial aquifers ranges from several feet to several tens of feet below land surface in the Cholla area, varying spatially based on proximity to recharge sources and topography and seasonally based on rainfall-runoff patterns. Where present, groundwater flows generally in the downstream direction of the drainages under which it is present, that is, from east to west in the Little Colorado River alluvium and from north to south in the Tanner Wash alluvium. Groundwater flow in the Little Colorado River alluvial aquifer is also influenced by deeper paleochannels that may not coincide with the present-day river channel.

The second hydrostratigraphic unit is the C-aquifer, which consists of the Coconino Sandstone and Schnebly Hill Formation in the vicinity of the plant. Groundwater in this aquifer is under confined conditions in areas north of the Little Colorado River where sufficiently thick layers of the Moenkopi Formation's Moqui member acts as a confining bed. Groundwater movement in the C-aquifer is generally to the north. However, the Cholla well field (southwest of the plant) has created a cone of depression that has made the groundwater flow in a westerly direction in that area. Near the FAP, the inferred direction of flow of the groundwater in the C-aquifer is to the west or southwest, possibly due to the broad, northwest-trending anticline that extends from the vicinity of the FAP to near Joseph City.

The alluvial aquifer and the C-aquifer are generally separated by the Moenkopi Formation, a regional aquitard that creates a barrier between the two aquifers in the vicinity of Cholla. In areas where the C-aquifer in the Coconino Sandstone is confined (primarily north of the Little Colorado River), the Wupatki member of the Moenkopi has been observed to be water-bearing; however, the Moqui member, which can be 250 to 300 feet thick in the vicinity of the plant, limits hydraulic connection between the alluvial aquifer and the C-aquifer.

*Ambient Groundwater Quality.* Ambient groundwater quality has been characterized in several previous reports (Sergent, Hauskins, & Beckwith 1973; Woodward-Clyde 1991; Montgomery & Associates 2011, 2017, and 2018; and AMEC 2012). In general, early data from the Site suggest that background water quality in the Little Colorado River alluvium is variable and possibly fairly poor due to elevated total dissolved solids (TDS) concentrations (Sergent, Hauskins, & Beckwith 1973; Montgomery & Associates 2017). Near the BAP and the FAP, background water quality has naturally-elevated concentrations of TDS and sulfate due to interaction with the Moqui member of the Moenkopi, which has gypsum stringers and an overall sulfate mineralogy (Montgomery & Associates 2017; Woodward-Clyde 1991). High nitrate concentrations observed in monitoring wells around the BAP are suspected to be naturally-occurring (Woodward-Clyde 1991). Background water quality in the alluvial aquifer improves near the Little Colorado River, as concentrations of TDS tend to decline.

## **1.2 Basis for Hydrogeological Investigation**

### **1.2.1 CCR Groundwater Monitoring Compliance**

The groundwater monitoring and corrective action process defined in the CCR Rule includes a phased approach to groundwater monitoring for each CCR unit:

- **Detection Monitoring:** This groundwater monitoring phase focuses on a set of constituents (listed in Appendix III of the CCR Rule) that are relatively mobile components of CCR and therefore represent indicators of possible impacts from CCR in groundwater. If statistically significant increases (SSIs) of any of the Appendix III constituents relative to background conditions are detected in the downgradient waste boundary wells and cannot be demonstrated to be associated with a source other than the CCR unit, then groundwater monitoring moves into assessment monitoring.
- **Assessment Monitoring:** This groundwater monitoring phase focuses on the constituents listed in Appendix IV of the CCR Rule. The Appendix IV constituents are generally less mobile and occur at lower concentrations in groundwater than the Appendix III constituents. Concentrations of Appendix IV constituents in downgradient wells are compared to Groundwater Protection Standards (GWPSs). The GWPSs, established for Appendix IV constituents only, are the higher of either the federal Safe Drinking Water Act Maximum Contaminant Level (MCL), an alternative risk-based GWPS identified in the CCR Rule, or a statistically-driven background threshold value for each constituent.
- **Groundwater Characterization and Corrective Action Assessment:** If exceedances of the GWPSs are determined to be occurring in the downgradient boundary wells at statistically significant levels (SSLs) and no alternative sources for the exceedances can be demonstrated, then both additional groundwater characterization and assessment of corrective actions are initiated. Following assessment of corrective measures, a remedy (or set of remedial activities) is selected and implemented as the groundwater corrective action program for the CCR unit. According to the CCR Rule, groundwater corrective action will continue until compliance with the GWPSs has been attained in all impacted wells and sustained for a period of three consecutive years.

### **1.2.2 Statistical Assessment of Collected Groundwater Data**

APS initiated CCR groundwater detection monitoring at Cholla in November 2015 and completed collection of at least eight initial rounds of monitoring at all wells in October 2017 in accordance with the CCR Rule. Statistical analysis of Appendix III constituent data collected during detection monitoring was completed in January 2018 and updated in May 2018. The analysis concluded that there is enough evidence to declare an SSI over background for one or more Appendix III constituents at the FAP, BAP, and SEDI (Montgomery & Associates 2018). On the basis of this analysis, assessment monitoring was initiated at the subject units and a statistical evaluation of Appendix IV constituent monitoring data was conducted.

Table 1-3 summarizes calculated GWPSs and identifies constituents and wells at which exceedances over GWPSs at SSLs have been reported. As indicated, there was sufficient evidence to declare exceedances for fluoride, lithium, arsenic, cobalt, and molybdenum concentrations downgradient of the FAP (Wood 2018b) and cobalt and lithium concentrations downgradient of the BAP (Wood 2018c). This hydrogeological investigation is intended to further define the extent of CCR constituents that have been observed to exceed applicable GWPSs in the assessment monitoring stage. These constituents are herein referred to as constituents of concern (COCs).

### 1.2.3 Conceptual Site Models

To characterize the nature and extent of fluoride, lithium, arsenic, cobalt, and molybdenum downgradient of the FAP and cobalt and lithium downgradient of the BAP, unit-specific CSMs were developed prior to initiating the hydrogeological investigation documented herein.

#### 1.2.3.1 CSM for the FAP

- The FAP is located within an ephemeral tributary to the Little Colorado River on the north side of I-40 approximately 1.5 miles southeast of the plant. The FAP dam was constructed approximately 40 years ago on alluvial and Moenkopi Moqui geologic units within an unnamed wash system that previously discharged to the Little Colorado River alluvium.
- The FAP dam has a clay core and an underlying slurry cutoff wall that extends one foot into the Moenkopi Moqui or two feet into stiff clay along the centerline of the dam where the alluvium prior to dam construction was greater than 20 ft thick. Where the alluvium was less than 20 ft thick, no cutoff wall was constructed, and the clay core was extended through the alluvium to the top of the Moenkopi Moqui bedrock. As a result, the slurry cutoff wall is only located in the middle portion of the dam and the extended clay core is located on the edges of the dam. Site investigations and evaluations to support design of the dam concluded that the alluvium has a relatively low permeability compared to typical alluvial materials due to the presence of silt and clay in the formation. The underlying Moenkopi Moqui is understood to have a low vertical permeability but could possibly have a higher lateral secondary permeability through bedding planes, fractures, joint structures, and the presence of gypsum nodules, stringers and layers.
- Following dam construction, fourteen piezometers were drilled and screened in the Moenkopi Moqui downgradient of the dam to monitor dam stability. During drilling in 1979, none of the piezometers encountered groundwater. As of late 2018, all but two of the piezometers downgradient of the dam that are screened in the Moenkopi Moqui have measurable water levels. Piezometers screened downgradient of the FAP dam in the Moenkopi Moqui have approximately 30 to 50 feet of head and monitored water levels appear to fluctuate with long-term water level trends in the FAP, suggesting a hydraulic connection between the FAP and the Moenkopi Moqui in the vicinity of the dam.
- Groundwater monitoring data indicate that attenuation in COC concentrations occurs between the FAP and downgradient unit boundary monitoring wells M-50A, M-51A, and W-123. Groundwater quality observations in downgradient wells after an increase in FAP fluoride concentrations (resulting from the shutdown of the Cholla Plant Unit 2 in October 2015) suggest that corresponding increases in downgradient well fluoride concentrations were relatively immediate (within a year), and that concentrations quickly stabilized to current levels thereafter. These observations suggest that in the vicinity of the dam, migration of contaminants to unit boundary monitoring wells may be influenced by preferential flow paths through or under the dam.

#### 1.2.3.2 CSM for the BAP

- The BAP is located on the north side of I-40 approximately one-mile northeast of the plant within a side channel to the Tanner Wash, an ephemeral tributary to the Little Colorado River. The BAP dam was constructed on alluvial and Moenkopi Moqui geologic units and has been used to impound bottom ash slurry for approximately 40 years.
- The eastern and southern portions of the BAP dam were constructed on alluvial, Moenkopi Holbrook, Moenkopi Moqui, and Chinle geologic units. The southern BAP dam has a slurry cutoff wall in the region

of the dam where the alluvium was greater than 20 feet thick prior to construction, and elsewhere in the southern and eastern dams, where the alluvium was less than 20 feet thick, the clay core extended through the alluvium to bedrock. As a result, the slurry cutoff wall was only constructed in the middle portion of the southern portion of the dam.

- Since the slurry cutoff wall was designed to provide dam stability and not prevent seepage under the dam, the slurry cutoff wall in the southern portion of the dam does not extend all the way through the alluvium to the Moenkopi Moqui bedrock. There is an approximately 10- to 20-ft thick layer of alluvium at the base of the cutoff wall above the Moqui.
- The alluvium in Tanner Wash and the wash beneath the southern portion of the dam appears to have a zone of coarser material at depth that includes clasts of petrified wood, likely eroded from the Chinle formation. It is likely that the various geologic units surrounding Tanner Wash contribute to natural variations in groundwater quality in the alluvium.
- Piezometers installed along the toe of the eastern portion of the dam have observable groundwater levels. The Moenkopi Moqui is understood to have a low vertical permeability but could possibly have a higher lateral secondary permeability through bedding planes, fractures, joint structures, and the presence of gypsum nodules, stringers, and layers. Surface seeps have occurred where flow may be migrating through distinct beds in the Moqui that intersect the ground surface.

## **2.0 Description of Investigation Activities**

Previous characterization efforts conducted at Cholla have facilitated development of the CSMs for the FAP and BAP and helped guide the investigation activities documented herein. This hydrogeological investigation was conducted in accordance with the *Well Installation and Sampling Work Plan* for the FAP (Wood 2018a) and is intended to meet groundwater characterization requirements for CCR units in the assessment monitoring stage, as specified in 40 CFR §257.95(g)(1).

During development of the planned investigation activities, the existing BAP monitoring well network (consisting of CCR and supplementary wells) was evaluated and considered adequate to define the nature and extent of COCs in groundwater downgradient of the BAP and meet the requirements of 40 CFR §257.95(g)(1). Specifically, the requirement to install a downgradient boundary well per 40 CFR §257.95(g)(1)(iii) was considered to be satisfied by the existing wells near the downgradient property boundary (e.g., W-301). Therefore, no additional wells were installed downgradient of the BAP as part of this investigation.

### **2.1 Delineation of Saturated Alluvial Aquifer**

Several previous attempts to install monitoring wells downgradient of the FAP have been unsuccessful because the boreholes were dry (e.g., W-127R, W-127RR, M-46AA [AMEC 2012]). Because the proposed new monitoring wells downgradient of the FAP would be used to assist in the delineation of elevated concentrations of COCs, the borings needed to be within the saturated portion of the alluvium, but also close enough to the presumed boundary of the plume to provide meaningful information. To estimate the extent of the saturated alluvial aquifer downgradient of the FAP, APS measured depth to water at select CCR and supplemental monitoring wells in August 2018. Additional depth to water and alluvial thickness data were obtained from a June/July 2017 potentiometric surface map and an alluvial thickness map developed by Montgomery & Associates (2017).

In the absence of specific geologic contact information, the following assumptions were made to calculate the saturated thickness of the alluvium:

- The geologic contact between the alluvium and the Moenkopi Formation at a given point could be approximated as the total depth of the monitoring well at that location;
- The alluvium is a single unit; and
- The saturated alluvial thickness is equal to groundwater elevation minus geologic contact elevation.

To estimate the saturated thickness of the alluvium, the elevation of the geologic contact was subtracted from the calculated groundwater level elevation at select monitoring wells. Wells that were measured and found to be dry and boreholes that were drilled dry were used to define the area of unsaturated alluvium. The results are shown in Figure 2-1.

## **2.2 August 2018 Groundwater Sampling**

APS conducted compliance monitoring associated with the facility's APP for the Site between August 2 and 7, 2018. Groundwater sampling was conducted in accordance with the groundwater Sampling and Analysis Plan (SAP) developed for the APP program (Mogollon Environmental Services LLC, 2013 201). The samples were analyzed by TestAmerica Laboratories, Inc. (TestAmerica), an Arizona Department of Health Services certified environmental laboratory (AZ0728). The August 2018 sampling event provided data to inform the placement of new monitoring wells at the FAP, and the results are summarized in Table 2-1. Laboratory reports for the samples are provided in Appendix A.

## **2.3 Well Installation Downgradient of the FAP**

This section provides a description of well installation activities, including boring logs and well construction diagrams, a well location map, and a well construction table. Boring logs and well construction diagrams are included in Appendix B, and photographs of the formation samples are presented in Appendix C.

### **2.3.1 Well Location and Purpose**

Three new groundwater monitoring wells (MW-65A, MW-66A, and MW-67A) were installed during the investigation to promote characterization of the nature and extent of COC concentrations downgradient of the FAP. The wells were installed in accordance with the Well Installation and Sampling Work Plan (Wood 2018a). Figure 1-2 presents the location of these wells relative to other site infrastructure. Rationale behind the location and purpose of each well is as follows:

- MW-65A is located on the south side of I-40 downgradient of the northwest side of the FAP dam approximately 950 ft downgradient of CCR downgradient monitoring well M-51A, in which some of the highest concentrations of fluoride are observed relative to other FAP monitoring wells. The objective of this well is to better define the extent of elevated fluoride concentrations downgradient of M-51A and better define the groundwater flow and saturated thickness in the area downgradient of the FAP.
- MW-66A is located on the south side of I-40 downgradient of the middle part of the FAP dam. The objective of this well is to better define groundwater flow and fluoride concentrations in an area thought to experience relatively lower seepage rates compared to the sides of the dam, due to how the central portion of the dam was constructed.

- MW-67A is located on the south side of I-40 approximately ¼-mile downgradient from MW-66A. The objective of this well is to serve as a sentinel monitoring well (i.e., a monitoring point outside of the area with elevated COC concentrations) to provide plume definition for the near future. Wood estimated the transport velocity of fluoride in the alluvial aquifer based on historical water quality data and previous hydrogeological investigations to identify this location, which was anticipated to have fluoride concentrations above the laboratory reporting limit but below the GWPS of 4.0 mg/L.

### **2.3.2 Borehole Advancement**

Wood contracted a licensed Arizona driller, Boart Longyear, to install the groundwater monitoring wells using a truck-mounted Sonic drill rig powered with a diesel engine. Continuous formation samples were inspected by a Wood field geologist at 2.5-ft depth intervals to log soils using the Unified Soil Classification System. Photos of the formation samples from the boreholes are provided in Appendix C. Borings were generally advanced approximately 2 to 5 ft into the Moenkopi Formation in order to identify and characterize the contact surface between the alluvium and the Moenkopi. After the contact was identified, the boring was backfilled with hydrated bentonite chips to seal off the Moenkopi from the alluvial aquifer.

Wood collected soil samples using a split spoon in the MW-67A boring at three depths: 11 to 11.5 ft bgs, 16 to 16.5 ft bgs, and 21 to 21.5 ft bgs. The samples were preserved in brass sleeves enclosed in plastic bags and delivered to the Wood materials laboratory to be tested for moisture content, specific gravity, and porosity. The soil samples were analyzed to obtain representative values for porosity for use in the site-specific groundwater flow and contaminant transport model developed to support corrective measures assessments at the FAP and BAP. The results of the soil laboratory tests are included in Appendix D.

Where present, the depth at which groundwater was initially observed was measured and recorded. Additional depth to water measurements were recorded as groundwater levels stabilized. The water level measurements are summarized in the boring logs presented in Appendix B.

### **2.3.3 Well Installation**

Groundwater monitoring wells MW-65A, MW-66A, and MW-67A were installed between November 12 and November 15, 2018. The wells were designed similar to existing CCR wells at the Site. The wells are each constructed of a 4-inch (in) nominal diameter Schedule 80 polyvinyl chloride (PVC) well casing and a 4-in nominal diameter Schedule 80 PVC screen with a 0.020-in slot size. Filter pack material consists of 8-12 silica sand, and a thin layer of pea gravel was placed directly on top of the filter pack to prevent clogging from the hydrated bentonite chips that were placed above the filter pack as a seal. The surface seal consists of cement grout. A well construction variance was filed with the Arizona Department of Water Resources for wells where the surface completion was less than 20 ft long (i.e., MW-65A and MW-67A). Surface completions consist of lockable 8-in diameter steel casings that extend approximately 2 ft above the ground surface. The surface vaults are surrounded by a 3-ft by 3-ft concrete pad with traffic bollards.

The wells are screened in the unconsolidated alluvium that overlies the Moenkopi Formation. The screen lengths are 10 ft, 20 ft, and 30 ft for MW-65A, MW-66A, and MW-67A, respectively. Construction details of the new monitoring wells are provided in Appendix B and summarized in Table 1-2.

### **2.3.4 Well Development**

The new monitoring wells were developed using swabbing, bailing, and pumping techniques on November 15 and 16, 2018. The development techniques used at each well depended on the volume of water produced by each well; however, the following is a general summary of the development process:

- The well screen was swabbed.
- Excess sediment was removed by bailing.
- Development was completed by moving the pump up and down the screen interval to remove fines until turbidity measured below 10 nephelometric turbidity units (NTUs) as measured with an electronic turbidimeter.

The volume of water removed from wells MW-65A and MW-67A was minimal (less than 4 gallons from MW-65A and approximately 25 gallons from MW-67A). An estimated 900 gallons was removed from MW-66A during development. After bailing the wells, water levels were slow to recover and had to be left overnight before recovering sufficiently for pumping. Groundwater from MW-65A failed to meet the 10 NTU specification due to slow recharge in the well. Table 2-2 summarizes the development activities for each well.

### **2.3.5 Management of Investigation-Derived Waste**

Investigation-derived waste included soil cores generated during borehole advancement and groundwater removed during well development.

Soil cores were placed on plastic sheeting and excess soil cuttings were spread on the ground. At the request of APS, the soil cores were left at the well site for inspection and subsequent disposal. In accordance with the provisions of the 1.04 General Permit (Arizona Administrative Code R18-9-B301.D), water produced during development was discharged to the land surface adjacent to the well.

### **2.3.6 Well Survey**

The location, surface elevation, and top of casing elevation of the completed wells were surveyed on December 19, 2018 by a registered land surveyor (Arizona). The survey report is provided in Appendix E, and details of the survey results are summarized in Table 1-2.

## **2.4 December 2018 Groundwater Sampling**

Following installation of the new monitoring wells, APS conducted a second round of groundwater sampling for investigation purposes at select CCR and supplemental site monitoring wells between December 5 and 8, 2018. Groundwater sampling was conducted according to the SAP developed for Cholla (Montgomery & Associates 2015) and the samples were analyzed by TestAmerica. Results from the December 2018 sampling event are presented in Tables 2-1 and 2-3 for the FAP and BAP, respectively. Laboratory reports and data validation reports for the December 2018 analyses are provided in Appendix A.

Evaluation of collected data, including delineation of COCs exceeding GWPSs at the FAP and BAP, is discussed in Section 3.

## **3.0 Evaluation of Collected Investigation Data**

The evaluation and discussion that follows relies on observations made during installation of the new wells and analytical data collected in December 2016, August 2018, and December 2018. Data collected during regularly-scheduled monitoring associated with CCR units under the CCR Rule were also evaluated. Data specific to the regularly-scheduled monitoring are included in the Annual Groundwater Monitoring and Corrective Action Report for 2018 (Wood, 2019) and the results, while used to inform the delineation of



COCs shown in Figures 3-1 through 3-7, are not duplicated here. The laboratory reports for the December 2016, August 2018, and December 2018 sampling events are included in Appendix A.

### **3.1 Fly Ash Pond**

#### **3.1.1 Notable Hydrogeologic Conditions Encountered During Investigation**

Hydrogeologic conditions encountered at the new monitoring wells during well installation are outlined below:

*MW-65A:* This well is located closest to the edge of the alluvial channel, and as such, the underlying Moqui member of the Moenkopi Formation is relatively shallow, from 20.5 ft bgs to the total depth of the borehole at 22.5 ft bgs. Alluvial materials directly above the Moenkopi consist of a sandy elastic silt from 13.5 ft bgs to 20.5 ft bgs overlain by a silty clay from 5.5 ft bgs to 13.5 ft bgs. During borehole advancement, groundwater was first encountered within the sandy elastic silt at 13.7 ft bgs. The MW-65A well screen was installed above the Moenkopi Moqui within the silty clay and sandy elastic silt. Following well installation and development, groundwater was measured at 14.1 ft bgs, suggesting that the semi-confined conditions observed elsewhere in the alluvial aquifer are not present in this vicinity.

*MW-66A:* This well is located downgradient of the FAP dam in the middle of the unnamed wash channel. Alluvial material is thickest in this well compared to MW-65A and MW-67A, which is consistent with the CSM for the FAP. The alluvial materials primarily consist of medium- to high-plasticity clay from essentially the ground surface (below the topsoil) to just above the contact with the Moenkopi Moqui, which was encountered from 52.5 ft bgs to the total depth of the borehole at 60 ft bgs. During borehole advancement, no obvious signs of groundwater were observed until a gravelly clay interval from 47.5 to 52.5 ft bgs was encountered. Approximately 1 hour after penetrating the gravelly clay interval, groundwater was measured in the borehole at 31.9 ft bgs. The MW-66A well screen was installed within the gravelly clay interval above the Moenkopi Formation. Following well installation and development, the water level stabilized at 28.5 ft bgs, indicating localized semi-confined conditions in the alluvial aquifer at this location.

*MW-67A:* This well is located downgradient from elevated concentrations of COCs observed in monitoring wells near the FAP. Alluvial materials at MW-67A consist primarily of clay from ground surface to 47.5 ft bgs, and a gravelly clay interval above the Moqui member from 43 ft bgs to 47 ft bgs. The Moqui is present from 47 ft bgs to the total depth of the borehole at 50 ft bgs. Groundwater was initially encountered at 35.8 ft bgs during borehole advancement. The MW-67A well screen was installed within the gravelly clay interval above the Moenkopi Formation. Following well installation and development, groundwater was measured at 33.9 ft bgs, suggesting semi-confined conditions similar to MW-66A.

Based on the lithologic logs and groundwater observations made during well installation activities, notable alluvial formation conditions include:

- The presence of a relatively permeable and thin layer of gravelly clay above the Moenkopi Moqui which is overlain by a relatively thick layer of medium- to high-plasticity clay. Alluvial groundwater appears to primarily occur under semi-confined conditions in the thin layer of gravelly clay above the Moqui at MW-66A and MW-67A.
- The alluvial material is thickest towards the middle of the wash channel (i.e., at MW-66A) and thins towards the edges (i.e., at MW-65A).

### **3.1.2 Nature and Extent of Release**

Analytical results from groundwater samples collected from the site monitoring wells (Table 2-1) were used to identify the extent of arsenic, cobalt, fluoride, lithium, and molybdenum concentrations over the respective GWPSs at the FAP. The results are depicted using iso-concentration contours in Figures 3-1, 3-2, 3-3, 3-4, and 3-5 for arsenic, cobalt, fluoride, lithium, and molybdenum, respectively. The iso-concentration contours represent the inferred footprints of elevated COCs in groundwater and are defined in relation to respective GWPSs. The footprints depicted on each figure are inferred from analytical data collected from the site monitoring wells.

The distributions of arsenic and cobalt in the aquifer downgradient of the FAP are not consistent with the distribution of other FAP COCs (i.e. fluoride, lithium, and molybdenum) or boron, which has been used to indicate the presence of CCR at the Site. Arsenic is a naturally-occurring constituent in soil and groundwater and observed variations could be associated with the heterogeneity of arsenic-containing materials in the alluvial drainage system and/or natural variations in groundwater chemistry. Cobalt is not routinely present at concentrations above the GWPS in downgradient wells and was likely identified as an exceedance based on a false positive during the initial statistical analysis of Appendix IV data (Wood, 2018b).

The spatial distributions of fluoride, lithium, and molybdenum exceeding respective GWPSs are similar. Fluoride concentrations that exceed the GWPS appear to remain predominantly beneath APS property or the I-40 right-of-way. Lithium concentrations that exceed the GWPS are present across the entire extent of alluvium downgradient of the dam and extend under the I-40 right-of-way onto downgradient property. Molybdenum concentrations that exceed the GWPS are predominantly confined to the region near and downgradient of the Geronimo seep, which extends under the I-40 right-of-way onto downgradient property.

### **3.1.3 Potential for Off-Site Migration of Contamination**

The inferred direction of groundwater flow in the alluvial aquifer downgradient of the FAP is towards the southwest. The inferred footprints of COC concentrations in groundwater are depicted using iso-concentration contours on Figures 3-1 through 3-5. The iso-concentration contours are defined by inferred COC concentrations in groundwater relative to respective GWPSs. Based on a comparison of Figure 1-3 to Figures 3-4 and 3-5, concentrations of lithium and molybdenum above the respective GWPS have likely migrated off-site to privately-owned APN 109-32-001.

## **3.2 Bottom Ash Pond**

### **3.2.1 Notable Hydrogeologic Conditions Encountered During Investigation**

No additional monitoring wells were installed as part of this hydrogeological investigation at the BAP.

### **3.2.2 Nature and Extent of Release**

Analytical results from groundwater samples collected from site monitoring wells (Table 2-3) were used to estimate the extent of cobalt and lithium concentrations over the respective GWPSs at the BAP. The results are depicted using iso-concentration contours in Figures 3-6 and 3-7 for cobalt and lithium, respectively. The iso-concentration contours represent the inferred footprints of elevated cobalt and lithium concentrations in groundwater and are defined in relation to respective GWPSs. The footprints depicted on each figure are inferred from analytical data collected from the site monitoring wells.

Elevated concentrations of cobalt appear to be present around the downgradient extent of the south and eastern dams at concentrations that exceed the GWPS of 0.006 mg/L. Cobalt concentrations that exceed the GWPS extend onto adjacent properties owned by the U.S. Federal Government and privately-owned Navajo County Assessor's parcel number (APN) 107-22-002. The highest concentrations are located in the vicinity of M-52A and W-307.

Concentrations of lithium are present in the downgradient aquifer above the GWPS of 0.31 mg/L. However, the distribution and uniformity of lithium concentrations raise doubt as to whether the exceedance is associated with discharge from the BAP, or rather, if it is associated with an alternative source, such as naturally-occurring compounds in the aquifer. An Alternative Source Demonstration (ASD) for lithium in groundwater downgradient of the BAP was completed in June 2019. The ASD concluded that natural variation in lithium concentrations is the cause of the GWPS exceedances at the BAP.

### **3.2.3 Potential for Off-Site Migration of Contamination**

The inferred direction of groundwater flow in the Tanner Wash alluvium is towards the southwest, along the direction of surface water flow. In the immediate vicinity of the BAP, groundwater flows radially outward from the BAP to the east and south of the unit. The inferred footprints of COC concentrations in groundwater are depicted using iso-concentration contours on Figures 3-6 and 3-7. The iso-concentration contours are defined by inferred COC concentrations in groundwater relative to respective GWPSs. Based on a comparison of Figure 1-3 to Figure 3-6, concentrations of cobalt above the respective GWPS have likely migrated off-site onto property owned by the U.S. Federal Government and privately-owned APN 107-22-002.

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**TABLES**



**Table 1-1**  
**Description of Coal Combustion Residual Units**

CCR Unit	Function	Operation	Size/Construction	History
Fly Ash Pond (FAP)	<i>Single CCR unit</i> - surface impoundment to store slurried fly ash from the plant.	Receives a slurry from the plant that contains primarily fly ash and flue gas emission control residuals but may also contain some bottom ash, boiler slag, boiler cleaning waste, oil/water separator solids, and storm water. Periodically receives solids from the SEDI.	- 430 acres in aerial extent. - Total storage capacity of about 18,000 acre-feet. - Normal operating pool elevation of 5,114 feet amsl.	- Constructed beginning in 1976 and placed into service in 1978. - Unlined; constructed on Moenkopi bedrock and a thin veneer of alluvial sediments. - The dam is constructed of earth fill with a central clay core that extends to bedrock where bedrock is shallow. In the central portion of the dam, where bedrock is deeper, a slurry cutoff wall extends one foot into bedrock or two feet into stiff clay.
Sedimentation Pond (SEDI)	<i>Single CCR unit</i> - collects water from drains around plant site, including storm water, process water, plant water, and slurry from plant leaks.	Collects discharge from on-site secondary wastewater treatment plant, effluent from the oil/water separator, vehicle wash water, plant wash water, and FGD wastes from scrubber or scrubber feed tank upsets. Water collected in the SEDI is pumped to Cholla's general water sump for recycling as process water.	- 1.3 acres in aerial extent. - Total storage capacity of 10.5 acre-feet. - Maximum pond depth of 10 feet. - the top of the pond side slope is at 5,019 feet amsl	- Placed into service in 1976. - Lined with a 2-foot-thick layer of compacted clay. - Constructed below grade.
Bottom Ash Pond (BAP)	<i>Single CCR unit</i> - surface impoundment to store slurried bottom ash from the plant.	Bottom ash is pumped to the BAP as a slurry. The bottom ash settles in the east and west upstream storage cells and the water is decanted to the reservoir and ultimately siphoned back to the plant for reuse. Slurry may also contain fly ash, boiler slag, flue gas emission control residuals, sedimentation pond effluent, cooling tower blowdown, oil/water separator effluent and solids, boiler cleaning waste, and storm water.	- 105 acres in aerial extent. - Total storage capacity of 2,300 acre-feet. - Normal operating pool elevation of 5,117.8 feet amsl.	- Constructed beginning in 1976 and placed into service in 1978. - Unlined; constructed on Moenkopi bedrock and Tanner Wash alluvium. - Consists of a reservoir directly behind the dam and two storage cells upstream of the reservoir. - The dam is constructed of earth fill with a central clay core that extends to bedrock where bedrock is shallow. Where bedrock is deeper, a slurry cutoff wall extends below the central clay core to provide stability to the dam.
Bottom Ash Monofill (BAM)	<i>Single CCR unit</i> - landfill for bottom ash solids excavated from the BAP.	Bottom ash that has been drained of water is excavated from the BAP and permanently stored in the BAM. Periodically receives solids from the SEDI.	- 41 acres in aerial extent.	- Placed into service in 1999.

**Notes:**

amsl - above mean sea level

BAP - Bottom Ash Pond

BAM - Bottom Ash Monofill

CCR - Coal combustion residuals

FAP - Fly Ash Pond

FGD - flue gas desulfurization

SEDI - Sedimentation Pond

**Source:**GEI Consultants, Inc. 2009. *Final Coal Ash Impoundment Specific Site Assessment Report, Arizona Public Service, Cholla Power Plant.* Submitted to Lockheed-Martin Corporation. December 2009.

**Table 1-2  
CCR Groundwater Monitoring System Summary**

Well	CCR Unit	Well Designation	Hydrogeologic Unit	Date Installed	Borehole Depth [ft bgs]	Top of Casing Elevation [ft AMSL]	Ground Surface Elevation [ft AMSL]	Top of Screen [ft bgs]	Bottom of Screen [ft bgs]	Screen Length [ft]	Top Screen Elevation [ft AMSL]	Bottom Screen Elevation [ft AMSL]	Bottom Borehole Elevation [ft AMSL]
M-50A	FAP	Downgradient	LCR Alluvium	9/18/2015	32	5,038.18	5,035.65	9	29	20	5,026.65	5,006.65	5,003.65
M-51A	FAP	Downgradient	LCR Alluvium	9/19/2015	14	5,041.77	5,039.10	7	12	5	5,032.10	5,027.10	5,025.10
W-123	FAP	Downgradient	LCR Alluvium	11/4/1983	40	5,039.90	5,038.53	14	29	15	5,024.53	5,009.53	4,998.53
M-64A	FAP/BAP	Background	LCR Alluvium	2/9/2017	69	4,991.90	4,988.90	30	60	30	4,958.90	4,928.90	4,919.90
MW-65A	FAP	Downgradient	LCR Alluvium	11/14/2018	25	5,027.86	5,026.21	9	19	10	5,017.21	5,007.21	5,001.21
MW-66A	FAP	Downgradient	LCR Alluvium	11/12/2018	60	5,033.35	5,032.46	24	49	25	5,008.46	4,983.46	4,972.46
MW-67A	FAP	Downgradient	LCR Alluvium	11/15/2018	50	5,025.38	5,024.05	15	45	30	5,009.05	4,979.05	4,974.05
M-56A	SEDI	Downgradient	LCR Alluvium	10/7/2015	100	5,023.17	5,020.63	40	85	45	4,980.63	4,935.63	4,920.63
M-57A	SEDI	Downgradient	LCR Alluvium	10/8/2015	100	5,023.82	5,021.16	40	85	45	4,981.16	4,936.16	4,921.16
M-58A	SEDI	Downgradient	LCR Alluvium	10/13/2015	100	5,023.84	5,021.24	39	84	45	4,982.24	4,937.24	4,921.24
M-62A	SEDI	Background	LCR Alluvium	11/17/2015	97	5,020.87	5,021.01	39	84	45	4,982.01	4,937.01	4,924.01
M-52A	BAP	Downgradient	Tanner Wash Alluvium	9/22/2015	83	5,049.36	5,047.08	20	70	50	5,027.08	4,977.08	4,964.08
M-53A	BAP	Downgradient	Tanner Wash Alluvium	9/22/2015	38	5,044.68	5,042.09	10	35	25	5,032.09	5,007.09	5,004.09
W-305	BAP	Downgradient	Tanner Wash Alluvium	10/7/1983	108	5,046.80	5,044.65	80	100	20	4,964.65	4,944.65	4,936.65
W-306	BAP	Downgradient	Tanner Wash Alluvium	10/11/1983	54	5,046.74	5,044.78	30	50	20	5,014.78	4,994.78	4,990.78
W-314	BAP	Downgradient	Tanner Wash Alluvium	1/27/1992	63	5,051.10	5,051.32	41	61	20	5,010.32	4,990.32	4,988.32
M-54	BAM	Background	Coconino Sandstone	10/2/2015	370	5,070.71	5,068.21	315	365	50	4,753.21	4,703.21	4,698.21
M-59	BAM	Downgradient	Coconino Sandstone	10/21/2015	425	5,136.00	5,133.86	373	423	50	4,760.86	4,710.86	4,708.86
M-60	BAM	Downgradient	Coconino Sandstone	11/1/2015	450	5,151.18	5,148.69	395	445	50	4,753.69	4,703.69	4,698.69
M-61	BAM	Downgradient	Coconino Sandstone	11/13/2015	420	5,127.58	5,124.95	365	415	50	4,759.95	4,709.95	4,704.95

**Notes:**

Source of presented information presented is Montgomery & Associates, 2017; and Wood Environment & Infrastructure Solutions, Inc. Surveying, 2018.

Vertical datum is NAVD 88

AMSL - Above mean sea level

BAM - Bottom Ash Monofill

BAP - Bottom Ash Pond

bgs - below ground surface

CCR - Coal combustion residuals

FAP - Fly Ash Pond

ft - feet

LCR - Little Colorado River

SEDI - Sedimentation Pond

**Table 1-3  
Summary of Appendix IV Constituent Statistical Analyses**

Constituent	BAP					FAP				
	BTV [mg/L]	GWPS [mg/L]	Basis for GWPS	Location of SSLs Over GWPS	Range of Exceeding LCLs [mg/L]	BTV [mg/L]	GWPS [mg/L]	Basis for GWPS	Location of SSLs Over GWPS	Range of Exceeding LCLs [mg/L]
Antimony	0.004	0.006	US EPA MCL	None	---	0.004	0.006	US EPA MCL	None	---
Arsenic	0.004	0.01	US EPA MCL	None	---	0.004	0.01	US EPA MCL	M-51A	0.012
Barium	0.05	2	US EPA MCL	None	---	0.05	2	US EPA MCL	None	---
Beryllium	0.001	0.004	US EPA MCL	None	---	0.001	0.004	US EPA MCL	None	---
Cadmium	0.0004	0.005	US EPA MCL	None	---	0.0004	0.005	US EPA MCL	None	---
Chromium	0.004	0.1	US EPA MCL	None	---	0.004	0.1	US EPA MCL	None	---
Cobalt	0.002	0.006	Alternative Risk-Based GWPS	M-52A, M-53A, W-305, and W-314	0.010-0.038	0.002	0.006	Alternative Risk-Based GWPS	M-51A	0.01*
Fluoride	0.8	4	US EPA MCL	None	---	0.8	4	US EPA MCL	M-51A	4.3
Lead	0.002	0.015	Alternative Risk-Based GWPS	None	---	0.002	0.015	Alternative Risk-Based GWPS	None	---
Lithium	0.31	0.31	BTV	W-306	0.52	0.31	0.31	BTV	M-50A, M-51A, and W-123	0.43 to 0.63
Mercury	0.0002	0.002	US EPA MCL	None	---	0.0002	0.002	US EPA MCL	None	---
Molybdenum	0.0061	0.1	Alternative Risk-Based GWPS	None	---	0.0061	0.1	Alternative Risk-Based GWPS	W-123	0.32
Selenium	0.002	0.05	US EPA MCL	None	---	0.002	0.05	US EPA MCL	None	---
Thallium	0.0014	0.002	US EPA MCL	None	---	0.0014	0.002	US EPA MCL	None	---
Combined Radium	1.6	5	US EPA MCL	None	---	1.6	5	US EPA MCL	None	---

**Notes:**

BAP - Bottom Ash Pond  
 BTV - Background Threshold Value  
 FAP - Fly Ash Pond  
 GWPS - Groundwater Protection Standard

LCL - Lower Confidence Limit  
 MCL - Maximum Contaminant Level  
 mg/L - milligrams per liter  
 SEDI - Sedimentation Pond

SSLs - statistically significant levels  
 US EPA - US Environmental Protection Agency

\*The reporting limit for cobalt is in exceedance of the GWPS; it is possible this is a false positive SSL over the GWPS on account of the laboratory's inability to detect a concentration below the GWPS.



**Table 2-1**  
**Water Quality Data Collected for Hydrogeologic Investigation at the FAP**

ANALYTE	UNITS	GWPS	AWQS	FAP CCR MWs											FAP MWs Associated with APP				
				FAP	M-50A		M-51A		W-123		MW-65A	MW-66A	MW-67A	M-64A <sup>(3)</sup>	W-124	W-125	W-126		
				12/16/16	8/6/18	10/24/18	8/6/18	10/24/18	8/6/18	10/24/18	12/5/18	12/5/18	12/5/18	8/2/18	8/6/18	8/2/18	12/21/16	8/6/18	12/5/18
Boron	mg/L	---	---	170	2.9	3.1	33	30	34	37	12	1.2	0.38	1.2	0.38	0.15	37	41	43
Calcium	mg/L	---	---	600	560	630	790	870	750	850	780	830	1500	470	650	110	740	680	760
Chloride	mg/L	---	---	15000	2500	2200	5900	5400	6500	6600	3900	4600	5000	4500	3300	790 D2	7000	6600 D2	7400
pH <sup>(1)</sup>	SU	---	---	3.1	7.5	7.4	7.3	7.3	7.7	7.7	7.3	8.1	6.9	7.4	7.4	7.7	7.4	7.5	7.4
Sulfate	mg/L	---	---	17000	3100	3100	3100	2900	3700	3600	2700	2900	1500	4300	1300	320	4200	4100	4200
Total Dissolved Solids	mg/L	---	---	15000	8000	8100	12000	12000	13000	14000	9900	11000	9300	12000	6900	1800	15000	14000	17000
Antimony	mg/L	0.006	0.006	0.033	--	---	--	---	--	---	<0.0010	<0.0010	<0.0010	--	--	--	<0.0010	--	<0.0010
Arsenic	mg/L	0.01	0.05	<b>0.25</b>	--	0.0028	--	<b>0.032</b>	--	0.0026	0.0025	0.0034	0.018	--	--	--	0.0010	--	0.0027
Barium	mg/L	2.0	2.0	0.067	--	0.0092	--	0.0074	--	0.0092	0.040	0.095	0.058	--	--	--	0.011	--	0.021
Beryllium	mg/L	0.004	0.004	<b>0.0045</b>	<0.001	---	<0.001	---	<0.001	---	--	--	--	<0.001	<0.001	<0.001	<0.0010	<0.001	--
Cadmium	mg/L	0.005	0.005	0.0012	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	0.00013	0.00029	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Chromium	mg/L	0.1	0.1	0.0085	0.0049	0.0046	<b>0.15</b>	0.021	0.047	0.043	0.0035	0.0098	0.0082	0.0015	<0.001	<0.001	0.0011	<0.001	0.0026
Cobalt	mg/L	0.006	--	0.0091	--	0.00063	--	<0.0050	--	0.0016	0.0047	0.0026	0.0058	--	--	--	0.0025	--	0.0049
Fluoride	mg/L	4.0	4.0	<b>55</b>	2.3	2.3	<b>6.2</b>	<b>5.0/5.5</b>	<b>4.2</b>	3.7/4.0	1.9	0.93	1.0	<0.8	0.68	0.55	2.1	<b>4.2</b>	3.5
Lead	mg/L	0.015	0.05	0.0034	<0.0005	<0.00050	<0.0005	<0.00050	<0.0005	<0.00050	0.0010	0.0040	0.0019	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	0.00072
Lithium	mg/L	0.31	--	<b>2.4</b>	--	<b>0.43</b>	--	<b>0.46</b>	--	<b>0.65</b>	<b>0.54</b>	<b>0.51</b>	<0.20	--	--	--	<b>0.95</b>	--	<b>0.78</b>
Mercury	mg/L	0.002	0.002	0.00073	--	---	--	---	--	---	<0.00020	<0.00020	<0.00020	--	--	--	<0.00020	--	<0.00020
Molybdenum	mg/L	0.1	--	<b>0.43</b>	--	0.0071	--	0.092	--	<b>0.37</b>	0.059	0.016	0.0061	--	--	--	0.060	--	<b>0.20</b>
Selenium	mg/L	0.05	0.05	0.038	--	0.0026	--	<0.0050	--	0.0059	0.0021	0.031	0.0011	--	--	--	0.0029	--	0.0015
Thallium	mg/L	0.002	0.002	0.0010	<0.0001	---	0.0002	---	<0.0001	---	0.00011	0.00015	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	0.00015
Alkalinity as CaCO3	mg/L	---	---	<6.0	180	---	97	---	77	---	160	80	180	500	140	180	140	97	100
Alkalinity, Phenolphthalein	mg/L	---	---	<6.0	<6.0	---	<6.0	---	<6.0	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Bicarbonate Alkalinity as CaCO3	mg/L	---	---	<6.0	180	---	97	---	77	---	160	80	180	500	140	180	140	97	100
Carbonate Alkalinity as CaCO3	mg/L	---	---	<6.0	<6.0	---	<6.0	---	<6.0	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Hydroxide Alkalinity as CaCO3	mg/L	---	---	<6.0	<6.0	---	<6.0	---	<6.0	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Magnesium	mg/L	---	---	2500	200	---	280	---	280	---	290	280	270	190	210	45	550	380	470
Potassium	mg/L	---	---	190	--	---	--	---	--	---	28	11	12	--	--	--	120	--	91
SiO2, Silica	mg/L	---	---	---	--	---	--	---	--	---	32	55	41	--	--	--	--	--	24
Sodium	mg/L	---	---	8600	1600	---	3200	---	4000	---	2000	2500	1400	3500	1300	430	3900	4200	4000

**Notes:**

- (1) the test for pH is specified to be performed in the field within 15 minutes of sampling; sample was received by the laboratory and analyzed past the regulatory holding time.
  - (2) the field measurement for pH at M-44S was 6.6.
  - (3) M-64A is the background well for the FAP and the BAP.
- Appendix III constituents for detection monitoring are identified in dark green; Appendix IV constituents for assessment monitoring are highlighted in light green.  
 Concentrations greater than the GWPS are bolded.

**Abbreviations:**

- = not sampled
- APP = Aquifer Protection Permit
- AWQS = Aquifer Water Quality Standard
- FAP = Fly Ash Pond
- GWPS = Groundwater Protection Standard
- mg/L = milligrams per liter
- MWs = monitoring wells
- SU = standard units

**Table 2-1**  
**Water Quality Data Collected for Hydrogeologic Investigation at the FAP**

				Site Supplemental MWs in the Vicinity of the FAP and Cholla Reservoir										
ANALYTE	UNITS	GWPS	AWQS	DM-04R	M-35	M-43A		M-44D	M-44S	M-45A		M-46A		M-62A
				8/7/18	8/7/18	12/21/16	8/7/18	8/2/18	8/2/18	12/21/16	8/7/18	12/21/16	8/7/18	8/6/18
Boron	mg/L	---	---	0.48	0.18	0.85	0.44	0.23	0.21	1.1	0.99	0.54	0.53	0.22
Calcium	mg/L	---	---	100 M3	79	850	660	80	840	630	590	1300	1200	420
Chloride	mg/L	---	---	590	570	2400	3000	1100	7500	800	930	6700	6700	3100
pH <sup>(1)</sup>	SU	---	---	7.9	7.8	7.3	7.5	7.3	5.1 <sup>(2)</sup>	7.2	7.1	7.2	7.3	7.5
Sulfate	mg/L	---	---	680	270	2000	2100	320	150	2100	2200	1800	2000	560
Total Dissolved Solids	mg/L	---	---	2300	1400	6600	7600	2300	13000	4400	4700	13000	13000	5600
Antimony	mg/L	0.006	0.006	--	--	<0.0010	--	--	--	<0.0010	--	<0.0010	--	--
Arsenic	mg/L	0.01	0.05	--	--	0.0046	--	--	--	0.00066	--	0.0028	--	--
Barium	mg/L	2.0	2.0	--	--	0.025	--	--	--	0.017	--	0.029	--	--
Beryllium	mg/L	0.004	0.004	<0.001	<0.001	<0.0010	<0.001	<0.001	<0.001	<0.0010	<0.001	<0.0010	<0.001	<0.001
Cadmium	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010
Chromium	mg/L	0.1	0.1	0.0018	<0.001	0.00080	<0.001	<0.001	<0.001	0.0013	<0.001	0.00077	0.0016	<0.001
Cobalt	mg/L	0.006	--	--	--	0.00069	--	--	--	0.0014	--	0.0015	--	--
Fluoride	mg/L	4.0	4.0	0.45	<0.4	<0.80	<0.4	0.78	2.9	0.78	0.64	<0.20	<0.8	<0.4
Lead	mg/L	0.015	0.05	0.0013	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	0.0011	0.0010
Lithium	mg/L	0.31	--	--	--	0.2	--	--	--	<0.20	--	0.24	--	--
Mercury	mg/L	0.002	0.002	--	--	<0.00020	--	--	--	<0.00020	--	<0.00020	--	--
Molybdenum	mg/L	0.1	--	--	--	0.0027	--	--	--	0.0030	--	0.060	--	--
Selenium	mg/L	0.05	0.05	--	--	<0.00050	--	--	--	<0.00050	--	<0.00050	--	--
Thallium	mg/L	0.002	0.002	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.00010	<0.0001	<0.0001
Alkalinity as CaCO3	mg/L	---	---	390	240	250	220	120	<6.0	260	370	170	210	190
Alkalinity, Phenolphthalein	mg/L	---	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Bicarbonate Alkalinity as CaCO3	mg/L	---	---	390	240	250	220	120	<6.0	260	370	170	210	190
Carbonate Alkalinity as CaCO3	mg/L	---	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Hydroxide Alkalinity as CaCO3	mg/L	---	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Magnesium	mg/L	---	---	53	40	220	220	43	92	140	120	250	240	150
Potassium	mg/L	---	---	--	--	10	--	--	--	12	--	17	--	--
SiO2, Silica	mg/L	---	---	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/L	---	---	600	330	1100	1400	600	3100	570	610	2600	2600	1200

**Notes:**

(1) the test for pH is specified to be performed in the field within 15 minutes of sampling; sample was received by the laboratory and analyzed past the regulatory holding time.

(2) the field measurement for pH at M-44S was 6.6.

(3) M-64A is the background well for the FAP and the BAP.

Appendix III constituents for detection monitoring are identified in dark green; Appendix IV constituents for assessment monitoring are highlighted in light green.

Concentrations greater than the GWPS are bolded.

**Abbreviations:**

-- = not sampled

APP = Aquifer Protection Permit

AWQS = Aquifer Water Quality Standard

FAP = Fly Ash Pond

GWPS = Groundwater Protection Standard

mg/L = milligrams per liter

MWs = monitoring wells

SU = standard units

**Table 2-2  
Well Development Summary**

Well ID	Time Spent Developing Well (min)	Depth to Water before Development (ft bgs)	Final Depth of Well (ft bgs)	Pumping Rate during Development (gpm)	Total Volume Purged (gal)	Final Measured Water Turbidity (NTUs)	Comments
MW-65A	10	13.70	25	~0.55	< 4	125-160	Water recovery slow. Development suspended.
MW-66A	605	28.64	60	~0.55 – 1.8	< 900	8.89	Development was relatively slow.
MW-67A	45	33.90	50	~0.55	~25	8.15	Development was relatively quick.

**Notes:**

ft bgs – feet below ground surface

gal – gallons

gpm – gallons per minute

min – minute

NTUs – Nephelometric Turbidity Unit

**Table 2-3**  
**Water Quality Data Collected for Hydrogeologic Investigation at the BAP**

ANALYTE	UNITS	GWPS	AWQS	BAP CCR MWs						Site Supplemental MWs in the Vicinity of the BAP						
				BAP	M-52A	M-53A	W-305	W-306	W-314	M-55A	W-301	W-302	W-304	W-307	W-308	W-309
				3/30/19	12/8/18	12/7/18	12/7/18	12/7/18	12/8/18	12/8/18	12/7/18	12/7/18	12/7/18	12/8/18	12/8/18	12/8/18
Boron	mg/L	---	---	4.8	4.3	3.4	0.35	1.1	1.1	0.43	2.4	0.64	0.50	2.4	0.45	0.42
Calcium	mg/L	---	---	550	920	620	710	410	800	700	760	560	590	790	730	280
Chloride	mg/L	---	---	2100	4900	2300	2400	1900	2700	4300	4000	2600	2900	2700	2900	1300
pH <sup>(1)</sup>	SU	---	---	8.3	6.8	7.4	7.3	7.9	7.3	7.3	7.2	7.3	7.3	7.2	7.1	8.1
Sulfate	mg/L	---	---	3100	2700	3000	2300	12000	2100	3400	3300	2400	2900	2600	3000	2900
Total Dissolved Solids	mg/L	---	---	7700	11000	7600	7000	19000	7700	11000	10000	7200	8100	7800	8300	6500
Antimony	mg/L	0.006	0.006	0.0027	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Arsenic	mg/L	0.01	0.05	0.017	0.0022	<0.0020	<0.0020	0.0041	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	0.0044
Barium	mg/L	2	2	0.20	0.019	0.0085	0.012	0.010	0.013	0.014	0.013	0.014	0.0083	0.012	0.0082	0.011
Beryllium	mg/L	0.004	0.004	<0.0010	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	mg/L	0.005	0.005	0.00011	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	mg/L	0.1	0.1	0.0035	0.043	<0.0050	<0.0050	<0.0050	0.014	<b>0.17</b>	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cobalt	mg/L	0.006	--	0.00099	<b>0.036</b>	<b>0.014</b>	<b>0.018</b>	<0.0020	<b>0.014</b>	<0.0020	<b>0.017</b>	0.0049	0.0034	<b>0.076</b>	0.0033	<0.0020
Fluoride	mg/L	4.0	4.0	3.7	1.0	2.3	<0.80	1.4	0.89	<0.80	<0.80	0.98	<0.80	<0.80	<0.80	1.0
Lead	mg/L	0.015	0.05	<0.00050	<0.0010	<0.0010	0.0030	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	0.0020	<0.0010	<0.0010
Lithium	mg/L	0.31	--	<0.20	0.29	0.20	0.21	<b>0.73</b>	<b>0.32</b>	<b>0.39</b>	<b>0.43</b>	<b>0.32</b>	<b>0.40</b>	0.24	<b>0.37</b>	<0.20
Mercury	mg/L	0.002	0.002	<0.00020	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	mg/L	0.1	--	0.027	0.031	0.042	0.021	0.028	0.0087	0.020	0.080	0.068	0.026	0.0044	0.032	0.024
Selenium	mg/L	0.05	0.05	0.014	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	0.083	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Thallium	mg/L	0.002	0.002	<0.00010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Alkalinity as CaCO3	mg/L	---	---	120	230	92	99	130	94	190	180	140	140	100	160	55
Alkalinity, Phenolphthalein	mg/L	---	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Bicarbonate Alkalinity as CaCO3	mg/L	---	---	120	230	92	99	130	94	190	180	140	140	100	160	55
Carbonate Alkalinity as CaCO3	mg/L	---	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Hydroxide Alkalinity as CaCO3	mg/L	---	---	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Magnesium	mg/L	---	---	300	300	220	110	230	160	160	170	120	100	150	120	34
Potassium	mg/L	---	---	28	7.1	13	3.0	2.6	1.8	3.0	4.6	5.5	5.8	5.4	7.7	12
SiO2, Silica	mg/L	---	---	---	14	9.4	11	12	8.9	12	14	12	9.6	13	12	22
Sodium	mg/L	---	---	1500	2600	1600	1500	5700	1500	2900	2600	1800	2100	1700	1900	1700

**Notes:**

(1) the test for pH is specified to be performed in the field within 15 minutes of sampling; sample was received by the laboratory and analyzed past the regulatory holding time.  
 Appendix III constituents for detection monitoring are identified in dark green; Appendix IV constituents for assessment monitoring are highlighted in light green.  
 Concentrations greater than the GWPS are bolded.

**Abbreviations:**

-- = not sampled  
 AWQS = Aquifer Water Quality Standard  
 BAP = Bottom Ash Pond  
 GWPS = Groundwater Protection Standard

mg/L = milligrams per liter  
 MWs = monitoring wells  
 SU = standard units

**FIGURES**







Job No. 14-2018-2040  
 PM: EHL  
 Date: 1/31/2020  
 Scale: 1" = 1.5 miles



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Arizona Public Service  
 Cholla Power Plant  
 Navajo County, Arizona

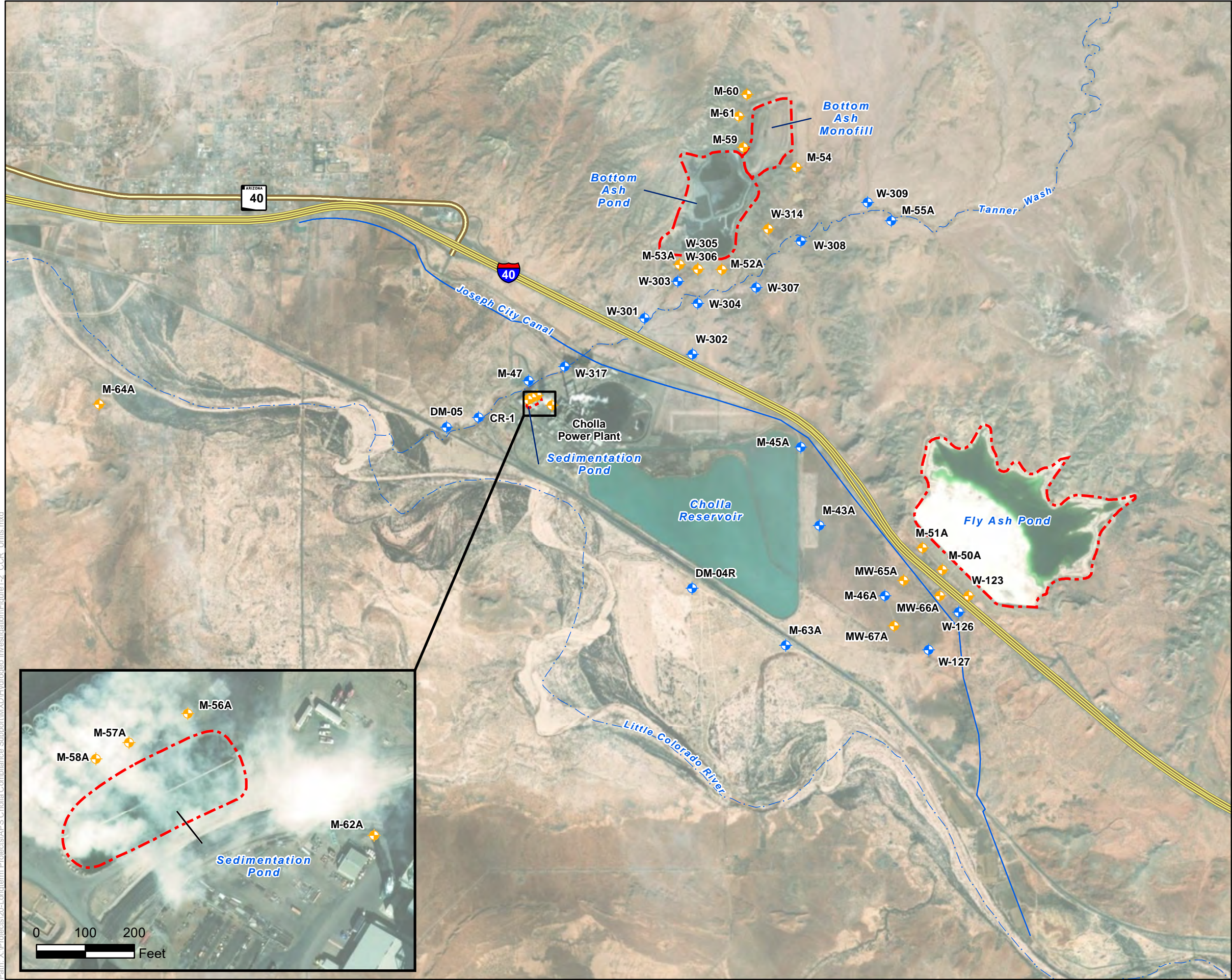
Site Location Map

FIGURE  
 1-1



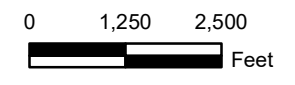
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- Legend**
- ◆ CCR Monitoring Well Location
  - ◆ Supplementary Site Monitoring Well Location
  - Ephemeral Surface Water Feature
  - Canal
  - Approximate Extent of CCR Unit

**Notes:**  
 CCR Coal Combustion Residuals



Arizona Public Service  
 Cholla Power Plant  
 Navajo County, Arizona

**FIGURE 1-2 CCR Units and Monitoring System Summary**

Job No. 1420182040  
 PM: EHL  
 Date: 1/31/2020  
 Scale: 1" = 2500'

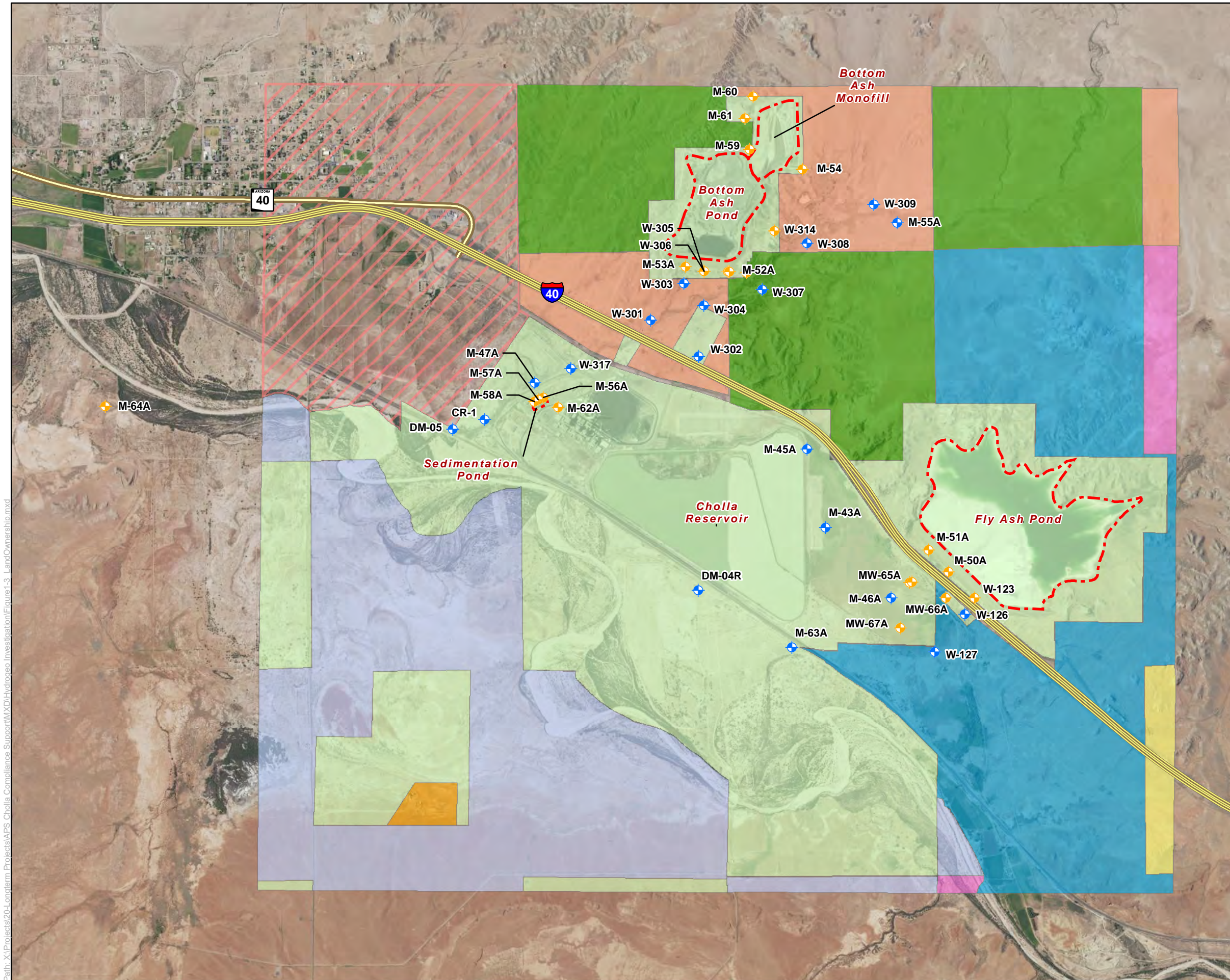


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Path: X:\Projects\20-Longterm Projects\APS Cholla Compliance Support\MXD\Hydrogeo Investigation\Figure1-2\_CCR\_Units.mxd







**Legend**

- ◆ CCR Monitoring Well Location
- ◆ Supplementary Site Monitoring Well Location
- Approximate Extent of CCR Unit
- APN 107-05-024
- APN 107-05-035E
- APN 107-22-002
- APN 109-32-001
- Arizona Public Service
- Arizona State Land Department
- Bureau of Land Management
- U.S. Federal Land
- Other Ownership

Notes:  
Parcel sizes and shapes are approximate.

Property Ownership Information Sources:  
1. Navajo County Assessor Property Tax Map  
2. Arizona State Land Department Land Ownership shapefile

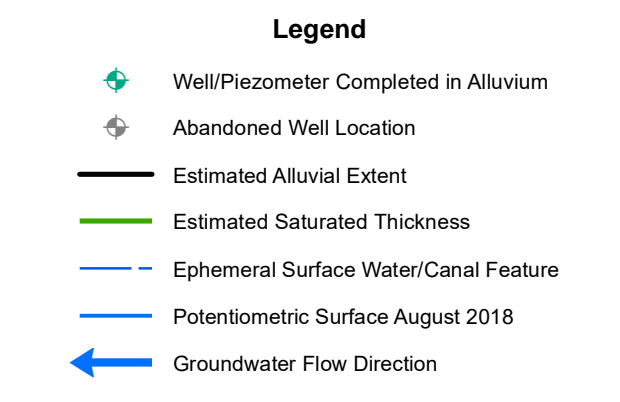
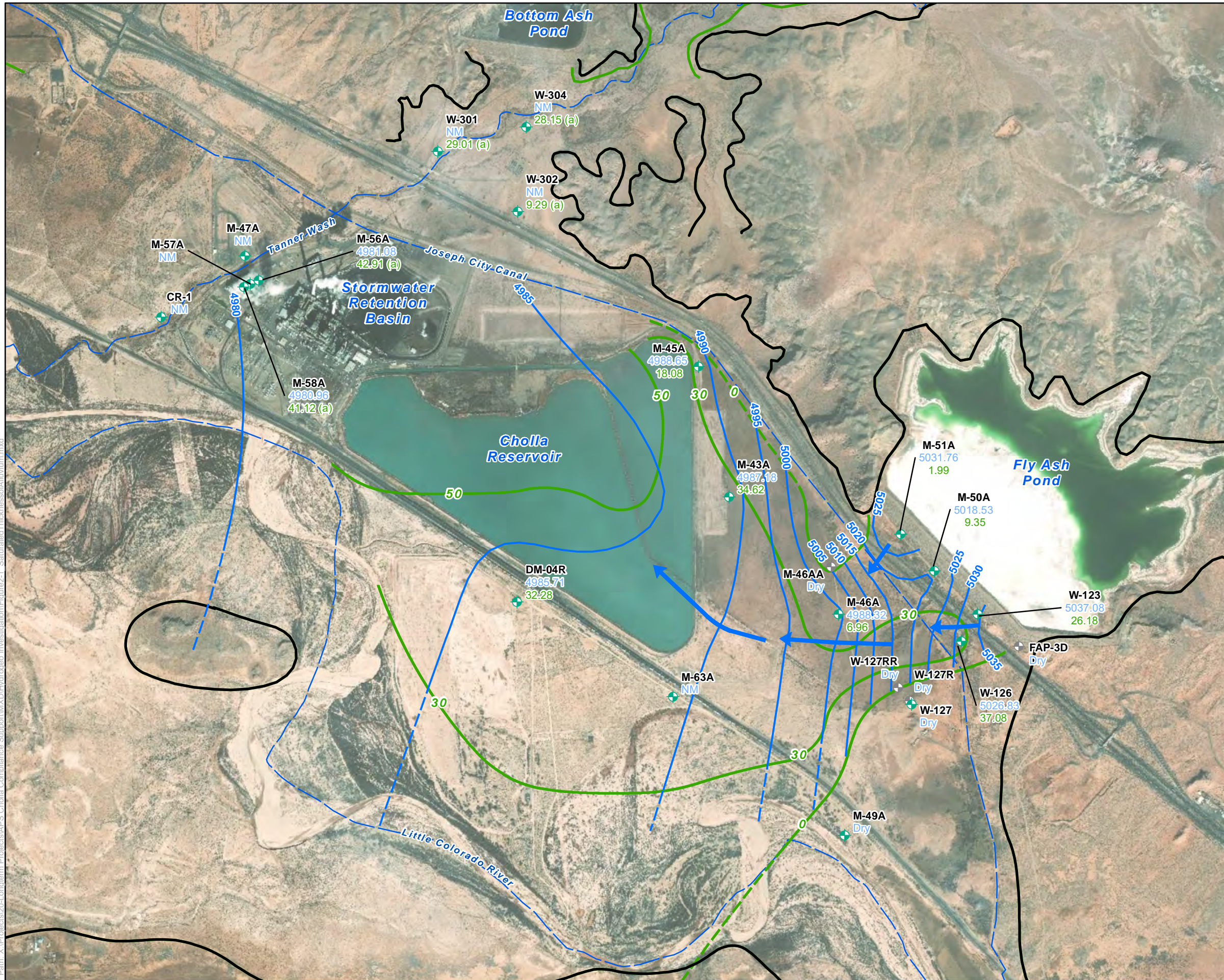
0 1,250 2,500  
Feet

N  
↑

Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE 1-3</b>	<b>Land Ownership Map</b>
Job No. 1420182040 PM: EHL Date: 1/31/2020 Scale: 1" = 2500'	
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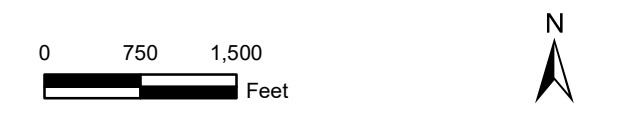
Path: X:\Projects\2014\Longterm Projects\APS Cholla Compliance Support\MXD\Hydrogeo Investigation\Figure 1-3\_LandOwnership.mxd





**Notes:**

- W-123** Well identification
- 5037.08** Groundwater elevation (ft amsl) measured in August 2018
- 26.18** Calculated Saturated thickness (ft of water)
- (a)** Saturated thickness from June/July 2017 event
- ft** Feet
- ft amsl** Feet above mean sea level
- NM** Water elevation not measured in August 2018



Arizona Public Service  
Cholla Power Plant  
Navajo County, Arizona

**FIGURE 2-1** Estimated Saturated Thickness of Alluvium

Job No. 1420182040  
PM: EHL  
Date: 1/31/2020  
Scale: 1" = 1,500'

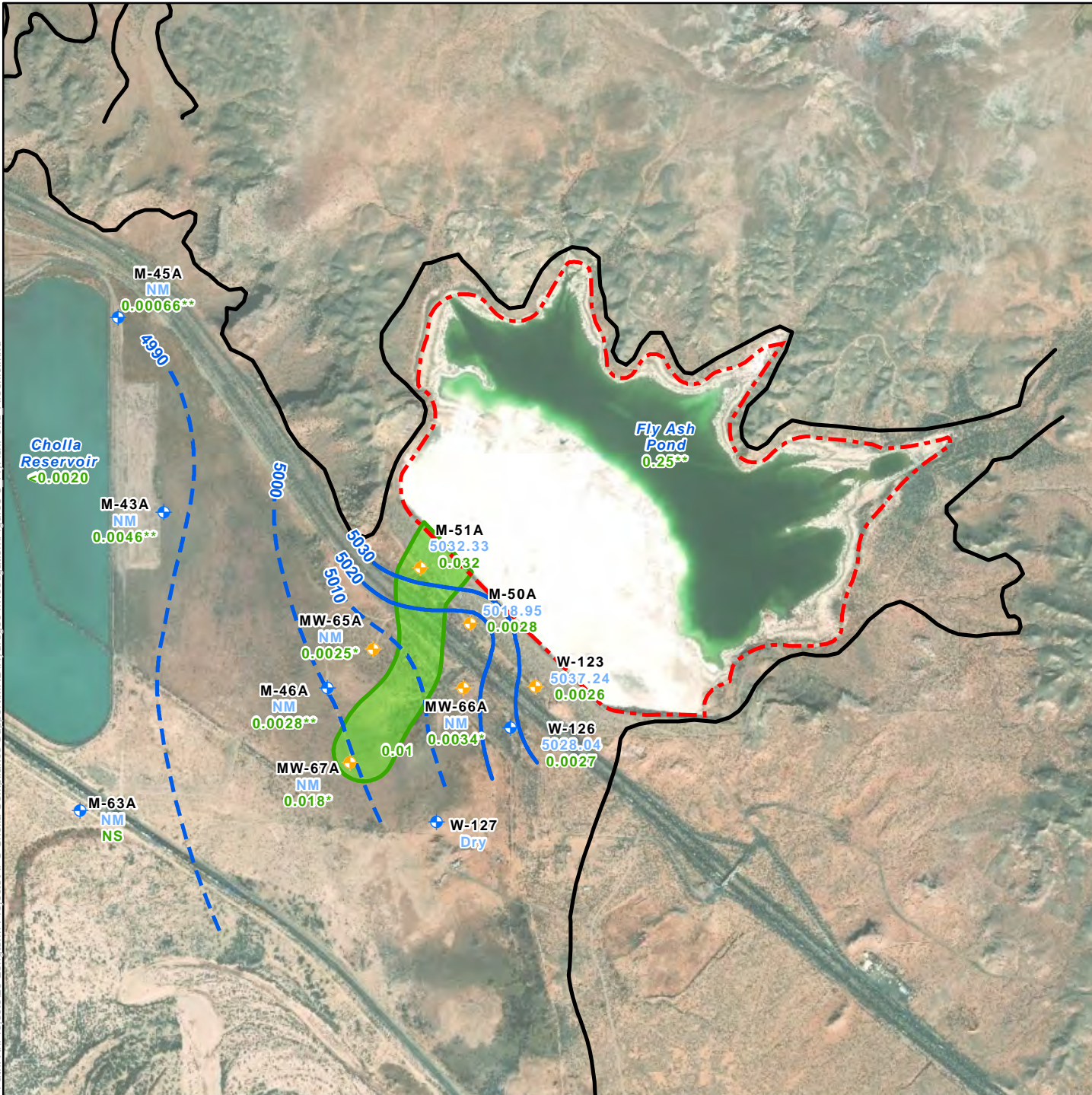


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Path: X:\Projects\20-L-Longterm Projects\APS Compliance Support\MXD\Hydrogeo Investigation\Figure2-1\_SaturatedThicknessofAlluvium.mxd



Path: X:\Projects\201-Longterm\Projects\APS Cholla Compliance Support\MXD\Hydrogeo Investigation\Figure3-3 FlyAshPond\_Arsenic.mxd



**Legend**

- ◆ CCR Monitoring Well Location
- ◆ Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

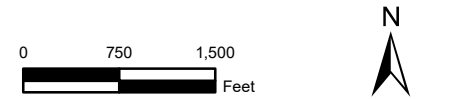
— (Dashed Where Inferred)

**Arsenic Concentration in Alluvial Aquifer**

- >0.01 mg/L
- GWPS (0.01 mg/L; Dashed Where Inferred)

**Notes:**

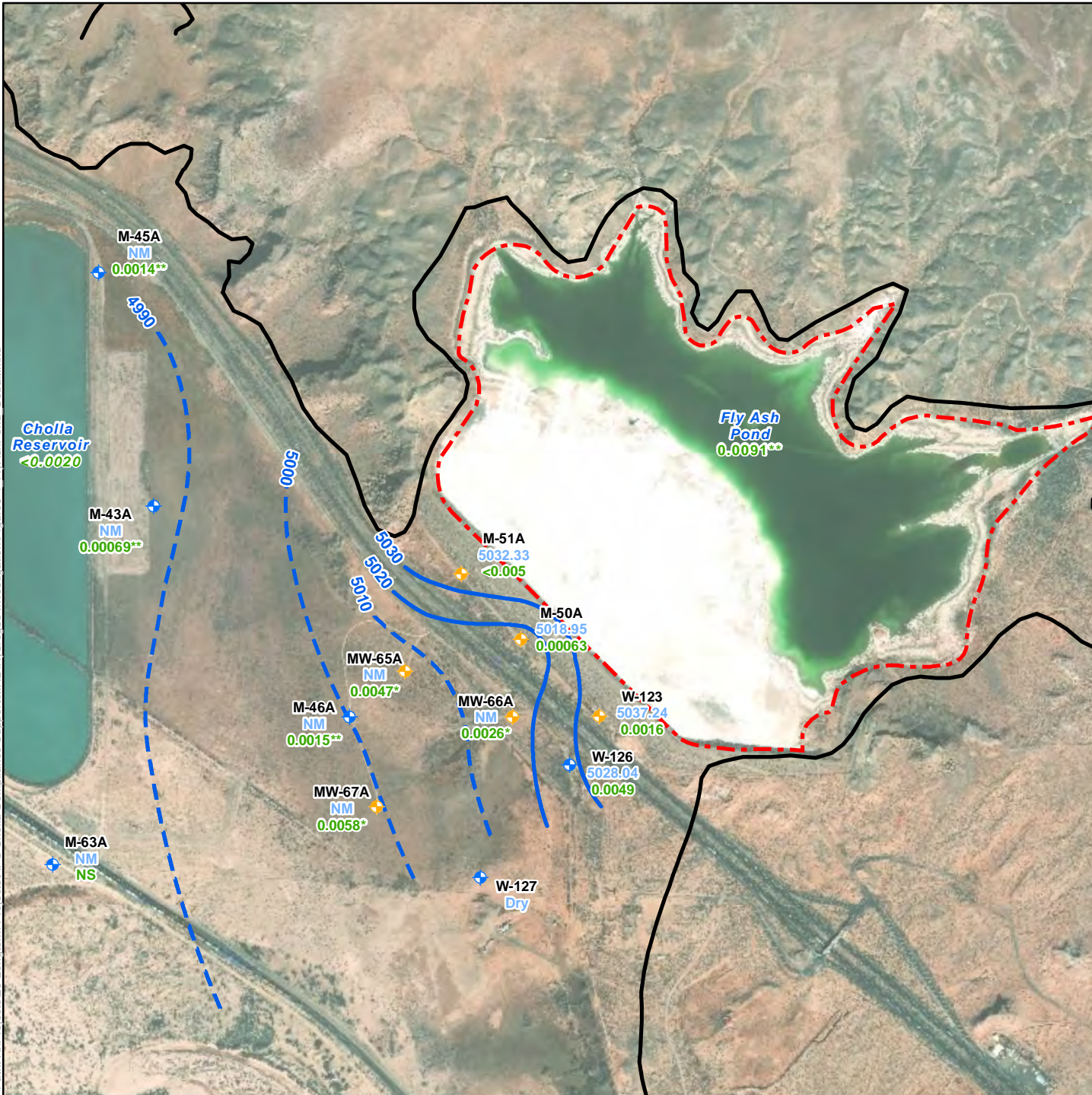
- W-123** Well Identification
- 5037.24** Groundwater elevation (ft amsl) measured in October 2018
- 0.0026** Arsenic concentration (mg/L) measured in October 2018
- \*** Sampled in December 2018
- \*\*** Sampled in December 2016
- ft amsl Feet above mean sea level
- NM Groundwater Elevation Not Measured
- NS Not Sampled
- mg/L Milligrams per liter
- GWPS Groundwater Protection Standard



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE</b> <b>3-1</b>	<b>Arsenic Iso-Concentration Map for the Fly Ash Pond</b>
Job No. 1420182040 PM: EHL Date: 1/31/2020 Scale: 1"= 1,500'	
The map shown here has been created with all due and reasonable care and is strictly for use with Wood Environment & Infrastructure Solutions, Inc. Project Number 1420182040. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Wood Environment & Infrastructure Solutions, Inc. assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.	



Path: X:\Projects\201-Longterm\Projects\APS Cholla Compliance Support\MXD\Hydrogeo Investigation\Figures\4 FlyAshPond\_Cobalt.mxd



**Legend**

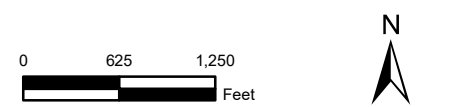
- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

(Dashed Where Inferred)

GWPS for Cobalt is 0.006 mg/L (no exceedences)

- Notes:**
- W-123** Well Identification
  - 5037.24** Groundwater elevation (ft amsl) measured in October 2018
  - 0.0016** Cobalt concentration (mg/L) measured in October 2018
  - \*** Sampled in December 2018
  - \*\*** Sampled in December 2016
  - ft amsl Feet above mean sea level
  - NM Groundwater Elevation Not Measured
  - NS Not Sampled
  - mg/L Milligrams per liter
  - GWPS Groundwater Protection Standard



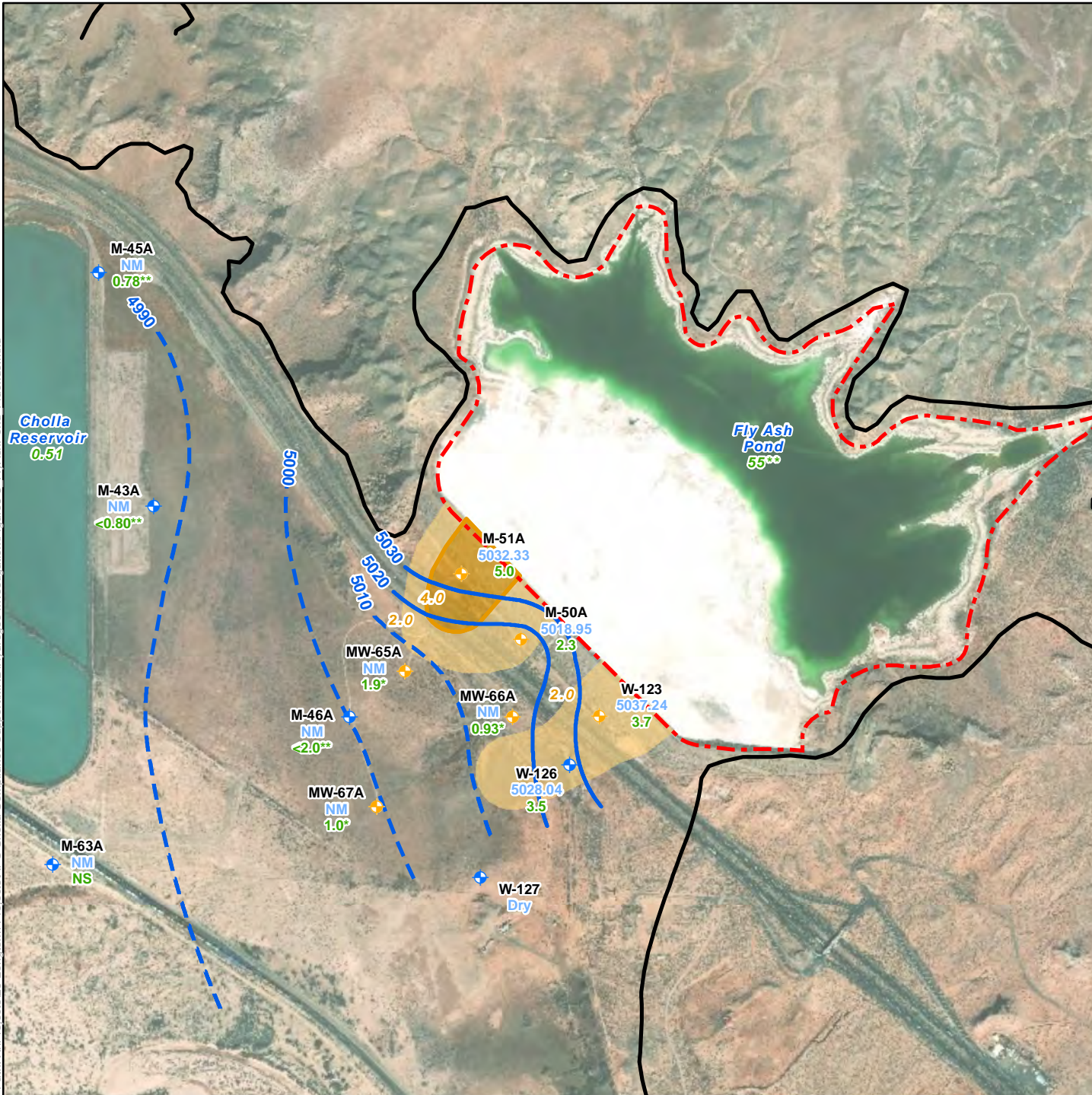
Arizona Public Service  
Cholla Power Plant  
Navajo County, Arizona

<b>FIGURE</b>	<b>Cobalt Iso-Concentration Map for the Fly Ash Pond</b>
Job No. 1420182040	
PM: EHL	
Date: 1/31/2020	
Scale: 1"= 1250'	

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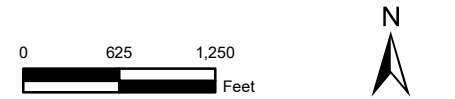
Path: X:\Projects\201-Longterm\Projects\APS Cholla Compliance Support\MXD\Hydrogeo Investigation\Figure3-3 FlyAshPond\_Fluoride.mxd



- Legend**
- CCR Monitoring Well Location
  - Supplementary Site Monitoring Well Location
  - Estimated Alluvial Extent
  - Approximate Extent of CCR Unit

- Potentiometric Surface - October 2018**
- (Dashed Where Inferred)
- Fluoride Concentration in Alluvial Aquifer**
- 2 mg/L
  - 4 mg/L
  - GWPS (4 mg/L; Dashed Where Inferred)

- Notes:**
- W-123 Well Identification
  - 5037.24 Groundwater elevation (ft amsl) measured in October 2018
  - 3.7 Fluoride concentration (mg/L) measured in October 2018
  - \* Sampled in December 2018
  - \*\* Sampled in December 2016
  - ft amsl Feet above mean sea level
  - NM Groundwater Elevation Not Measured
  - NS Not Sampled
  - mg/L Milligrams per liter
  - GWPS Groundwater Protection Standard



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Navajo County, Arizona

**FIGURE 3-3 Fluoride Iso-Concentration Map for the Fly Ash Pond**

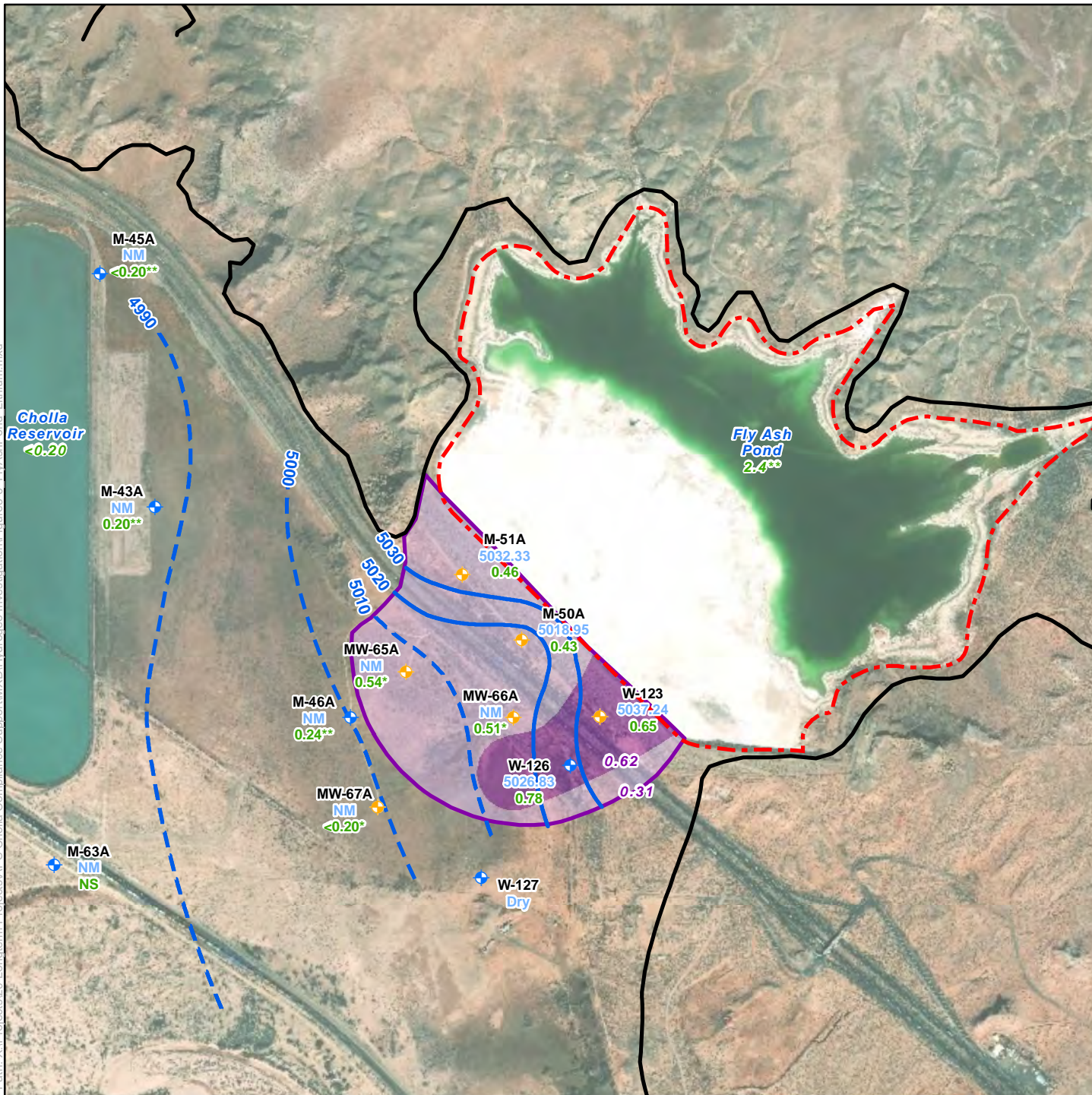
Job No.	1420182040
PM:	EHL
Date:	1/31/2020
Scale:	1"= 1250'

**wood.**

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Path: X:\Projects\201-Longterm\Projects\APS Cholla Compliance Support\MXD\Hydrogeo Investigation\Figure3-6 FlyAshPond\_Lithium.mxd



**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

- (Dashed Where Inferred)

**Lithium Concentration in Alluvial Aquifer**

- >0.31 mg/L
- >0.62 mg/L
- GWPS (0.31 mg/L; Dashed Where Inferred)

**Notes:**

- W-123** Well Identification
- 5037.24** Groundwater elevation (ft amsl) measured in October 2018
- 0.65** Lithium concentration (mg/L) measured in October 2018
- \*** Sampled in December 2018
- \*\*** Sampled in December 2016
- ft amsl** Feet above mean sea level
- NM** Groundwater Elevation Not Measured
- NS** Not Sampled
- mg/L** Milligrams per liter
- GWPS** Groundwater Protection Standard

0 625 1,250 Feet

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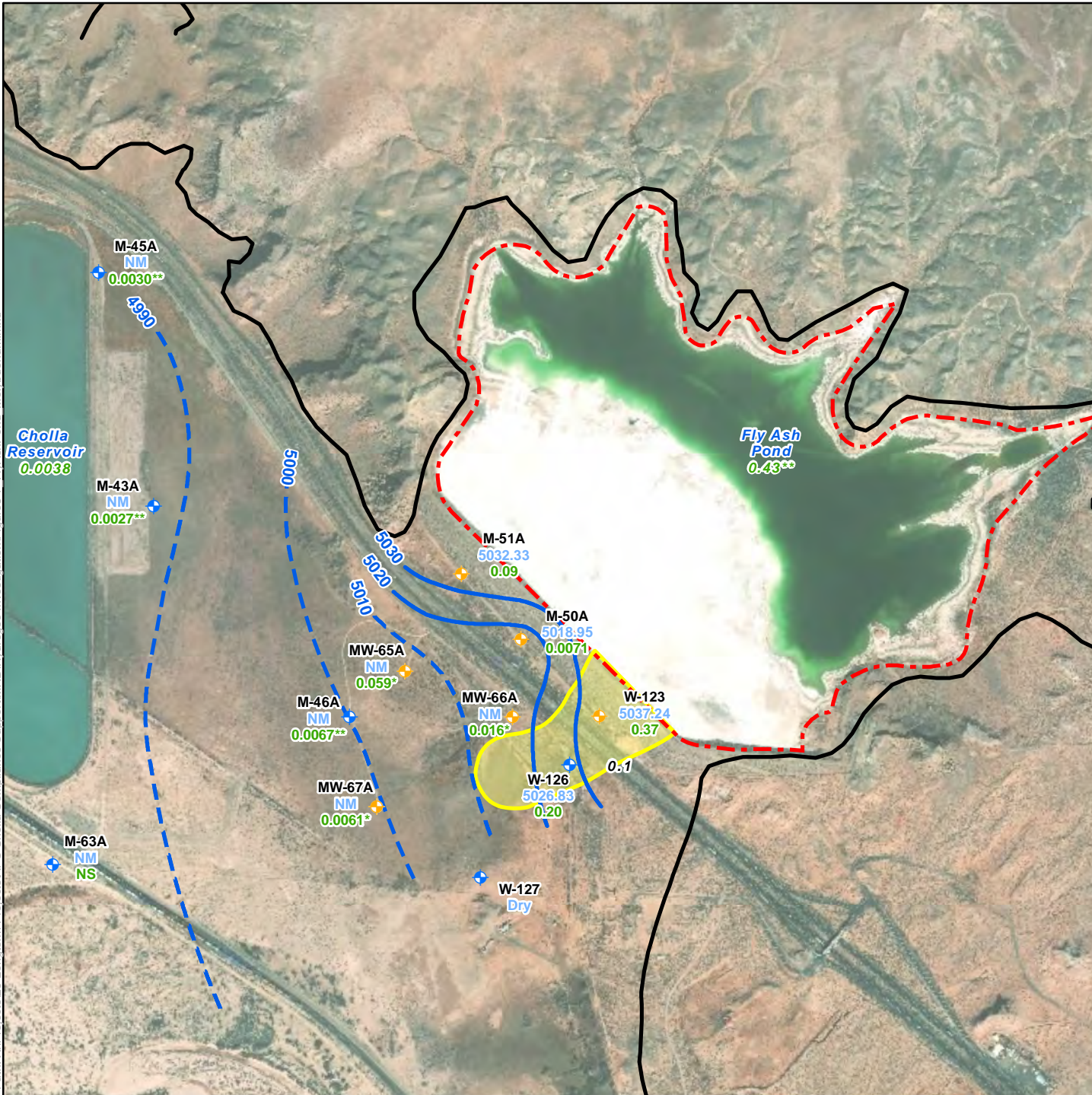
**FIGURE 3-4 Lithium Iso-Concentration Map for the Fly Ash Pond**

Job No.	1420182040
PM:	EHL
Date:	1/31/2020
Scale:	1"= 1250'

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Path: X:\Projects\201-Longterm\Projects\APS Cholla Compliance Support\MXD\Hydrogeo Investigation\Figures\Figure3-7\_FlyAshPond\_Molybdenum.mxd



**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

- (Dashed Where Inferred)

**Molybdenum Concentration in Alluvial Aquifer**

- >0.1 mg/L
- GWPS (0.1 mg/L; Dashed Where Inferred)

**Notes:**

- W-123** Well Identification
- 5037.24** Groundwater elevation (ft amsl) measured in October 2018
- 0.37** Lithium concentration (mg/L) measured in October 2018
- \*** Sampled in December 2018
- \*\*** Sampled in December 2016
- ft amsl Feet above mean sea level
- NM Groundwater Elevation Not Measured
- NS Not Sampled
- mg/L Milligrams per liter
- GWPS Groundwater Protection Standard

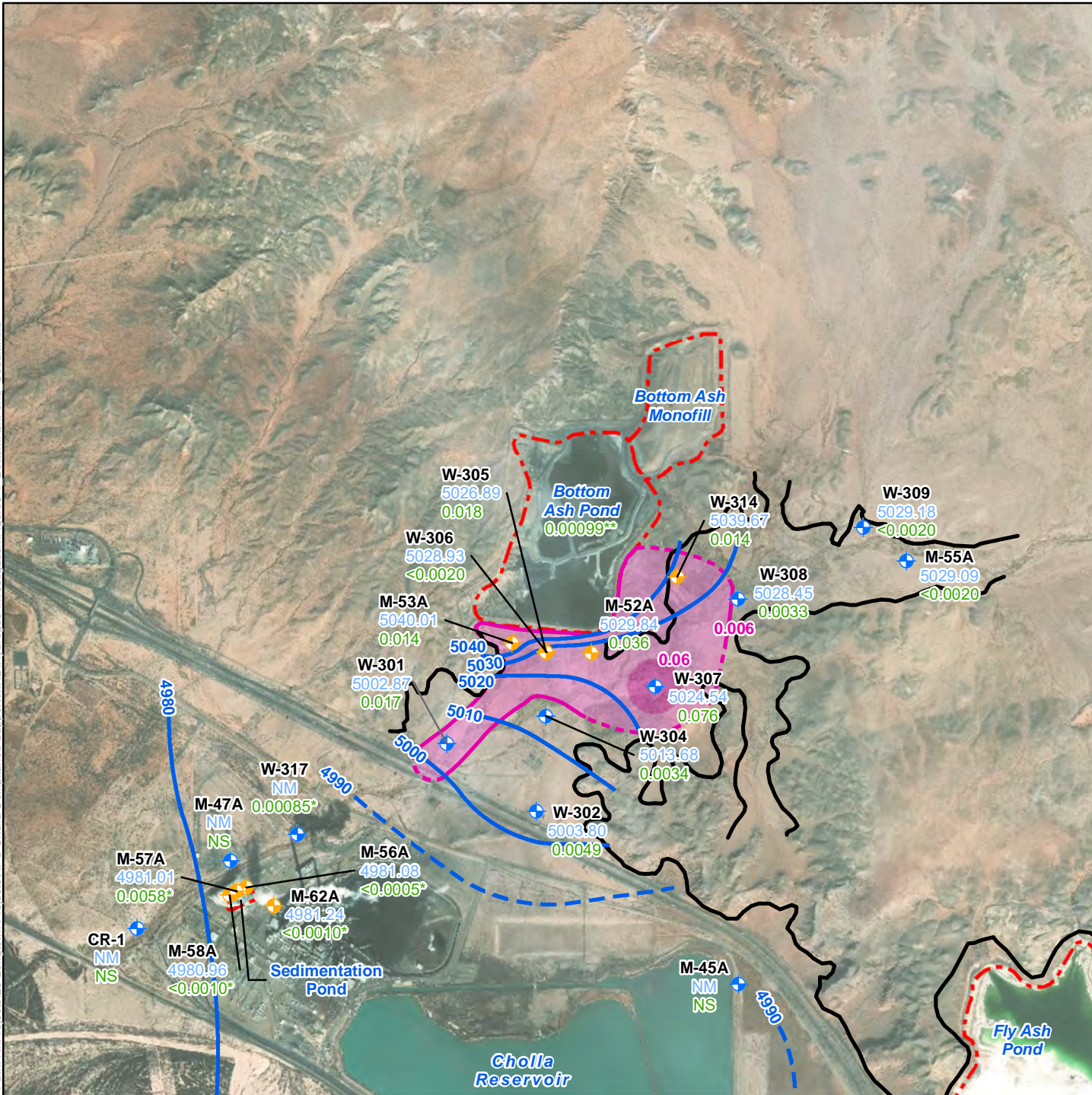


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Navajo County, Arizona

<b>FIGURE</b> <b>3-5</b>	<b>Molybdenum Iso-Concentration Map for the Fly Ash Pond</b>
Job No. 1420182040 PM: EHL Date: 1/31/2020 Scale: 1"= 1250'	
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Path: X:\Projects\201-Longterm-Projects\APS-Cholla Compliance Support\MXD\Hydrogeo-Investigation\Figure3-1-BottomAshPond\_Cobalt.mxd



**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

- (Dashed Where Inferred)

**Cobalt Concentration in Alluvial Aquifer**

- >0.06 mg/L
- >0.006 mg/L
- GWPS (0.006 mg/L; Dashed Where Inferred)

**Notes:**

- W-309** Well Identification
- 5029.18** Groundwater elevation (ft amsl) measured in October 2018
- <math><0.0020</math>** Cobalt concentration (mg/L) measured in Dec 2018
- \*** Sampled in May 2018
- \*\*** Sampled in March 2019
- ft amsl** Feet above mean sea level
- mg/L** Milligrams per liter
- NM** Groundwater Elevation Not Measured
- NS** Not Sampled
- GWPS** Groundwater Protection Standard

0 1,000 2,000 Feet

N

Arizona Public Service  
Cholla Power Plant  
Navajo County, Arizona

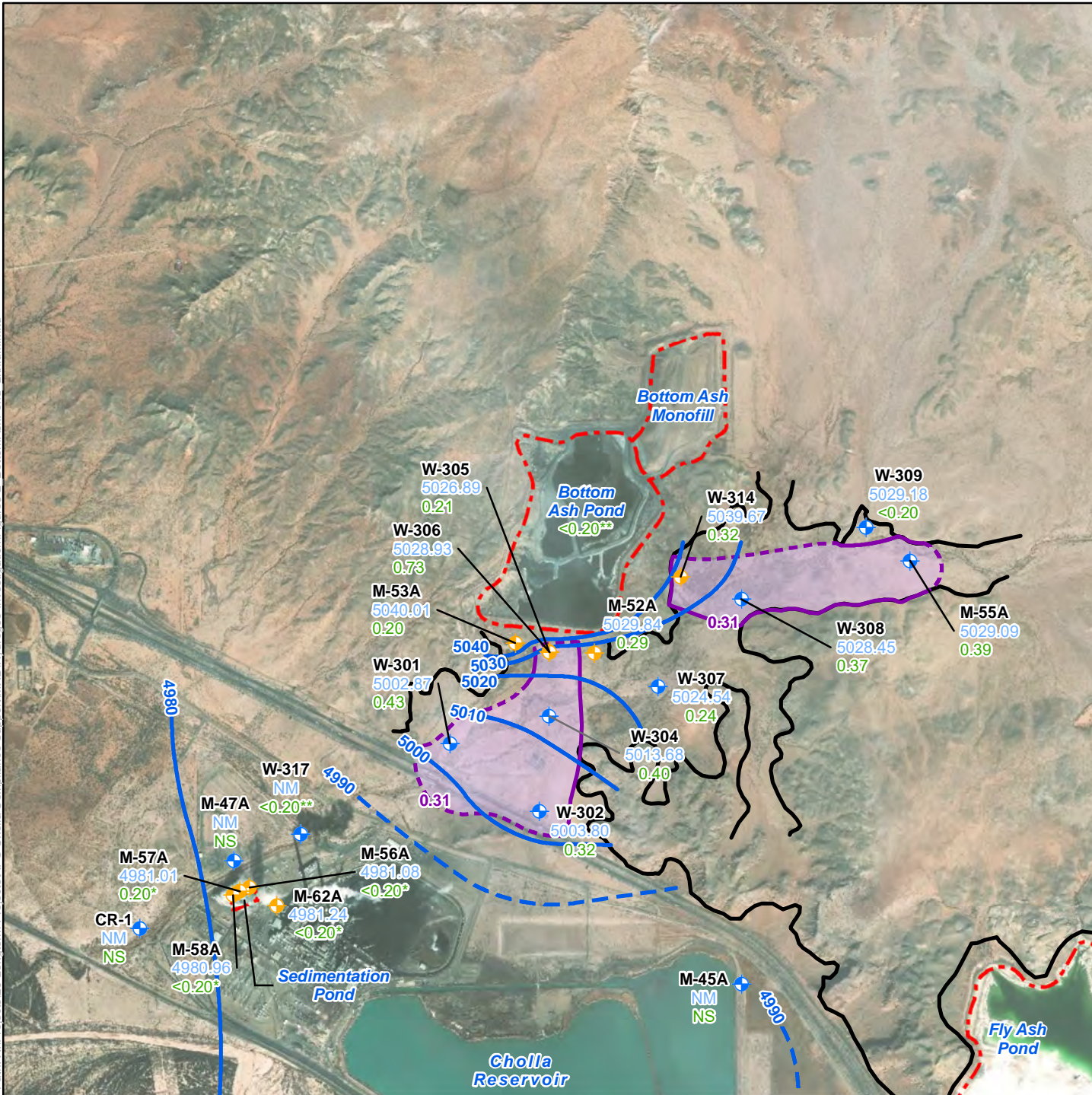
**FIGURE 3-6 Cobalt Iso-Concentration Map for the Bottom Ash Pond**

Job No.	1420182040
PM:	EHL
Date:	1/31/2020
Scale:	1"= 2,000'

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Path: X:\Projects\2014\comterm\Projects\APS\Cholla Compliance Support\MXD\Hydrogeo Investigation\Figure3-2\_BottomAshPond\_Lithium.mxd



**Legend**

- CCR Monitoring Well Location
- Supplementary Site Monitoring Well Location
- Estimated Alluvial Extent
- Approximate Extent of CCR Unit

**Potentiometric Surface - October 2018**

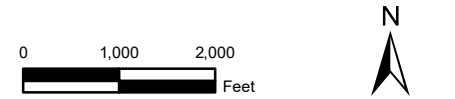
(Dashed Where Inferred)

**Lithium Concentration in Alluvial Aquifer**

- >0.31 mg/L
- GWPS (0.31 mg/L; Dashed Where Inferred)

**Notes:**

- W-309** Well Identification
- 5029.18 Groundwater elevation (ft amsl) measured in October 2018
- <math><0.20</math> Lithium concentration (mg/L) measured in December 2018
- \* Sampled in May 2018
- \*\* Sampled in March 2019
- ft amsl Feet above mean sea level
- mg/L Milligrams per liter
- NM Groundwater Elevation Not Measured
- NS Not Sampled
- GWPS Groundwater Protection Standard



Arizona Public Service  
Cholla Power Plant  
Navajo County, Arizona

<b>FIGURE</b> 3-7	<b>Lithium Iso-Concentration Map for the Bottom Ash Pond</b>
Job No. 1420182040	
PM: EHL	
Date: 1/31/2020	
Scale: 1"= 2,000'	

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**APPENDIX A**

**Analytical Laboratory and Data Validation Reports**



**Table 1**  
**Field Samples Submitted to Analytical Laboratories**  
**CCR Rule Compliance Monitoring Groundwater Data**  
**Arizona Public Services Cholla**  
**Joseph City, Arizona**

<b>Field Sample Identification</b>	<b>Collection Date and Time</b>	<b>Laboratory Sample Identification</b>	<b>Notes</b>
CH-CCR-W301-12718	12/7/2018 14:19	550-114628-1	
CH-CCR-W302-12718	12/7/2018 15:05	550-114628-2	
CH-CCR-W304-12718	12/7/2018 15:59	550-114628-3	
CH-CCR-W305-12718	12/7/2018 13:06	550-114628-4	
CH-CCR-W306-12718	12/7/2018 12:28	550-114628-5	
CH-CCR-W307-12818	12/8/2018 13:58	550-114628-6	
CH-CCR-W308-12818	12/8/2018 12:42	550-114628-7	
CH-CCR-W309-12818	12/8/2018 11:25	550-114628-8	
CH-CCR-M52A-12818	12/8/2018 14:54	550-114628-9	
CH-CCR-M53A-12718	12/7/2018 11:14	550-114628-10	
CH-CCR-FD02-12718	12/7/2018 11:14	550-114628-11	Field duplicate of CH-CCR-M53A-12718
CH-CCR-M55A-12818	12/8/2018 16:50	550-114628-12	
CH-CCR-W314-12818	12/8/2018 15:27	550-114628-13	
CH-CCR-W-126-12518	12/5/2018 13:49	550-114629-1	
CH-CCR-MW65A-12518	12/5/2018 16:42	550-114629-2	
CH-CCR-MW66A-12518	12/5/2018 14:58	550-114629-3	
CH-CCR-MW67A-12518	12/5/2018 15:48	550-114629-4	
CH-CCR-FD01-12518	12/5/2018 13:49	550-114629-5	Field duplicate of CH-CCR-W-126-125128

**Table 2**  
**Field Duplicate Detections**  
**CCR Rule Compliance Monitoring Groundwater Data**  
**Arizona Public Services Cholla**  
**Joseph City, Arizona**

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-M53A-12718 and CH-CCR-FD02-12718					
Chloride	400 mg/L	2,300	2,300	0.0%	
Fluoride	0.80 mg/L	2.3	2.3	0.0%	
Sulfate	400 mg/L	3,000	3,100	3.3%	
Boron	0.050 mg/L	3.4	3.3	3.0%	
Calcium	2.0 mg/L	620	600	3.3%	
Magnesium	2.0 mg/L	220	210	4.7%	
Potassium	0.50 mg/L	13	13	0.0%	
Sodium	0.50 mg/L	1,600	1,500	6.5%	
Alkalinity	6.0 mg/L	92	91	1.1%	
Bicarbonate Alkalinity	6.0 mg/L	92	91	1.1%	
Total Dissolved Solids	100 mg/L	7,600	8,000	5.1%	
pH	1.7 S.U.	7.4	7.4	0.0%	
Radium 228	0.5 pCi/L	1.1	0.9	20%	
Total Radium	0.5 pCi/L	1.1	0.9	20%	
Fluoride	0.80 mg/L	2.3	2	0.0%	
Lithium	0.20 mg/L	0.20	0.20 U	NC	± RL
Magnesium	2.0 mg/L	220	210	4.7%	
Silica	0.21 mg/L	9.4	8.9	5.5%	
Barium	0.0020 mg/L	0.0085	0.0087	2.3%	
Cadmium	0.0010 mg/L	0.0014	0.0012	15%	
Cobalt	0.0020 mg/L	0.014	0.013	7.4%	
Molybdenum	0.0020 mg/L	0.042	0.039	7.4%	

**Table 2**  
**Field Duplicate Detections**  
**CCR Rule Compliance Monitoring Groundwater Data**  
**Arizona Public Services Cholla**  
**Joseph City, Arizona**

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Samples CH-CCR-W-126-12518 and CH-CCR-FD01-12518					
Chloride	400 mg/L	7,400	6,900	7.0%	
Fluoride	0.80 mg/L	3.5	3.6	2.8%	
Sulfate	400 mg/L	4,200	4,100	2.4%	
Boron	0.05 mg/L	43	43	0.0%	
Calcium	2.0 mg/L	760	760	0.0%	
Magnesium	2.0 mg/L	470	470	0.0%	
Potassium	0.50 mg/L	91	89	2.2%	
Sodium	1.0 mg/L	4,000	4,000	0.0%	
Alkalinity	6.0 mg/L	100	100	0.0%	
Bicarbonate Alkalinity	6.0 mg/L	100	100	0.0%	
Total Dissolved Solids	200 mg/L	17,000	16,000	6.1%	
pH	1.7 S.U.	7.4	7.4	0.0%	
Radium 228	0.4 pCi/L	0.9	0.9	0.0%	
Total Radium	0.4 pCi/L	0.9	0.9	0.0%	
Fluoride	0.80 mg/L	3.5	3.6	2.8%	
Lithium	0.20 mg/L	0.78	0.76	2.6%	
Magnesium	2.0 mg/L	470	470	0.0%	
Silica	0.21 mg/L	24	20	18%	
Arsenic	0.00050 mg/L	0.0027	0.0013	70%	J-FD
Barium	0.00050 mg/L	0.021	0.015	33%	J-FD
Chromium	0.0010 mg/L	0.0026	0.0016	48%	J-FD
Cobalt	0.00050 mg/L	0.0049	0.0038	25%	J-FD
Lead	0.00050 mg/L	0.00072	0.00050 U	NC	± RL
Molybdenum	0.00050 mg/L	0.20	0.17	16%	
Selenium	0.00050 mg/L	0.0015	0.0020	29%	J-FD
Thallium	0.00010 mg/L	0.00015	0.00010 U	NC	± RL

**Table 2**  
**Field Duplicate Detections**  
**CCR Rule Compliance Monitoring Groundwater Data**  
**Arizona Public Services Cholla**  
**Joseph City, Arizona**

**Notes:**

mg/L = milligrams per liter

NC = not calculable

pCi/L = picocuries per liter

S.U. = standard units

**Qualifier Definitions:**

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

**Reason Codes:**

± RL = The difference between analyte concentrations is less than the reporting limit, indicating acceptable sampling and analytical precision.

FD = Imprecision between primary and field duplicate results. Potential sampling and/or analytical imprecision.

**Table 3**  
**Qualifiers Added During Data Validation**  
**CCR Rule Compliance Monitoring Groundwater Data**  
**Arizona Public Services Cholla**  
**Joseph City, Arizona**

Sample Identification	Analyte	Result	Qualifier and Reason Code
CH-CCR-FD01-12518	Arsenic	0.00013 mg/L	J FD
CH-CCR-FD01-12518	Barium	0.015 mg/L	J FD
CH-CCR-FD01-12518	Chromium	0.0016 mg/L	J FD
CH-CCR-FD01-12518	Cobalt	0.0038 mg/L	J FD
CH-CCR-FD01-12518	Fluoride	3.6 mg/L	J LM, NQ
CH-CCR-FD01-12518	Fluoride	3.6 mg/L	J LM
CH-CCR-FD01-12518	Lithium	0.76 mg/L	J LM
CH-CCR-FD01-12518	pH	7.4 S.U.	J HT
CH-CCR-FD01-12518	Selenium	0.0020 mg/L	J FD
CH-CCR-FD01-12518	Silica	20 mg/L	J LM
CH-CCR-FD02-12718	Fluoride	2.3 mg/L	J NQ
CH-CCR-FD02-12718	pH	7.4 S.U.	J HT
CH-CCR-M52A-12818	Fluoride	1.0 mg/L	J NQ
CH-CCR-M52A-12818	pH	6.8 S.U.	J HT
CH-CCR-M53A-12718	Fluoride	2.3 mg/L	J NQ
CH-CCR-M53A-12718	pH	7.4 S.U.	J HT
CH-CCR-M55A-12818	Fluoride	0.80 mg/L	UJ NQ
CH-CCR-M55A-12818	pH	7.3 S.U.	J HT
CH-CCR-MW65A-12518	Fluoride	1.9 mg/L	J NQ
CH-CCR-MW65A-12518	pH	7.3 S.U.	J HT
CH-CCR-MW66A-12518	Fluoride	0.93 mg/L	J NQ
CH-CCR-MW66A-12518	pH	8.1 S.U.	J HT
CH-CCR-MW67A-12518	Fluoride	1.0 mg/L	J NQ
CH-CCR-MW67A-12518	pH	6.9 S.U.	J HT
CH-CCR-W-126-12518	Arsenic	0.0027 mg/L	J FD
CH-CCR-W-126-12518	Barium	0.021 mg/L	J FD
CH-CCR-W-126-12518	Chromium	0.0026 mg/L	J FD
CH-CCR-W-126-12518	Cobalt	0.0049 mg/L	J FD
CH-CCR-W-126-12518	Fluoride	3.5 mg/L	J LM
CH-CCR-W-126-12518	Fluoride	3.5 mg/L	J LM, NQ
CH-CCR-W-126-12518	Lithium	0.78 mg/L	J LM
CH-CCR-W-126-12518	pH	7.4 S.U.	J HT
CH-CCR-W-126-12518	Selenium	0.0015 mg/L	J FD
CH-CCR-W-126-12518	Silica	24 mg/L	J LM
CH-CCR-W301-12718	Fluoride	0.80 mg/L	UJ NQ
CH-CCR-W301-12718	pH	7.2 S.U.	J HT
CH-CCR-W302-12718	Fluoride	0.98 mg/L	J NQ
CH-CCR-W302-12718	pH	7.3 S.U.	J HT
CH-CCR-W304-12718	Fluoride	0.80 mg/L	UJ NQ
CH-CCR-W304-12718	pH	7.3 S.U.	J HT

**Table 3**  
**Qualifiers Added During Data Validation**  
**CCR Rule Compliance Monitoring Groundwater Data**  
**Arizona Public Services Cholla**  
**Joseph City, Arizona**

CH-CCR-W305-12718	Fluoride	0.80 mg/L	UJ NQ
CH-CCR-W305-12718	pH	7.3 S.U.	J HT
CH-CCR-W306-12718	Fluoride	1.4 mg/L	J NQ
CH-CCR-W306-12718	pH	7.9 S.U.	J HT
CH-CCR-W307-12818	Fluoride	0.80 mg/L	UJ NQ
CH-CCR-W307-12818	pH	7.2 S.U.	J HT
CH-CCR-W308-12818	Fluoride	0.80 mg/L	UJ NQ
CH-CCR-W308-12818	pH	7.1 S.U.	J HT
CH-CCR-W309-12818	Fluoride	1.0 mg/L	J NQ
CH-CCR-W309-12818	pH	8.1 S.U.	J HT
CH-CCR-W314-12818	Fluoride	0.89 mg/L	J NQ
CH-CCR-W314-12818	pH	7.3 S.U.	J HT

**Notes:**

mg/L = milligrams per liter

S.U. = standard units

**Qualifier Definitions:**

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

**Reason Codes:**

FD = Imprecision between primary and field duplicate results. Potential sampling and/or analytical imprecision.

HT = The maximum recommended hold time was exceeded and the result should be considered an estimated value.

LM = Low matrix spike recovery. Potentially low analytical bias.

NQ = There were insufficient quality control parameters reported for this analysis.

# TestAmerica

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## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-74837-1

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

12/31/2016 8:33:41 AM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.
E2	Concentration estimated. Analyte exceeded calibration range. Reanalysis not performed due to sample matrix.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.
D2	Sample required dilution due to high concentration of analyte.

### General Chemistry

Qualifier	Qualifier Description
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
D2	Sample required dilution due to high concentration of analyte.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

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**Job ID: 550-74837-1**

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**Laboratory: TestAmerica Phoenix**

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**Narrative**

**Job Narrative  
550-74837-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 12/22/2016 1:19 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.4° C and 1.8° C.

**HPLC/IC**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**Metals**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**General Chemistry**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-74837-1	CH-CCR-LAKE-1216	Water	12/21/16 09:10	12/22/16 13:19
550-74837-2	CH-CCR-M45A-1216	Water	12/21/16 10:44	12/22/16 13:19
550-74837-3	CH-CCR-M43A-1216	Water	12/21/16 11:58	12/22/16 13:19
550-74837-4	CH-CCR-M46A-1216	Water	12/21/16 13:08	12/22/16 13:19
550-74837-5	CH-CCR-W126-1216	Water	12/21/16 14:24	12/22/16 13:19
550-74837-6	CH-CCR-FAP-1216	Water	12/21/16 15:40	12/22/16 13:19
550-74837-7	CH-CCR-M100-1216	Water	12/21/16 15:40	12/22/16 13:19

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Client Sample ID: CH-CCR-LAKE-1216

## Lab Sample ID: 550-74837-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	330	D2	40	mg/L	20		300.0	Total/NA
Fluoride	0.50		0.40	mg/L	1		300.0	Total/NA
Sulfate	260	D2	40	mg/L	20		300.0	Total/NA
Boron	0.14		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	52		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	54		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	4.0		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	250		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	160		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	160		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1100		20	mg/L	1		SM 2540C	Total/NA
pH	8.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M45A-1216

## Lab Sample ID: 550-74837-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	800	D2	40	mg/L	20		300.0	Total/NA
Fluoride	0.76		0.40	mg/L	1		300.0	Total/NA
Sulfate	2100	D2	40	mg/L	20		300.0	Total/NA
Boron	1.1		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	630		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	140		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	12		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	570		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	260		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	260		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	4400	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M43A-1216

## Lab Sample ID: 550-74837-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2400	D2	200	mg/L	100		300.0	Total/NA
Sulfate	2000	D2	200	mg/L	100		300.0	Total/NA
Boron	0.85		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	850		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	220		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	10		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1100		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	250		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	250		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	6600	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M46A-1216

## Lab Sample ID: 550-74837-4

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Client Sample ID: CH-CCR-M46A-1216 (Continued)

## Lab Sample ID: 550-74837-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6700	D2	200	mg/L	100		300.0	Total/NA
Sulfate	1800	D2	200	mg/L	100		300.0	Total/NA
Boron	0.54		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	1300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	250		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	17		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2600	D2	5.0	mg/L	10		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	170		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	170		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	13000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W126-1216

## Lab Sample ID: 550-74837-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	7000	D2	400	mg/L	200		300.0	Total/NA
Sulfate	4200	D2	400	mg/L	200		300.0	Total/NA
Boron	37		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	740		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	550		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	120		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	3900	D2	5.0	mg/L	10		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	15000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FAP-1216

## Lab Sample ID: 550-74837-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	15000	D2	4000	mg/L	2000		300.0	Total/NA
Fluoride	50	D1	4.0	mg/L	10		300.0	Total/NA
Sulfate	17000	D2	4000	mg/L	2000		300.0	Total/NA
Boron	170	D2	5.0	mg/L	100		200.7 Rev 4.4	Total/NA
Calcium	600		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	2500	D2	200	mg/L	100		200.7 Rev 4.4	Total/NA
Potassium	190		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	8600	D2	50	mg/L	100		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	15000	D2	2000	mg/L	1		SM 2540C	Total/NA
pH	3.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M100-1216

## Lab Sample ID: 550-74837-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	15000	D2	4000	mg/L	2000		300.0	Total/NA
Fluoride	51	D1	4.0	mg/L	10		300.0	Total/NA
Sulfate	16000	D2	4000	mg/L	2000		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

Client Sample ID: CH-CCR-M100-1216 (Continued)

Lab Sample ID: 550-74837-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Boron	170	D2	5.0	mg/L	100		200.7 Rev 4.4	Total/NA
Calcium	610		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	2500	D2	200	mg/L	100		200.7 Rev 4.4	Total/NA
Potassium	190		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	8500	D2	50	mg/L	100		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	21000	D2	2000	mg/L	1		SM 2540C	Total/NA
pH	3.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.3	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

**Client Sample ID: CH-CCR-LAKE-1216**

**Lab Sample ID: 550-74837-1**

Date Collected: 12/21/16 09:10

Matrix: Water

Date Received: 12/22/16 13:19

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	330	D2	40	mg/L			12/23/16 09:20	20
Fluoride	0.50		0.40	mg/L			12/23/16 08:52	1
Sulfate	260	D2	40	mg/L			12/23/16 09:20	20

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.14		0.050	mg/L		12/23/16 12:19	12/30/16 02:37	1
Calcium	52		2.0	mg/L		12/23/16 12:19	12/30/16 02:37	1
Magnesium	54		2.0	mg/L		12/23/16 12:19	12/30/16 02:37	1
Potassium	4.0		0.50	mg/L		12/23/16 12:19	12/30/16 02:37	1
Sodium	250		0.50	mg/L		12/23/16 12:19	12/30/16 17:44	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	160		6.0	mg/L			12/28/16 09:53	1
Bicarbonate Alkalinity as CaCO3	160		6.0	mg/L			12/28/16 09:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/28/16 09:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Total Dissolved Solids	1100		20	mg/L			12/27/16 08:55	1
pH	8.4	H5	1.7	SU			12/28/16 16:07	1
Temperature	15.7	H5	0.1	Degrees C			12/28/16 16:07	1

**Client Sample ID: CH-CCR-M45A-1216**

**Lab Sample ID: 550-74837-2**

Date Collected: 12/21/16 10:44

Matrix: Water

Date Received: 12/22/16 13:19

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	800	D2	40	mg/L			12/23/16 10:15	20
Fluoride	0.76		0.40	mg/L			12/23/16 09:47	1
Sulfate	2100	D2	40	mg/L			12/23/16 10:15	20

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.1		0.050	mg/L		12/23/16 12:19	12/30/16 02:40	1
Calcium	630		2.0	mg/L		12/23/16 12:19	12/30/16 02:40	1
Magnesium	140		2.0	mg/L		12/23/16 12:19	12/30/16 02:40	1
Potassium	12		0.50	mg/L		12/23/16 12:19	12/30/16 02:40	1
Sodium	570		0.50	mg/L		12/23/16 12:19	12/30/16 17:47	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	260		6.0	mg/L			12/28/16 09:53	1
Bicarbonate Alkalinity as CaCO3	260		6.0	mg/L			12/28/16 09:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/28/16 09:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Total Dissolved Solids	4400	D2	100	mg/L			12/27/16 08:55	1
pH	7.2	H5	1.7	SU			12/28/16 16:07	1

TestAmerica Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Client Sample ID: CH-CCR-M45A-1216

Date Collected: 12/21/16 10:44

Date Received: 12/22/16 13:19

## Lab Sample ID: 550-74837-2

Matrix: Water

### General Chemistry (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Temperature	15.9	H5	0.1	Degrees C			12/28/16 16:07	1

## Client Sample ID: CH-CCR-M43A-1216

Date Collected: 12/21/16 11:58

Date Received: 12/22/16 13:19

## Lab Sample ID: 550-74837-3

Matrix: Water

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2400	D2	200	mg/L			12/23/16 00:37	100
Fluoride	ND	D1 D5	0.80	mg/L			12/23/16 00:09	2
Sulfate	2000	D2	200	mg/L			12/23/16 00:37	100

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.85		0.050	mg/L		12/23/16 12:19	12/30/16 02:46	1
Calcium	850		2.0	mg/L		12/23/16 12:19	12/30/16 02:46	1
Magnesium	220		2.0	mg/L		12/23/16 12:19	12/30/16 02:46	1
Potassium	10		0.50	mg/L		12/23/16 12:19	12/30/16 02:46	1
Sodium	1100		0.50	mg/L		12/23/16 12:19	12/30/16 17:53	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	250		6.0	mg/L			12/28/16 09:53	1
Bicarbonate Alkalinity as CaCO3	250		6.0	mg/L			12/28/16 09:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/28/16 09:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Total Dissolved Solids	6600	D2	100	mg/L			12/27/16 08:55	1
pH	7.3	H5	1.7	SU			12/28/16 16:07	1
Temperature	15.6	H5	0.1	Degrees C			12/28/16 16:07	1

## Client Sample ID: CH-CCR-M46A-1216

Date Collected: 12/21/16 13:08

Date Received: 12/22/16 13:19

## Lab Sample ID: 550-74837-4

Matrix: Water

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6700	D2	200	mg/L			12/23/16 01:31	100
Fluoride	ND	D1 D5	2.0	mg/L			12/23/16 01:04	5
Sulfate	1800	D2	200	mg/L			12/23/16 01:31	100

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.54		0.050	mg/L		12/23/16 12:19	12/30/16 02:52	1
Calcium	1300		2.0	mg/L		12/23/16 12:19	12/30/16 02:52	1
Magnesium	250		2.0	mg/L		12/23/16 12:19	12/30/16 02:52	1
Potassium	17		0.50	mg/L		12/23/16 12:19	12/30/16 02:52	1
Sodium	2600	D2	5.0	mg/L		12/23/16 12:19	12/30/16 17:59	10

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

**Client Sample ID: CH-CCR-M46A-1216**

**Lab Sample ID: 550-74837-4**

Date Collected: 12/21/16 13:08

Matrix: Water

Date Received: 12/22/16 13:19

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	170		6.0	mg/L			12/28/16 09:53	1
Bicarbonate Alkalinity as CaCO3	170		6.0	mg/L			12/28/16 09:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/28/16 09:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
<b>Total Dissolved Solids</b>	<b>13000</b>	<b>D2</b>	200	mg/L			12/27/16 08:55	1
<b>pH</b>	<b>7.2</b>	<b>H5</b>	1.7	SU			12/28/16 16:07	1
<b>Temperature</b>	<b>15.6</b>	<b>H5</b>	0.1	Degrees C			12/28/16 16:07	1

**Client Sample ID: CH-CCR-W126-1216**

**Lab Sample ID: 550-74837-5**

Date Collected: 12/21/16 14:24

Matrix: Water

Date Received: 12/22/16 13:19

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	7000	D2	400	mg/L			12/23/16 11:34	200
Fluoride	ND	D1 D5	2.0	mg/L			12/23/16 11:07	5
Sulfate	4200	D2	400	mg/L			12/23/16 11:34	200

## Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	37		0.050	mg/L		12/23/16 12:19	12/30/16 02:58	1
Calcium	740		2.0	mg/L		12/23/16 12:19	12/30/16 02:58	1
Magnesium	550		2.0	mg/L		12/23/16 12:19	12/30/16 02:58	1
Potassium	120		0.50	mg/L		12/23/16 12:19	12/30/16 02:58	1
Sodium	3900	D2	5.0	mg/L		12/23/16 12:19	12/30/16 18:02	10

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	140		6.0	mg/L			12/28/16 09:53	1
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L			12/28/16 09:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/28/16 09:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
<b>Total Dissolved Solids</b>	<b>15000</b>	<b>D2</b>	200	mg/L			12/27/16 08:55	1
<b>pH</b>	<b>7.4</b>	<b>H5</b>	1.7	SU			12/28/16 16:07	1
<b>Temperature</b>	<b>15.9</b>	<b>H5</b>	0.1	Degrees C			12/28/16 16:07	1

**Client Sample ID: CH-CCR-FAP-1216**

**Lab Sample ID: 550-74837-6**

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	15000	D2	4000	mg/L			12/30/16 04:40	2000
Fluoride	50	D1	4.0	mg/L			12/30/16 04:12	10
Sulfate	17000	D2	4000	mg/L			12/30/16 04:40	2000

## Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	170	D2	5.0	mg/L		12/23/16 12:19	12/30/16 18:04	100

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Client Sample ID: CH-CCR-FAP-1216

## Lab Sample ID: 550-74837-6

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

### Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	600		2.0	mg/L		12/23/16 12:19	12/30/16 03:04	1
Magnesium	2500	D2	200	mg/L		12/23/16 12:19	12/30/16 18:04	100
Potassium	190		0.50	mg/L		12/23/16 12:19	12/30/16 03:04	1
Sodium	8600	D2	50	mg/L		12/23/16 12:19	12/30/16 18:04	100

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/28/16 09:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Total Dissolved Solids	15000	D2	2000	mg/L			12/27/16 08:55	1
pH	3.1	H5	1.7	SU			12/28/16 16:07	1
Temperature	16.2	H5	0.1	Degrees C			12/28/16 16:07	1

## Client Sample ID: CH-CCR-M100-1216

## Lab Sample ID: 550-74837-7

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	15000	D2	4000	mg/L			12/30/16 05:35	2000
Fluoride	51	D1	4.0	mg/L			12/30/16 05:07	10
Sulfate	16000	D2	4000	mg/L			12/30/16 05:35	2000

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	170	D2	5.0	mg/L		12/23/16 12:19	12/30/16 18:07	100
Calcium	610		2.0	mg/L		12/23/16 12:19	12/30/16 03:10	1
Magnesium	2500	D2	200	mg/L		12/23/16 12:19	12/30/16 18:07	100
Potassium	190		0.50	mg/L		12/23/16 12:19	12/30/16 03:10	1
Sodium	8500	D2	50	mg/L		12/23/16 12:19	12/30/16 18:07	100

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/29/16 09:26	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1
Total Dissolved Solids	21000	D2	2000	mg/L			12/27/16 08:55	1
pH	3.1	H5	1.7	SU			12/28/16 16:07	1
Temperature	16.3	H5	0.1	Degrees C			12/28/16 16:07	1

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-106425/2**  
**Matrix: Water**  
**Analysis Batch: 106425**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/22/16 13:44	1
Fluoride	ND		0.40	mg/L			12/22/16 13:44	1
Sulfate	ND		2.0	mg/L			12/22/16 13:44	1

**Lab Sample ID: LCS 550-106425/5**  
**Matrix: Water**  
**Analysis Batch: 106425**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.0		mg/L		100	90 - 110
Fluoride	4.00	4.31		mg/L		108	90 - 110
Sulfate	20.0	20.4		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-106425/6**  
**Matrix: Water**  
**Analysis Batch: 106425**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.0		mg/L		100	90 - 110	0	20
Fluoride	4.00	4.24		mg/L		106	90 - 110	1	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-74791-A-2 MS**  
**Matrix: Water**  
**Analysis Batch: 106425**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	ND		20.0	20.0		mg/L		100	80 - 120
Fluoride	ND		4.00	4.01		mg/L		100	80 - 120
Sulfate	ND		20.0	20.3		mg/L		100	80 - 120

**Lab Sample ID: 550-74791-A-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 106425**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	ND		20.0	20.5		mg/L		103	80 - 120	3	20
Fluoride	ND		4.00	4.12		mg/L		103	80 - 120	3	20
Sulfate	ND		20.0	20.7		mg/L		102	80 - 120	2	20

**Lab Sample ID: MB 550-106426/2**  
**Matrix: Water**  
**Analysis Batch: 106426**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/22/16 19:08	1
Fluoride	ND		0.40	mg/L			12/22/16 19:08	1
Sulfate	ND		2.0	mg/L			12/22/16 19:08	1

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: LCS 550-106426/5**  
**Matrix: Water**  
**Analysis Batch: 106426**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.4		mg/L		102	90 - 110
Fluoride	4.00	3.83		mg/L		96	90 - 110
Sulfate	20.0	20.5		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-106426/6**  
**Matrix: Water**  
**Analysis Batch: 106426**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.4		mg/L		102	90 - 110	0	20
Fluoride	4.00	3.82		mg/L		96	90 - 110	0	20
Sulfate	20.0	20.5		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-74855-F-1 MS**  
**Matrix: Water**  
**Analysis Batch: 106426**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	290	E2 M3	20.0	296	E2 M3	mg/L		23	80 - 120
Fluoride	0.70		4.00	4.51		mg/L		95	80 - 120
Sulfate	78		20.0	95.1		mg/L		83	80 - 120

**Lab Sample ID: 550-74855-F-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 106426**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	290	E2 M3	20.0	295	E2 M3	mg/L		23	80 - 120	0	20
Fluoride	0.70		4.00	4.60		mg/L		98	80 - 120	2	20
Sulfate	78		20.0	95.4		mg/L		85	80 - 120	0	20

**Lab Sample ID: MB 550-106836/2**  
**Matrix: Water**  
**Analysis Batch: 106836**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/29/16 16:20	1
Fluoride	ND		0.40	mg/L			12/29/16 16:20	1
Sulfate	ND		2.0	mg/L			12/29/16 16:20	1

**Lab Sample ID: LCS 550-106836/5**  
**Matrix: Water**  
**Analysis Batch: 106836**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	19.8		mg/L		99	90 - 110
Fluoride	4.00	3.99		mg/L		100	90 - 110
Sulfate	20.0	20.2		mg/L		101	90 - 110

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: LCSD 550-106836/6**  
**Matrix: Water**  
**Analysis Batch: 106836**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.0		mg/L		100	90 - 110	1	20
Fluoride	4.00	4.01		mg/L		100	90 - 110	1	20
Sulfate	20.0	20.3		mg/L		102	90 - 110	1	20

**Lab Sample ID: 550-75015-G-1 MS**  
**Matrix: Water**  
**Analysis Batch: 106836**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10		20.0	31.3		mg/L		105	80 - 120
Fluoride	ND		4.00	4.29		mg/L		102	80 - 120
Sulfate	22		20.0	42.5		mg/L		102	80 - 120

**Lab Sample ID: 550-75015-G-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 106836**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	10		20.0	31.2		mg/L		105	80 - 120	0	20
Fluoride	ND		4.00	4.37		mg/L		104	80 - 120	2	20
Sulfate	22		20.0	42.6		mg/L		103	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-106458/1-A**  
**Matrix: Water**  
**Analysis Batch: 106859**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 106458**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		12/23/16 12:19	12/30/16 01:32	1
Calcium	ND		2.0	mg/L		12/23/16 12:19	12/30/16 01:32	1
Magnesium	ND		2.0	mg/L		12/23/16 12:19	12/30/16 01:32	1
Potassium	ND		0.50	mg/L		12/23/16 12:19	12/30/16 01:32	1
Sodium	ND		0.50	mg/L		12/23/16 12:19	12/30/16 01:32	1

**Lab Sample ID: LCS 550-106458/2-A**  
**Matrix: Water**  
**Analysis Batch: 106859**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 106458**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.978		mg/L		98	85 - 115
Calcium	21.0	21.3		mg/L		102	85 - 115
Magnesium	21.0	21.3		mg/L		101	85 - 115
Potassium	20.0	20.5		mg/L		103	85 - 115
Sodium	20.0	19.6		mg/L		98	85 - 115

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCSD 550-106458/3-A**  
**Matrix: Water**  
**Analysis Batch: 106859**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 106458**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.986		mg/L		99	85 - 115	1	20
Calcium	21.0	21.2		mg/L		101	85 - 115	0	20
Magnesium	21.0	21.2		mg/L		101	85 - 115	0	20
Potassium	20.0	20.4		mg/L		102	85 - 115	1	20
Sodium	20.0	19.7		mg/L		98	85 - 115	0	20

**Lab Sample ID: 550-74787-D-2-A MS**  
**Matrix: Water**  
**Analysis Batch: 106859**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 106458**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.13		1.00	1.16		mg/L		103	70 - 130		
Calcium	130		21.0	151	M3	mg/L		79	70 - 130		
Magnesium	7.5		21.0	28.8		mg/L		101	70 - 130		
Potassium	19		20.0	40.0		mg/L		103	70 - 130		
Sodium	250	M3	20.0	258	M3	mg/L		63	70 - 130		

**Lab Sample ID: 550-74787-D-2-B MSD**  
**Matrix: Water**  
**Analysis Batch: 106859**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 106458**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.13		1.00	1.15		mg/L		102	70 - 130	1	20
Calcium	130		21.0	150	M3	mg/L		74	70 - 130	1	20
Magnesium	7.5		21.0	28.7		mg/L		101	70 - 130	0	20
Potassium	19		20.0	40.0		mg/L		103	70 - 130	0	20
Sodium	250	M3	20.0	256	M3	mg/L		52	70 - 130	1	20

## Method: SM 2320B - Alkalinity

**Lab Sample ID: MB 550-106608/1**  
**Matrix: Water**  
**Analysis Batch: 106608**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/28/16 09:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/28/16 09:53	1

**Lab Sample ID: LCS 550-106608/2**  
**Matrix: Water**  
**Analysis Batch: 106608**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	256		mg/L		102	90 - 110		

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Method: SM 2320B - Alkalinity (Continued)

**Lab Sample ID: LCSD 550-106608/14**

**Matrix: Water**

**Analysis Batch: 106608**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	252		mg/L		101	90 - 110	2	20

**Lab Sample ID: 550-74730-C-3 DU**

**Matrix: Water**

**Analysis Batch: 106608**

**Client Sample ID: Duplicate**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity as CaCO3	520		504		mg/L		2	20
Bicarbonate Alkalinity as CaCO3	520		504		mg/L		2	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

**Lab Sample ID: MB 550-106709/1**

**Matrix: Water**

**Analysis Batch: 106709**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/29/16 09:26	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/29/16 09:26	1

**Lab Sample ID: LCS 550-106709/2**

**Matrix: Water**

**Analysis Batch: 106709**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity as CaCO3	250	252		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-106709/14**

**Matrix: Water**

**Analysis Batch: 106709**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	254		mg/L		102	90 - 110	1	20

**Lab Sample ID: 550-74730-D-4 DU**

**Matrix: Water**

**Analysis Batch: 106709**

**Client Sample ID: Duplicate**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity as CaCO3	480		480		mg/L		0	20
Bicarbonate Alkalinity as CaCO3	480		480		mg/L		0	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-106498/1**  
**Matrix: Water**  
**Analysis Batch: 106498**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			12/27/16 08:55	1

**Lab Sample ID: LCS 550-106498/2**  
**Matrix: Water**  
**Analysis Batch: 106498**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	970		mg/L		97	90 - 110

**Lab Sample ID: LCSD 550-106498/3**  
**Matrix: Water**  
**Analysis Batch: 106498**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	966		mg/L		97	90 - 110	0	10

**Lab Sample ID: 550-74877-B-1 DU**  
**Matrix: Water**  
**Analysis Batch: 106498**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	1400		1380		mg/L		0.4	10

**Lab Sample ID: 550-74896-A-1 DU**  
**Matrix: Water**  
**Analysis Batch: 106498**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	1400		1300		mg/L		5	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-106679/13**  
**Matrix: Water**  
**Analysis Batch: 106679**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.0	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-106679/25**  
**Matrix: Water**  
**Analysis Batch: 106679**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.0	98.5 - 101.5

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: LCSSRM 550-106679/31**  
**Matrix: Water**  
**Analysis Batch: 106679**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.0	98.5 - 101.5

**Lab Sample ID: 550-74641-B-1 DU**  
**Matrix: Water**  
**Analysis Batch: 106679**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	9.7	H5	9.7	H5	SU		0.3	5
Temperature	15.2	H5	15.1	H5	Degrees C		0.7	

**Lab Sample ID: 550-74837-7 DU**  
**Matrix: Water**  
**Analysis Batch: 106679**

**Client Sample ID: CH-CCR-M100-1216**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	3.1	H5	3.1	H5	SU		0.3	5
Temperature	16.3	H5	16.5	H5	Degrees C		1	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## HPLC/IC

### Analysis Batch: 106425

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	300.0	
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	300.0	
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	300.0	
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	300.0	
MB 550-106425/2	Method Blank	Total/NA	Water	300.0	
LCS 550-106425/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-106425/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-74791-A-2 MS	Matrix Spike	Total/NA	Water	300.0	
550-74791-A-2 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 106426

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	300.0	
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	300.0	
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	300.0	
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	300.0	
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	300.0	
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	300.0	
MB 550-106426/2	Method Blank	Total/NA	Water	300.0	
LCS 550-106426/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-106426/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-74855-F-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-74855-F-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 106836

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	300.0	
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	300.0	
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	300.0	
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	300.0	
MB 550-106836/2	Method Blank	Total/NA	Water	300.0	
LCS 550-106836/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-106836/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-75015-G-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-75015-G-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 106458

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	200.7	
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	200.7	
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	200.7	
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	200.7	
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	200.7	
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	200.7	
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	200.7	
MB 550-106458/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-106458/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-106458/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Metals (Continued)

### Prep Batch: 106458 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74787-D-2-A MS	Matrix Spike	Total/NA	Water	200.7	
550-74787-D-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 106859

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	200.7 Rev 4.4	106458
MB 550-106458/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	106458
LCS 550-106458/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	106458
LCSD 550-106458/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	106458
550-74787-D-2-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	106458
550-74787-D-2-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	106458

### Analysis Batch: 106888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	200.7 Rev 4.4	106458
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	200.7 Rev 4.4	106458

## General Chemistry

### Analysis Batch: 106498

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	SM 2540C	
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	SM 2540C	
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	SM 2540C	
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	SM 2540C	
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	SM 2540C	
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	SM 2540C	
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	SM 2540C	
MB 550-106498/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-106498/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-106498/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-74877-B-1 DU	Duplicate	Total/NA	Water	SM 2540C	
550-74896-A-1 DU	Duplicate	Total/NA	Water	SM 2540C	

### Analysis Batch: 106608

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	SM 2320B	
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	SM 2320B	
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	SM 2320B	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## General Chemistry (Continued)

### Analysis Batch: 106608 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	SM 2320B	
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	SM 2320B	
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	SM 2320B	
MB 550-106608/1	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-106608/2	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-106608/14	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-74730-C-3 DU	Duplicate	Total/NA	Water	SM 2320B	

### Analysis Batch: 106679

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-1	CH-CCR-LAKE-1216	Total/NA	Water	SM 4500 H+ B	
550-74837-2	CH-CCR-M45A-1216	Total/NA	Water	SM 4500 H+ B	
550-74837-3	CH-CCR-M43A-1216	Total/NA	Water	SM 4500 H+ B	
550-74837-4	CH-CCR-M46A-1216	Total/NA	Water	SM 4500 H+ B	
550-74837-5	CH-CCR-W126-1216	Total/NA	Water	SM 4500 H+ B	
550-74837-6	CH-CCR-FAP-1216	Total/NA	Water	SM 4500 H+ B	
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-106679/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-106679/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-106679/31	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-74641-B-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	
550-74837-7 DU	CH-CCR-M100-1216	Total/NA	Water	SM 4500 H+ B	

### Analysis Batch: 106709

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74837-7	CH-CCR-M100-1216	Total/NA	Water	SM 2320B	
MB 550-106709/1	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-106709/2	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-106709/14	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-74730-D-4 DU	Duplicate	Total/NA	Water	SM 2320B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

**Client Sample ID: CH-CCR-LAKE-1216**

**Lab Sample ID: 550-74837-1**

**Date Collected: 12/21/16 09:10**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	106425	12/23/16 08:52	BCB	TAL PHX
Total/NA	Analysis	300.0		20	106425	12/23/16 09:20	BCB	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106859	12/30/16 02:37	CJD	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106888	12/30/16 17:44	CJD	TAL PHX
Total/NA	Analysis	SM 2320B		1	106608	12/28/16 09:53	JNC	TAL PHX
Total/NA	Analysis	SM 2540C		1	106498	(Start) 12/27/16 08:55 (End) 12/28/16 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	106679	12/28/16 16:07	JCB	TAL PHX

**Client Sample ID: CH-CCR-M45A-1216**

**Lab Sample ID: 550-74837-2**

**Date Collected: 12/21/16 10:44**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	106425	12/23/16 09:47	BCB	TAL PHX
Total/NA	Analysis	300.0		20	106425	12/23/16 10:15	BCB	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106859	12/30/16 02:40	CJD	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106888	12/30/16 17:47	CJD	TAL PHX
Total/NA	Analysis	SM 2320B		1	106608	12/28/16 09:53	JNC	TAL PHX
Total/NA	Analysis	SM 2540C		1	106498	(Start) 12/27/16 08:55 (End) 12/28/16 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	106679	12/28/16 16:07	JCB	TAL PHX

**Client Sample ID: CH-CCR-M43A-1216**

**Lab Sample ID: 550-74837-3**

**Date Collected: 12/21/16 11:58**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	106426	12/23/16 00:09	BCB	TAL PHX
Total/NA	Analysis	300.0		100	106426	12/23/16 00:37	BCB	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106859	12/30/16 02:46	CJD	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106888	12/30/16 17:53	CJD	TAL PHX
Total/NA	Analysis	SM 2320B		1	106608	12/28/16 09:53	JNC	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

**Client Sample ID: CH-CCR-M43A-1216**

**Lab Sample ID: 550-74837-3**

**Date Collected: 12/21/16 11:58**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	106498	12/27/16 08:55 12/28/16 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	106679	12/28/16 16:07	JCB	TAL PHX

**Client Sample ID: CH-CCR-M46A-1216**

**Lab Sample ID: 550-74837-4**

**Date Collected: 12/21/16 13:08**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	106426	12/23/16 01:04	BCB	TAL PHX
Total/NA	Analysis	300.0		100	106426	12/23/16 01:31	BCB	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106859	12/30/16 02:52	CJD	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		10	106888	12/30/16 17:59	CJD	TAL PHX
Total/NA	Analysis	SM 2320B		1	106608	12/28/16 09:53	JNC	TAL PHX
Total/NA	Analysis	SM 2540C		1	106498	12/27/16 08:55 12/28/16 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	106679	12/28/16 16:07	JCB	TAL PHX

**Client Sample ID: CH-CCR-W126-1216**

**Lab Sample ID: 550-74837-5**

**Date Collected: 12/21/16 14:24**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	106426	12/23/16 11:07	BCB	TAL PHX
Total/NA	Analysis	300.0		200	106426	12/23/16 11:34	BCB	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106859	12/30/16 02:58	CJD	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		10	106888	12/30/16 18:02	CJD	TAL PHX
Total/NA	Analysis	SM 2320B		1	106608	12/28/16 09:53	JNC	TAL PHX
Total/NA	Analysis	SM 2540C		1	106498	12/27/16 08:55 12/28/16 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	106679	12/28/16 16:07	JCB	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

**Client Sample ID: CH-CCR-FAP-1216**

**Lab Sample ID: 550-74837-6**

**Date Collected: 12/21/16 15:40**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	106836	12/30/16 04:12	KLH	TAL PHX
Total/NA	Analysis	300.0		2000	106836	12/30/16 04:40	KLH	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106859	12/30/16 03:04	CJD	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		100	106888	12/30/16 18:04	CJD	TAL PHX
Total/NA	Analysis	SM 2320B		1	106608	12/28/16 09:53	JNC	TAL PHX
Total/NA	Analysis	SM 2540C		1	106498		YET	TAL PHX
						(Start) 12/27/16 08:55		
						(End) 12/28/16 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	106679	12/28/16 16:07	JCB	TAL PHX

**Client Sample ID: CH-CCR-M100-1216**

**Lab Sample ID: 550-74837-7**

**Date Collected: 12/21/16 15:40**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	106836	12/30/16 05:07	KLH	TAL PHX
Total/NA	Analysis	300.0		2000	106836	12/30/16 05:35	KLH	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106859	12/30/16 03:10	CJD	TAL PHX
Total/NA	Prep	200.7			106458	12/23/16 12:19	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		100	106888	12/30/16 18:07	CJD	TAL PHX
Total/NA	Analysis	SM 2320B		1	106709	12/29/16 09:26	JNC	TAL PHX
Total/NA	Analysis	SM 2540C		1	106498		YET	TAL PHX
						(Start) 12/27/16 08:55		
						(End) 12/28/16 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	106679	12/28/16 16:07	JCB	TAL PHX

**Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

## Laboratory: TestAmerica Phoenix

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0728	06-09-17

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# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74837-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
SM 2320B	Alkalinity	SM	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



**TestAmerica Phoenix**

**Chain of Custody Record**

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

*74837*

Regulatory Program: **CCR** TestAmerica Laboratories, Inc.

Client Contact	Doug Lavernway	Lab Contact:	Doug Lavernway	Carrier:	12/22/2016	COC No.:	COCs
Analysis Turnaround Time		Filtered Sample ( Y / N )					
Sample Type (C-Comp, G-Grab)		Perform MS / MSD ( Y / N )					
EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)		EPA 300.0 (Cl, F, SO4)					
SM 2540C (TDS)		SM 4500-HB (pH)					
SM 2320B (HCO3)							
Sampler:		For Lab Use Only:					
Walk-in Client:		Lab Sampling:					
Job / SDG No.:							

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	SM 2320B (HCO3)	Sample Specific Notes:
1 CH-CCR-LAKE-1216	12/21/2016	910	G	W	2	N	X	X	X	X	X	X	
2 CH-CCR-M45A-1216	12/21/2016	1044	G	W	2	N	X	X	X	X	X	X	
3 CH-CCR-M43A-1216	12/21/2016	1158	G	W	2	N	X	X	X	X	X	X	
4 CH-CCR-M46A-1216	12/21/2016	1308	G	W	2	N	X	X	X	X	X	X	
5 CH-CCR-W126-1216	12/21/2016	1424	G	W	2	N	X	X	X	X	X	X	
6 CH-CCR-FAP-1216	12/21/2016	1540	G	W	2	N	X	X	X	X	X	X	
7 CH-CCR-M100-1216	12/21/2016	1540	G	W	2	N	X	X	X	X	X	X	



**Preservation Used:** 1- Ice, 2- HCl, 3- H2SO4, 4- HNO3, 5- NaOH, 6- Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

**Special Instructions/QC Requirements & Comments:**

*1.49e, 1.88e*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

Custody Seals Intact:	Custody Seal No.:	Cooler Temp. (°C):	Obs'd:	Corrd:	Therm ID No.:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

*Boo Lavernway*

*APQS*

*12/16/16*

*12/22/16 1315*

*CVS*

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-74837-1

**Login Number: 74837**  
**List Number: 1**  
**Creator: Vilaboy, Monica**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-74844-1

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

1/19/2017 6:59:13 AM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

TotalAccess

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

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**Job ID: 550-74844-1**

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**Laboratory: TestAmerica Phoenix**

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## Narrative

**Job Narrative**  
**550-74844-1**

### Comments

No additional comments.

### Receipt

The samples were received on 12/22/2016 1:19 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.4° C and 1.8° C.

### HPLC/IC

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

### Metals

Method(s) 200.8 LL: Internal standard responses were outside of acceptance limits for the following samples: CH-CCR-LAKE-1216 (550-74844-1), CH-CCR-FAP-1216 (550-74844-6) and CH-CCR-M100-1216 (550-74844-7). The sample(s) shows evidence of matrix interference.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-74844-1	CH-CCR-LAKE-1216	Water	12/21/16 09:10	12/22/16 13:19
550-74844-2	CH-CCR-M45A-1216	Water	12/21/16 10:44	12/22/16 13:19
550-74844-3	CH-CCR-M43A-1216	Water	12/21/16 11:58	12/22/16 13:19
550-74844-4	CH-CCR-M46A-1216	Water	12/21/16 13:08	12/22/16 13:19
550-74844-5	CH-CCR-W126-1216	Water	12/21/16 14:24	12/22/16 13:19
550-74844-6	CH-CCR-FAP-1216	Water	12/21/16 15:40	12/22/16 13:19
550-74844-7	CH-CCR-M100-1216	Water	12/21/16 15:40	12/22/16 13:19

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Client Sample ID: CH-CCR-LAKE-1216

## Lab Sample ID: 550-74844-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.51		0.40	mg/L	1		300.0	Total/NA
Barium	0.14		0.0020	mg/L	4		200.8 LL	Total/NA
Molybdenum	0.0038		0.0020	mg/L	4		200.8 LL	Total/NA
Selenium	0.0042	D1	0.0020	mg/L	4		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M45A-1216

## Lab Sample ID: 550-74844-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.78		0.40	mg/L	1		300.0	Total/NA
Arsenic	0.00066		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.017		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0013		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0014		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0030		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M43A-1216

## Lab Sample ID: 550-74844-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.20		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0046		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.025		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.00080		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.00069		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0027		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-M46A-1216

## Lab Sample ID: 550-74844-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.24		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0028		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.029		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.00077		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0015		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0067		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-W126-1216

## Lab Sample ID: 550-74844-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	2.1	D1	2.0	mg/L	5		300.0	Total/NA
Lithium	0.95		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0010		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.011		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0011		0.00050	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0025		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.060		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0029		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-FAP-1216

## Lab Sample ID: 550-74844-6

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Client Sample ID: CH-CCR-FAP-1216 (Continued)

## Lab Sample ID: 550-74844-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	55	D1	4.0	mg/L	10		300.0	Total/NA
Beryllium	0.0045		0.0010	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	2.4		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Antimony	0.033		0.0010	mg/L	1		200.8 LL	Total/NA
Arsenic	0.25	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.067		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.0012		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0085	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Cobalt	0.0091	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Lead	0.0034		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.43		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.038	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Thallium	0.0010		0.00010	mg/L	1		200.8 LL	Total/NA
Hg	0.00073		0.00020	mg/L	1		245.1	Total/NA

## Client Sample ID: CH-CCR-M100-1216

## Lab Sample ID: 550-74844-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	55	D1	4.0	mg/L	10		300.0	Total/NA
Beryllium	0.0045		0.0010	mg/L	1		200.7 Rev 4.4	Total/NA
Lithium	2.4		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Antimony	0.033		0.0010	mg/L	1		200.8 LL	Total/NA
Arsenic	0.25	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Barium	0.068		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.0013		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0091	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Cobalt	0.0094	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Lead	0.0036		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.43		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.042	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Thallium	0.0010		0.00010	mg/L	1		200.8 LL	Total/NA
Hg	0.00072		0.00020	mg/L	1		245.1	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

**Client Sample ID: CH-CCR-LAKE-1216**

**Lab Sample ID: 550-74844-1**

Date Collected: 12/21/16 09:10

Matrix: Water

Date Received: 12/22/16 13:19

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.51		0.40	mg/L			12/29/16 01:03	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		12/23/16 12:26	12/30/16 06:07	1
Lithium	ND		0.20	mg/L		12/23/16 12:26	12/30/16 06:07	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0040	mg/L		12/27/16 15:07	01/17/17 13:34	4
Arsenic	ND	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:34	4
Barium	0.14		0.0020	mg/L		12/27/16 15:07	01/17/17 13:34	4
Cadmium	ND		0.00040	mg/L		12/27/16 15:07	01/17/17 13:34	4
Chromium	ND	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:34	4
Cobalt	ND	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:34	4
Lead	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:59	1
Molybdenum	0.0038		0.0020	mg/L		12/27/16 15:07	01/17/17 13:34	4
Selenium	0.0042	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:34	4
Thallium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 12:59	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/27/16 12:17	12/29/16 23:42	1

**Client Sample ID: CH-CCR-M45A-1216**

**Lab Sample ID: 550-74844-2**

Date Collected: 12/21/16 10:44

Matrix: Water

Date Received: 12/22/16 13:19

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.78		0.40	mg/L			12/29/16 01:31	1

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		12/23/16 12:26	12/30/16 06:10	1
Lithium	ND		0.20	mg/L		12/23/16 12:26	12/30/16 06:10	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/27/16 15:07	01/02/17 13:04	1
Arsenic	0.00066		0.00050	mg/L		12/27/16 15:07	01/02/17 13:04	1
Barium	0.017		0.00050	mg/L		12/27/16 15:07	01/02/17 13:04	1
Cadmium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:04	1
Chromium	0.0013		0.00050	mg/L		12/27/16 15:07	01/02/17 13:04	1
Cobalt	0.0014		0.00050	mg/L		12/27/16 15:07	01/02/17 13:04	1
Lead	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 13:04	1
Molybdenum	0.0030		0.00050	mg/L		12/27/16 15:07	01/02/17 13:04	1
Selenium	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 13:04	1
Thallium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:04	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Client Sample ID: CH-CCR-M45A-1216

## Lab Sample ID: 550-74844-2

Date Collected: 12/21/16 10:44

Matrix: Water

Date Received: 12/22/16 13:19

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/27/16 12:17	12/29/16 23:44	1

## Client Sample ID: CH-CCR-M43A-1216

## Lab Sample ID: 550-74844-3

Date Collected: 12/21/16 11:58

Matrix: Water

Date Received: 12/22/16 13:19

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/29/16 01:58	2

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		12/23/16 12:26	12/30/16 06:16	1
Lithium	0.20		0.20	mg/L		12/23/16 12:26	12/30/16 06:16	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/27/16 15:07	01/02/17 13:06	1
Arsenic	0.0046		0.00050	mg/L		12/27/16 15:07	01/02/17 13:06	1
Barium	0.025		0.00050	mg/L		12/27/16 15:07	01/02/17 13:06	1
Cadmium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:06	1
Chromium	0.00080		0.00050	mg/L		12/27/16 15:07	01/02/17 13:06	1
Cobalt	0.00069		0.00050	mg/L		12/27/16 15:07	01/02/17 13:06	1
Lead	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 13:06	1
Molybdenum	0.0027		0.00050	mg/L		12/27/16 15:07	01/02/17 13:06	1
Selenium	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 13:06	1
Thallium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:06	1

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/27/16 12:17	12/29/16 23:45	1

## Client Sample ID: CH-CCR-M46A-1216

## Lab Sample ID: 550-74844-4

Date Collected: 12/21/16 13:08

Matrix: Water

Date Received: 12/22/16 13:19

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	2.0	mg/L			12/29/16 02:26	5

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		12/23/16 12:26	12/30/16 06:22	1
Lithium	0.24		0.20	mg/L		12/23/16 12:26	12/30/16 06:22	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/27/16 15:07	01/02/17 13:08	1
Arsenic	0.0028		0.00050	mg/L		12/27/16 15:07	01/02/17 13:08	1
Barium	0.029		0.00050	mg/L		12/27/16 15:07	01/02/17 13:08	1
Cadmium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:08	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

**Client Sample ID: CH-CCR-M46A-1216**

**Lab Sample ID: 550-74844-4**

Date Collected: 12/21/16 13:08

Matrix: Water

Date Received: 12/22/16 13:19

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	0.00077		0.00050	mg/L		12/27/16 15:07	01/02/17 13:08	1
Cobalt	0.0015		0.00050	mg/L		12/27/16 15:07	01/02/17 13:08	1
Lead	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 13:08	1
Molybdenum	0.0067		0.00050	mg/L		12/27/16 15:07	01/02/17 13:08	1
Selenium	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 13:08	1
Thallium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:08	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		01/02/17 11:17	01/03/17 14:57	1

**Client Sample ID: CH-CCR-W126-1216**

**Lab Sample ID: 550-74844-5**

Date Collected: 12/21/16 14:24

Matrix: Water

Date Received: 12/22/16 13:19

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.1	D1	2.0	mg/L			12/29/16 02:53	5

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		12/23/16 12:26	12/30/16 06:28	1
Lithium	0.95		0.20	mg/L		12/23/16 12:26	12/30/16 06:28	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/27/16 15:07	01/02/17 13:10	1
Arsenic	0.0010		0.00050	mg/L		12/27/16 15:07	01/02/17 13:10	1
Barium	0.011		0.00050	mg/L		12/27/16 15:07	01/02/17 13:10	1
Cadmium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:10	1
Chromium	0.0011		0.00050	mg/L		12/27/16 15:07	01/02/17 13:10	1
Cobalt	0.0025		0.00050	mg/L		12/27/16 15:07	01/02/17 13:10	1
Lead	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 13:10	1
Molybdenum	0.060		0.00050	mg/L		12/27/16 15:07	01/02/17 13:10	1
Selenium	0.0029		0.00050	mg/L		12/27/16 15:07	01/02/17 13:10	1
Thallium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 13:10	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/27/16 12:17	12/29/16 23:47	1

**Client Sample ID: CH-CCR-FAP-1216**

**Lab Sample ID: 550-74844-6**

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	55	D1	4.0	mg/L			12/29/16 03:20	10

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

**Client Sample ID: CH-CCR-FAP-1216**

**Lab Sample ID: 550-74844-6**

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0045		0.0010	mg/L		12/23/16 12:26	12/30/16 06:34	1
Lithium	2.4		0.20	mg/L		12/23/16 12:26	12/30/16 06:34	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.033		0.0010	mg/L		12/27/16 15:07	01/02/17 13:13	1
Arsenic	0.25	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:36	4
Barium	0.067		0.00050	mg/L		12/27/16 15:07	01/02/17 13:13	1
Cadmium	0.0012		0.00010	mg/L		12/27/16 15:07	01/02/17 13:13	1
Chromium	0.0085	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:36	4
Cobalt	0.0091	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:36	4
Lead	0.0034		0.00050	mg/L		12/27/16 15:07	01/02/17 13:13	1
Molybdenum	0.43		0.00050	mg/L		12/27/16 15:07	01/02/17 13:13	1
Selenium	0.038	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:36	4
Thallium	0.0010		0.00010	mg/L		12/27/16 15:07	01/02/17 13:13	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	0.00073		0.00020	mg/L		12/27/16 12:17	12/29/16 23:49	1

**Client Sample ID: CH-CCR-M100-1216**

**Lab Sample ID: 550-74844-7**

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	55	D1	4.0	mg/L			12/29/16 03:48	10

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0045		0.0010	mg/L		12/23/16 12:26	12/30/16 06:40	1
Lithium	2.4		0.20	mg/L		12/23/16 12:26	12/30/16 06:40	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	0.033		0.0010	mg/L		12/27/16 15:07	01/02/17 13:19	1
Arsenic	0.25	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:39	4
Barium	0.068		0.00050	mg/L		12/27/16 15:07	01/02/17 13:19	1
Cadmium	0.0013		0.00010	mg/L		12/27/16 15:07	01/02/17 13:19	1
Chromium	0.0091	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:39	4
Cobalt	0.0094	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:39	4
Lead	0.0036		0.00050	mg/L		12/27/16 15:07	01/02/17 13:19	1
Molybdenum	0.43		0.00050	mg/L		12/27/16 15:07	01/02/17 13:19	1
Selenium	0.042	D1	0.0020	mg/L		12/27/16 15:07	01/17/17 13:39	4
Thallium	0.0010		0.00010	mg/L		12/27/16 15:07	01/02/17 13:19	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	0.00072		0.00020	mg/L		01/02/17 11:17	01/03/17 14:53	1

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-106754/2**  
**Matrix: Water**  
**Analysis Batch: 106754**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND		0.40	mg/L			12/28/16 16:23	1

**Lab Sample ID: LCS 550-106754/5**  
**Matrix: Water**  
**Analysis Batch: 106754**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	4.00	4.05		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-106754/6**  
**Matrix: Water**  
**Analysis Batch: 106754**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	4.00	4.04		mg/L		101	90 - 110	0	20

**Lab Sample ID: 550-74938-Q-1 MS**  
**Matrix: Water**  
**Analysis Batch: 106754**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	0.61		4.00	4.67		mg/L		102	80 - 120

**Lab Sample ID: 550-74938-Q-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 106754**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	0.61		4.00	4.70		mg/L		102	80 - 120	1	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-106460/1-A**  
**Matrix: Water**  
**Analysis Batch: 106863**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 106460**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		12/23/16 12:26	12/30/16 05:45	1
Lithium	ND		0.20	mg/L		12/23/16 12:26	12/30/16 05:45	1

**Lab Sample ID: LCS 550-106460/2-A**  
**Matrix: Water**  
**Analysis Batch: 106863**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 106460**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	1.00	1.00		mg/L		100	85 - 115
Lithium	1.00	0.985		mg/L		98	85 - 115

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCSD 550-106460/3-A**  
**Matrix: Water**  
**Analysis Batch: 106863**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 106460**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Beryllium	1.00	1.00		mg/L		100	85 - 115	0	20
Lithium	1.00	0.988		mg/L		99	85 - 115	0	20

**Lab Sample ID: 550-74840-E-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 106863**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 106460**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Beryllium	ND		1.00	1.00		mg/L		100	70 - 130		
Lithium	ND		1.00	1.04		mg/L		99	70 - 130		

**Lab Sample ID: 550-74840-E-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 106863**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 106460**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Beryllium	ND		1.00	0.994		mg/L		99	70 - 130	1	20
Lithium	ND		1.00	1.01		mg/L		95	70 - 130	3	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-106563/1-A**  
**Matrix: Water**  
**Analysis Batch: 106913**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 106563**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/27/16 15:07	01/02/17 12:39	1
Arsenic	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:39	1
Barium	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:39	1
Cadmium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 12:39	1
Chromium	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:39	1
Cobalt	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:39	1
Lead	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:39	1
Molybdenum	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:39	1
Selenium	ND		0.00050	mg/L		12/27/16 15:07	01/02/17 12:39	1
Thallium	ND		0.00010	mg/L		12/27/16 15:07	01/02/17 12:39	1

**Lab Sample ID: LCS 550-106563/2-A**  
**Matrix: Water**  
**Analysis Batch: 106913**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 106563**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Antimony	0.100	0.0984		mg/L		98	85 - 115		
Arsenic	0.100	0.0982		mg/L		98	85 - 115		
Barium	0.100	0.0979		mg/L		98	85 - 115		
Cadmium	0.100	0.0980		mg/L		98	85 - 115		
Chromium	0.100	0.0991		mg/L		99	85 - 115		
Cobalt	0.100	0.0996		mg/L		100	85 - 115		
Lead	0.100	0.0963		mg/L		96	85 - 115		

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-106563/2-A**  
**Matrix: Water**  
**Analysis Batch: 106913**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 106563**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Molybdenum	0.100	0.0989		mg/L		99	85 - 115
Selenium	0.100	0.0969		mg/L		97	85 - 115
Thallium	0.100	0.0974		mg/L		97	85 - 115

**Lab Sample ID: LCSD 550-106563/3-A**  
**Matrix: Water**  
**Analysis Batch: 106913**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 106563**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Antimony	0.100	0.0990		mg/L		99	85 - 115	1	20
Arsenic	0.100	0.0979		mg/L		98	85 - 115	0	20
Barium	0.100	0.0987		mg/L		99	85 - 115	1	20
Cadmium	0.100	0.0981		mg/L		98	85 - 115	0	20
Chromium	0.100	0.0994		mg/L		99	85 - 115	0	20
Cobalt	0.100	0.0993		mg/L		99	85 - 115	0	20
Lead	0.100	0.0970		mg/L		97	85 - 115	1	20
Molybdenum	0.100	0.0990		mg/L		99	85 - 115	0	20
Selenium	0.100	0.0987		mg/L		99	85 - 115	2	20
Thallium	0.100	0.0977		mg/L		98	85 - 115	0	20

**Lab Sample ID: 550-74795-D-1-D MS**  
**Matrix: Water**  
**Analysis Batch: 106913**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 106563**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	ND		0.100	0.100		mg/L		100	70 - 130
Arsenic	0.0016		0.100	0.102		mg/L		100	70 - 130
Barium	0.051		0.100	0.149		mg/L		99	70 - 130
Cadmium	ND		0.100	0.0984		mg/L		98	70 - 130
Chromium	0.00054		0.100	0.100		mg/L		100	70 - 130
Cobalt	ND		0.100	0.0969		mg/L		97	70 - 130
Lead	ND		0.100	0.0943		mg/L		94	70 - 130
Molybdenum	0.0094		0.100	0.112		mg/L		102	70 - 130
Selenium	0.0028		0.100	0.102		mg/L		100	70 - 130
Thallium	ND		0.100	0.0965		mg/L		96	70 - 130

**Lab Sample ID: 550-74795-D-1-E MSD**  
**Matrix: Water**  
**Analysis Batch: 106913**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 106563**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Antimony	ND		0.100	0.101		mg/L		101	70 - 130	1	20
Arsenic	0.0016		0.100	0.102		mg/L		100	70 - 130	0	20
Barium	0.051		0.100	0.151		mg/L		100	70 - 130	1	20
Cadmium	ND		0.100	0.0983		mg/L		98	70 - 130	0	20
Chromium	0.00054		0.100	0.0995		mg/L		99	70 - 130	1	20
Cobalt	ND		0.100	0.0964		mg/L		96	70 - 130	1	20
Lead	ND		0.100	0.0953		mg/L		95	70 - 130	1	20
Molybdenum	0.0094		0.100	0.112		mg/L		103	70 - 130	0	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: 550-74795-D-1-E MSD**  
**Matrix: Water**  
**Analysis Batch: 106913**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 106563**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Selenium	0.0028		0.100	0.102		mg/L		99	70 - 130	0	20
Thallium	ND		0.100	0.0972		mg/L		97	70 - 130	1	20

## Method: 245.1 - Mercury (CVAA)

**Lab Sample ID: MB 550-106536/1-A**  
**Matrix: Water**  
**Analysis Batch: 106816**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 106536**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/27/16 12:17	12/29/16 23:27	1

**Lab Sample ID: LCS 550-106536/2-A**  
**Matrix: Water**  
**Analysis Batch: 106816**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 106536**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hg	0.0100	0.0102		mg/L		102	85 - 115

**Lab Sample ID: LCSD 550-106536/3-A**  
**Matrix: Water**  
**Analysis Batch: 106816**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 106536**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hg	0.0100	0.0106		mg/L		106	85 - 115	4	20

**Lab Sample ID: 550-74795-D-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 106816**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 106536**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Hg	ND		0.0100	0.00998		mg/L		100	70 - 130

**Lab Sample ID: 550-74795-D-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 106816**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 106536**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hg	ND		0.0100	0.0103		mg/L		103	70 - 130	3	20

**Lab Sample ID: MB 550-106906/1-A**  
**Matrix: Water**  
**Analysis Batch: 106971**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 106906**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		01/02/17 11:17	01/03/17 14:44	1

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Method: 245.1 - Mercury (CVAA) (Continued)

**Lab Sample ID: LCS 550-106906/2-A**  
**Matrix: Water**  
**Analysis Batch: 106971**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 106906**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Hg	0.0100	0.0104		mg/L		104	85 - 115

**Lab Sample ID: LCSD 550-106906/3-A**  
**Matrix: Water**  
**Analysis Batch: 106971**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 106906**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.0100	0.0106		mg/L		106	85 - 115	2	20

**Lab Sample ID: 550-74877-D-3-D MS**  
**Matrix: Water**  
**Analysis Batch: 106971**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 106906**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Hg	ND		0.0100	0.00950		mg/L		95	70 - 130

**Lab Sample ID: 550-74877-D-3-E MSD**  
**Matrix: Water**  
**Analysis Batch: 106971**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 106906**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.0100	0.00997		mg/L		100	70 - 130	5	20

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## HPLC/IC

### Analysis Batch: 106754

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	300.0	
550-74844-2	CH-CCR-M45A-1216	Total/NA	Water	300.0	
550-74844-3	CH-CCR-M43A-1216	Total/NA	Water	300.0	
550-74844-4	CH-CCR-M46A-1216	Total/NA	Water	300.0	
550-74844-5	CH-CCR-W126-1216	Total/NA	Water	300.0	
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	300.0	
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	300.0	
MB 550-106754/2	Method Blank	Total/NA	Water	300.0	
LCS 550-106754/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-106754/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-74938-Q-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-74938-Q-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

## Metals

### Prep Batch: 106460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	200.7	
550-74844-2	CH-CCR-M45A-1216	Total/NA	Water	200.7	
550-74844-3	CH-CCR-M43A-1216	Total/NA	Water	200.7	
550-74844-4	CH-CCR-M46A-1216	Total/NA	Water	200.7	
550-74844-5	CH-CCR-W126-1216	Total/NA	Water	200.7	
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	200.7	
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	200.7	
MB 550-106460/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-106460/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-106460/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-74840-E-1-A MS	Matrix Spike	Total/NA	Water	200.7	
550-74840-E-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Prep Batch: 106536

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	245.1	
550-74844-2	CH-CCR-M45A-1216	Total/NA	Water	245.1	
550-74844-3	CH-CCR-M43A-1216	Total/NA	Water	245.1	
550-74844-5	CH-CCR-W126-1216	Total/NA	Water	245.1	
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	245.1	
MB 550-106536/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-106536/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-106536/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-74795-D-3-B MS	Matrix Spike	Total/NA	Water	245.1	
550-74795-D-3-C MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	

### Prep Batch: 106563

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	200.8	
550-74844-2	CH-CCR-M45A-1216	Total/NA	Water	200.8	
550-74844-3	CH-CCR-M43A-1216	Total/NA	Water	200.8	
550-74844-4	CH-CCR-M46A-1216	Total/NA	Water	200.8	
550-74844-5	CH-CCR-W126-1216	Total/NA	Water	200.8	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Metals (Continued)

### Prep Batch: 106563 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	200.8	
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	200.8	
MB 550-106563/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-106563/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-106563/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-74795-D-1-D MS	Matrix Spike	Total/NA	Water	200.8	
550-74795-D-1-E MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Analysis Batch: 106816

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	245.1	106536
550-74844-2	CH-CCR-M45A-1216	Total/NA	Water	245.1	106536
550-74844-3	CH-CCR-M43A-1216	Total/NA	Water	245.1	106536
550-74844-5	CH-CCR-W126-1216	Total/NA	Water	245.1	106536
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	245.1	106536
MB 550-106536/1-A	Method Blank	Total/NA	Water	245.1	106536
LCS 550-106536/2-A	Lab Control Sample	Total/NA	Water	245.1	106536
LCSD 550-106536/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	106536
550-74795-D-3-B MS	Matrix Spike	Total/NA	Water	245.1	106536
550-74795-D-3-C MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	106536

### Analysis Batch: 106863

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	200.7 Rev 4.4	106460
550-74844-2	CH-CCR-M45A-1216	Total/NA	Water	200.7 Rev 4.4	106460
550-74844-3	CH-CCR-M43A-1216	Total/NA	Water	200.7 Rev 4.4	106460
550-74844-4	CH-CCR-M46A-1216	Total/NA	Water	200.7 Rev 4.4	106460
550-74844-5	CH-CCR-W126-1216	Total/NA	Water	200.7 Rev 4.4	106460
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	200.7 Rev 4.4	106460
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	200.7 Rev 4.4	106460
MB 550-106460/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	106460
LCS 550-106460/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	106460
LCSD 550-106460/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	106460
550-74840-E-1-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	106460
550-74840-E-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	106460

### Prep Batch: 106906

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-4	CH-CCR-M46A-1216	Total/NA	Water	245.1	
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	245.1	
MB 550-106906/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-106906/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-106906/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-74877-D-3-D MS	Matrix Spike	Total/NA	Water	245.1	
550-74877-D-3-E MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	

### Analysis Batch: 106913

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	200.8 LL	106563
550-74844-2	CH-CCR-M45A-1216	Total/NA	Water	200.8 LL	106563
550-74844-3	CH-CCR-M43A-1216	Total/NA	Water	200.8 LL	106563

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Metals (Continued)

### Analysis Batch: 106913 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-4	CH-CCR-M46A-1216	Total/NA	Water	200.8 LL	106563
550-74844-5	CH-CCR-W126-1216	Total/NA	Water	200.8 LL	106563
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	200.8 LL	106563
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	200.8 LL	106563
MB 550-106563/1-A	Method Blank	Total/NA	Water	200.8 LL	106563
LCS 550-106563/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	106563
LCSD 550-106563/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	106563
550-74795-D-1-D MS	Matrix Spike	Total/NA	Water	200.8 LL	106563
550-74795-D-1-E MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	106563

### Analysis Batch: 106971

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-4	CH-CCR-M46A-1216	Total/NA	Water	245.1	106906
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	245.1	106906
MB 550-106906/1-A	Method Blank	Total/NA	Water	245.1	106906
LCS 550-106906/2-A	Lab Control Sample	Total/NA	Water	245.1	106906
LCSD 550-106906/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	106906
550-74877-D-3-D MS	Matrix Spike	Total/NA	Water	245.1	106906
550-74877-D-3-E MSD	Matrix Spike Duplicate	Total/NA	Water	245.1	106906

### Analysis Batch: 108067

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-74844-1	CH-CCR-LAKE-1216	Total/NA	Water	200.8 LL	106563
550-74844-6	CH-CCR-FAP-1216	Total/NA	Water	200.8 LL	106563
550-74844-7	CH-CCR-M100-1216	Total/NA	Water	200.8 LL	106563

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

**Client Sample ID: CH-CCR-LAKE-1216**

**Date Collected: 12/21/16 09:10**

**Date Received: 12/22/16 13:19**

**Lab Sample ID: 550-74844-1**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	106754	12/29/16 01:03	KLH	TAL PHX
Total/NA	Prep	200.7			106460	12/23/16 12:26	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106863	12/30/16 06:07	CJD	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		1	106913	01/02/17 12:59	TEK	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		4	108067	01/17/17 13:34	TEK	TAL PHX
Total/NA	Prep	245.1			106536	12/27/16 12:17	JTG	TAL PHX
Total/NA	Analysis	245.1		1	106816	12/29/16 23:42	EXZ	TAL PHX

**Client Sample ID: CH-CCR-M45A-1216**

**Date Collected: 12/21/16 10:44**

**Date Received: 12/22/16 13:19**

**Lab Sample ID: 550-74844-2**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	106754	12/29/16 01:31	KLH	TAL PHX
Total/NA	Prep	200.7			106460	12/23/16 12:26	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106863	12/30/16 06:10	CJD	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		1	106913	01/02/17 13:04	TEK	TAL PHX
Total/NA	Prep	245.1			106536	12/27/16 12:17	JTG	TAL PHX
Total/NA	Analysis	245.1		1	106816	12/29/16 23:44	EXZ	TAL PHX

**Client Sample ID: CH-CCR-M43A-1216**

**Date Collected: 12/21/16 11:58**

**Date Received: 12/22/16 13:19**

**Lab Sample ID: 550-74844-3**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	106754	12/29/16 01:58	KLH	TAL PHX
Total/NA	Prep	200.7			106460	12/23/16 12:26	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106863	12/30/16 06:16	CJD	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		1	106913	01/02/17 13:06	TEK	TAL PHX
Total/NA	Prep	245.1			106536	12/27/16 12:17	JTG	TAL PHX
Total/NA	Analysis	245.1		1	106816	12/29/16 23:45	EXZ	TAL PHX

**Client Sample ID: CH-CCR-M46A-1216**

**Date Collected: 12/21/16 13:08**

**Date Received: 12/22/16 13:19**

**Lab Sample ID: 550-74844-4**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	106754	12/29/16 02:26	KLH	TAL PHX

TestAmerica Phoenix



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

**Client Sample ID: CH-CCR-M46A-1216**

**Lab Sample ID: 550-74844-4**

Date Collected: 12/21/16 13:08

Matrix: Water

Date Received: 12/22/16 13:19

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			106460	12/23/16 12:26	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106863	12/30/16 06:22	CJD	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		1	106913	01/02/17 13:08	TEK	TAL PHX
Total/NA	Prep	245.1			106906	01/02/17 11:17	JTG	TAL PHX
Total/NA	Analysis	245.1		1	106971	01/03/17 14:57	JTG	TAL PHX

**Client Sample ID: CH-CCR-W126-1216**

**Lab Sample ID: 550-74844-5**

Date Collected: 12/21/16 14:24

Matrix: Water

Date Received: 12/22/16 13:19

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	106754	12/29/16 02:53	KLH	TAL PHX
Total/NA	Prep	200.7			106460	12/23/16 12:26	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106863	12/30/16 06:28	CJD	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		1	106913	01/02/17 13:10	TEK	TAL PHX
Total/NA	Prep	245.1			106536	12/27/16 12:17	JTG	TAL PHX
Total/NA	Analysis	245.1		1	106816	12/29/16 23:47	EXZ	TAL PHX

**Client Sample ID: CH-CCR-FAP-1216**

**Lab Sample ID: 550-74844-6**

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	106754	12/29/16 03:20	KLH	TAL PHX
Total/NA	Prep	200.7			106460	12/23/16 12:26	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106863	12/30/16 06:34	CJD	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		1	106913	01/02/17 13:13	TEK	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		4	108067	01/17/17 13:36	TEK	TAL PHX
Total/NA	Prep	245.1			106536	12/27/16 12:17	JTG	TAL PHX
Total/NA	Analysis	245.1		1	106816	12/29/16 23:49	EXZ	TAL PHX

**Client Sample ID: CH-CCR-M100-1216**

**Lab Sample ID: 550-74844-7**

Date Collected: 12/21/16 15:40

Matrix: Water

Date Received: 12/22/16 13:19

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	106754	12/29/16 03:48	KLH	TAL PHX
Total/NA	Prep	200.7			106460	12/23/16 12:26	EXZ	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	106863	12/30/16 06:40	CJD	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

**Client Sample ID: CH-CCR-M100-1216**

**Lab Sample ID: 550-74844-7**

**Date Collected: 12/21/16 15:40**

**Matrix: Water**

**Date Received: 12/22/16 13:19**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		1	106913	01/02/17 13:19	TEK	TAL PHX
Total/NA	Prep	200.8			106563	12/27/16 15:07	EXZ	TAL PHX
Total/NA	Analysis	200.8 LL		4	108067	01/17/17 13:39	TEK	TAL PHX
Total/NA	Prep	245.1			106906	01/02/17 11:17	JTG	TAL PHX
Total/NA	Analysis	245.1		1	106971	01/03/17 14:53	JTG	TAL PHX

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

## Laboratory: TestAmerica Phoenix

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0728	06-09-17

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-74844-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
245.1	Mercury (CVAA)	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

**Chain of Custody Record**

74844

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact		Doug Lavarnway		Lab Contact:		Doug Lavarnway		Carrier:		12/22/2016		COC No:		COCs				
4801 Cholla Lake Road		928-587-0319		Analysis Turnaround Time		TAT if different from Below								Sampler:				
Joseph City, Az 86032														For Lab Use Only:				
(928) 587-0319		Phone												Walk-in Client:				
(xxx) xxx-xxxx		FAX												Lab Sampling:				
Project Name: CCR														Job / SDG No.:				
Site: Cholla														Sample Specific Notes:				
P O #																		
Sample Identification				Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )								
1				12/21/2016	910	G	W	2	N	X	X	X	X					
2				12/21/2016	1044	G	W	2	N	X	X	X	X					
3				12/21/2016	1158	G	W	2	N	X	X	X	X					
4				12/21/2016	1308	G	W	2	N	X	X	X	X					
5				12/21/2016	1424	G	W	2	N	X	X	X	X					
6				12/21/2016	1540	G	W	2	N	X	X	X	X					
7				12/21/2016	1540	G	W	2	N	X	X	X	X					
8				12/21/2016	1540	G	W	2	N	X	X	X	X					
9				12/21/2016	1540	G	W	2	N	X	X	X	X					
10				12/21/2016	1540	G	W	2	N	X	X	X	X					
11				12/21/2016	1540	G	W	2	N	X	X	X	X					
12				12/21/2016	1540	G	W	2	N	X	X	X	X					
13				12/21/2016	1540	G	W	2	N	X	X	X	X					
14				12/21/2016	1540	G	W	2	N	X	X	X	X					

**Preservation Used:** 1= Ice, 2= HCI, 3= H2SO4, 4= HNO3, 5= NaOH, 6= Other  
 Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

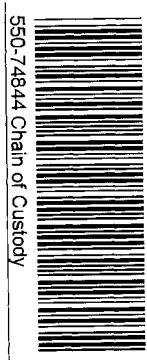
Special Instructions/QC Requirements & Comments:

1. Year 2016

Custody Seal No.:  
 Cooler Temp. (°C): Obsd: \_\_\_\_\_  
 Therm ID No.: \_\_\_\_\_

Relinquished by: *Doug Lavarnway*  
 Company: *APS*  
 Date/Time: *12/21/16*  
 Received by: *[Signature]*  
 Company: *APS*  
 Date/Time: *12/21/16*

Relinquished by: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_  
 Received in Laboratory by: *[Signature]*  
 Company: *APS*  
 Date/Time: *12/21/16*



## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-74844-1

**Login Number: 74844**  
**List Number: 1**  
**Creator: Vilaboy, Monica**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-107426-1

Client Project/Site: APP

For:

Arizona Public Service Company

PO BOX 188, Ste. 4458

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

8/31/2018 9:01:50 AM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
D1	Sample required dilution due to matrix.
N1	See case narrative.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.
D2	Sample required dilution due to high concentration of analyte.
D1	Sample required dilution due to matrix.
B3	Target analyte detected in calibration blank at or above the method reporting limit.

### General Chemistry

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Job ID: 550-107426-1**

**Laboratory: TestAmerica Phoenix**

## Narrative

**Job Narrative  
550-107426-1**

### Comments

No additional comments.

### Receipt

The samples were received on 8/7/2018 4:30 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 0.4° C and 1.6° C.

### Receipt Exceptions

Several sample sites were missing from the pick list

CH-APP-DM4R-8718 (550-107426-1), CH-APP-DM4R-8718 (550-107426-1[DU]), CH-APP-DM4R-8718 (550-107426-1[MS]), CH-APP-DM4R-8718 (550-107426-1[MSD]), CH-APP-M35-8718 (550-107426-2), CH-APP-M43A-8718 (550-107426-3), CH-APP-M44D-8218 (550-107426-4), CH-APP-M44S-8218 (550-107426-5), CH-APP-M45A-8718 (550-107426-6), CH-APP-M46A-8718 (550-107426-7), CH-APP-M50A-8618 (550-107426-8), CH-APP-M51A-8618 (550-107426-9), CH-APP-FD02-8618 (550-107426-10), CH-APP-M62A-8618 (550-107426-11), CH-APP-M64A-8218 (550-107426-12), CH-APP-FD01-8218 (550-107426-13), CH-APP-W123-8618 (550-107426-14), CH-APP-W124-8618 (550-107426-15), CH-APP-W125-8218 (550-107426-16) and CH-APP-W126-8618 (550-107426-17)

### HPLC/IC

Method(s) 300.0: The following samples was diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-APP-M64A-8218 (550-107426-12) and CH-APP-FD01-8218 (550-107426-13). The samples contained high concentrations of Chloride and Sulfate. Fluoride was not detected in the diluted samples; as such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

Method(s) 300.0: The following sample was diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: CH-APP-M46A-8718 (550-107426-7). Fluoride was not detected in the diluted sample. As such, an elevated reporting limit (RL) has been provided and the data has been qualified with D1 and D5 flags.

Method(s) 300.0: The matrix spike/matrix spike duplicate (MS/MSD) samples were inadvertently omitted during the preparation procedure for Anions by method EPA 300.0 for the following analytical batch; 550-154735. Therefore, no data was available to report for the MS/MSD. The results for the associated laboratory control sample/laboratory sample control duplicate (LCS/LCSD) were within acceptance limits and can be used to verify batch accuracy and precision. As such, these data have been reported and qualified with a N1 flags.

CH-APP-M45A-8718 (550-107426-6), CH-APP-M46A-8718 (550-107426-7), CH-APP-M62A-8618 (550-107426-11) and CH-APP-W124-8618 (550-107426-15).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### Metals

Method(s) 200.7 Rev 4.4: The continuing calibration blank (CCB) for analytical batch 550-153712 contained Sodium above the reporting limit (RL). All reported samples associated with this CCB contained this analyte at a concentration greater than 10X the value found in the CCB; therefore, re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-107426-1	CH-APP-DM4R-8718	Water	08/07/18 10:09	08/07/18 16:30
550-107426-2	CH-APP-M35-8718	Water	08/07/18 10:30	08/07/18 16:30
550-107426-3	CH-APP-M43A-8718	Water	08/07/18 08:54	08/07/18 16:30
550-107426-4	CH-APP-M44D-8218	Water	08/02/18 13:19	08/07/18 16:30
550-107426-5	CH-APP-M44S-8218	Water	08/02/18 14:00	08/07/18 16:30
550-107426-6	CH-APP-M45A-8718	Water	08/07/18 07:29	08/07/18 16:30
550-107426-7	CH-APP-M46A-8718	Water	08/07/18 09:11	08/07/18 16:30
550-107426-8	CH-APP-M50A-8618	Water	08/06/18 12:37	08/07/18 16:30
550-107426-9	CH-APP-M51A-8618	Water	08/06/18 11:58	08/07/18 16:30
550-107426-10	CH-APP-FD02-8618	Water	08/06/18 11:58	08/07/18 16:30
550-107426-11	CH-APP-M62A-8618	Water	08/06/18 14:54	08/07/18 16:30
550-107426-12	CH-APP-M64A-8218	Water	08/02/18 11:19	08/07/18 16:30
550-107426-13	CH-APP-FD01-8218	Water	08/02/18 11:19	08/07/18 16:30
550-107426-14	CH-APP-W123-8618	Water	08/06/18 13:44	08/07/18 16:30
550-107426-15	CH-APP-W124-8618	Water	08/06/18 13:13	08/07/18 16:30
550-107426-16	CH-APP-W125-8218	Water	08/02/18 15:09	08/07/18 16:30
550-107426-17	CH-APP-W126-8618	Water	08/06/18 14:15	08/07/18 16:30

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Client Sample ID: CH-APP-DM4R-8718

## Lab Sample ID: 550-107426-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	590	D2	200	mg/L	100		300.0	Total/NA
Fluoride	0.45		0.40	mg/L	1		300.0	Total/NA
Sulfate	680	D2	200	mg/L	100		300.0	Total/NA
Boron	0.48		0.050	mg/L	1		200.7	Total/NA
Calcium	100	M3	2.0	mg/L	1		200.7	Total/NA
Magnesium	53		2.0	mg/L	1		200.7	Total/NA
Sodium	600	M3	0.50	mg/L	1		200.7	Total/NA
Chromium	0.0018		0.0010	mg/L	1		200.8 LL	Total/NA
Lead	0.0013		0.00050	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	390		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	390		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	2300	D2	40	mg/L	1		SM 2540C	Total/NA
pH	7.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.3	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M35-8718

## Lab Sample ID: 550-107426-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	570	D2	200	mg/L	100		300.0	Total/NA
Sulfate	270	D2	200	mg/L	100		300.0	Total/NA
Boron	0.18		0.050	mg/L	1		200.7	Total/NA
Calcium	79		2.0	mg/L	1		200.7	Total/NA
Magnesium	40		2.0	mg/L	1		200.7	Total/NA
Sodium	330		0.50	mg/L	1		200.7	Total/NA
Alkalinity as CaCO3	240		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	240		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1400		20	mg/L	1		SM 2540C	Total/NA
pH	7.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.4	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M43A-8718

## Lab Sample ID: 550-107426-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3000	D2	200	mg/L	100		300.0	Total/NA
Sulfate	2100	D2	200	mg/L	100		300.0	Total/NA
Boron	0.44		0.050	mg/L	1		200.7	Total/NA
Calcium	660		2.0	mg/L	1		200.7	Total/NA
Magnesium	220		2.0	mg/L	1		200.7	Total/NA
Sodium	1400		0.50	mg/L	1		200.7	Total/NA
Alkalinity as CaCO3	220		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	220		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	7600	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M44D-8218

## Lab Sample ID: 550-107426-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1100	D2	200	mg/L	100		300.0	Total/NA
Fluoride	0.78		0.40	mg/L	1		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Client Sample ID: CH-APP-M44D-8218 (Continued)

## Lab Sample ID: 550-107426-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	320	D2	200	mg/L	100		300.0	Total/NA
Boron	0.23		0.050	mg/L	1		200.7	Total/NA
Calcium	80		2.0	mg/L	1		200.7	Total/NA
Magnesium	43		2.0	mg/L	1		200.7	Total/NA
Sodium	600		0.50	mg/L	1		200.7	Total/NA
Alkalinity as CaCO3	120		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	120		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	2300	D2	40	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M44S-8218

## Lab Sample ID: 550-107426-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	7500	D2	200	mg/L	100		300.0	Total/NA
Fluoride	2.9	D1	2.0	mg/L	5		300.0	Total/NA
Sulfate	150	D2	10	mg/L	5		300.0	Total/NA
Boron	0.21		0.050	mg/L	1		200.7	Total/NA
Calcium	840		2.0	mg/L	1		200.7	Total/NA
Magnesium	92		2.0	mg/L	1		200.7	Total/NA
Sodium	3100	D2	1.0	mg/L	2		200.7	Total/NA
Total Dissolved Solids	13000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	5.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M45A-8718

## Lab Sample ID: 550-107426-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	930	D2	40	mg/L	20		300.0	Total/NA
Fluoride	0.64		0.40	mg/L	1		300.0	Total/NA
Sulfate	2200	D2 N1	100	mg/L	50		300.0	Total/NA
Boron	0.99		0.050	mg/L	1		200.7	Total/NA
Calcium	590		2.0	mg/L	1		200.7	Total/NA
Magnesium	120		2.0	mg/L	1		200.7	Total/NA
Sodium	610		0.50	mg/L	1		200.7	Total/NA
Alkalinity as CaCO3	370		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	370		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	4700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	11.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M46A-8718

## Lab Sample ID: 550-107426-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6700	D2	200	mg/L	100		300.0	Total/NA
Sulfate	2000	D2	200	mg/L	100		300.0	Total/NA
Boron	0.53		0.050	mg/L	1		200.7	Total/NA
Calcium	1200		2.0	mg/L	1		200.7	Total/NA
Magnesium	240		2.0	mg/L	1		200.7	Total/NA
Sodium	2600	D2	1.0	mg/L	2		200.7	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Client Sample ID: CH-APP-M46A-8718 (Continued)

Lab Sample ID: 550-107426-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chromium	0.0016		0.0010	mg/L	1		200.8 LL	Total/NA
Lead	0.0011		0.00050	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	210		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	210		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	13000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M50A-8618

Lab Sample ID: 550-107426-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2500	D2	200	mg/L	100		300.0	Total/NA
Fluoride	2.3	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3100	D2	200	mg/L	100		300.0	Total/NA
Boron	2.9		0.050	mg/L	1		200.7	Total/NA
Calcium	560		2.0	mg/L	1		200.7	Total/NA
Magnesium	200		2.0	mg/L	1		200.7	Total/NA
Sodium	1600	B3	0.50	mg/L	1		200.7	Total/NA
Chromium	0.0049		0.0010	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	8000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	10.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M51A-8618

Lab Sample ID: 550-107426-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5900	D2	200	mg/L	100		300.0	Total/NA
Fluoride	6.2	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3100	D2	200	mg/L	100		300.0	Total/NA
Boron	33		0.050	mg/L	1		200.7	Total/NA
Calcium	790		2.0	mg/L	1		200.7	Total/NA
Magnesium	280		2.0	mg/L	1		200.7	Total/NA
Sodium	3200	D2	1.0	mg/L	2		200.7	Total/NA
Chromium	0.15	D1	0.010	mg/L	10		200.8 LL	Total/NA
Thallium	0.00020		0.00010	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	97		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	97		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-FD02-8618

Lab Sample ID: 550-107426-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5700	D2	200	mg/L	100		300.0	Total/NA
Fluoride	6.2	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3100	D2	200	mg/L	100		300.0	Total/NA
Boron	33		0.050	mg/L	1		200.7	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Client Sample ID: CH-APP-FD02-8618 (Continued)

## Lab Sample ID: 550-107426-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Calcium	770		2.0	mg/L	1		200.7	Total/NA
Magnesium	270		2.0	mg/L	1		200.7	Total/NA
Sodium	3100	D2	1.0	mg/L	2		200.7	Total/NA
Chromium	0.093	D1	0.010	mg/L	10		200.8 LL	Total/NA
Thallium	0.00018		0.00010	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	96		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	96		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M62A-8618

## Lab Sample ID: 550-107426-11

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3100	D2	200	mg/L	100		300.0	Total/NA
Sulfate	560	D2	200	mg/L	100		300.0	Total/NA
Boron	0.22		0.050	mg/L	1		200.7	Total/NA
Calcium	420		2.0	mg/L	1		200.7	Total/NA
Magnesium	150		2.0	mg/L	1		200.7	Total/NA
Sodium	1200	B3	0.50	mg/L	1		200.7	Total/NA
Lead	0.0010		0.00050	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	190		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	190		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	5600	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-M64A-8218

## Lab Sample ID: 550-107426-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4500	D2	200	mg/L	100		300.0	Total/NA
Sulfate	4300	D2	200	mg/L	100		300.0	Total/NA
Boron	1.2		0.050	mg/L	1		200.7	Total/NA
Calcium	470		2.0	mg/L	1		200.7	Total/NA
Magnesium	190		2.0	mg/L	1		200.7	Total/NA
Sodium	3500	D2	1.0	mg/L	2		200.7	Total/NA
Chromium	0.0015		0.0010	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	500		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	500		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-FD01-8218

## Lab Sample ID: 550-107426-13

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4500	D2	200	mg/L	100		300.0	Total/NA
Sulfate	4300	D2	200	mg/L	100		300.0	Total/NA
Boron	1.2		0.050	mg/L	1		200.7	Total/NA
Calcium	480		2.0	mg/L	1		200.7	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Client Sample ID: CH-APP-FD01-8218 (Continued)

## Lab Sample ID: 550-107426-13

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Magnesium	190		2.0	mg/L	1		200.7	Total/NA
Sodium	3400	D2	1.0	mg/L	2		200.7	Total/NA
Chromium	0.0027		0.0010	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	500		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	500		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	12000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-W123-8618

## Lab Sample ID: 550-107426-14

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6500	D2	200	mg/L	100		300.0	Total/NA
Fluoride	4.2	D1	2.0	mg/L	5		300.0	Total/NA
Sulfate	3700	D2	200	mg/L	100		300.0	Total/NA
Boron	34		0.050	mg/L	1		200.7	Total/NA
Calcium	750		2.0	mg/L	1		200.7	Total/NA
Magnesium	280		2.0	mg/L	1		200.7	Total/NA
Sodium	4000	D2	1.0	mg/L	2		200.7	Total/NA
Chromium	0.047		0.0010	mg/L	1		200.8 LL	Total/NA
Alkalinity as CaCO3	77		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	77		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	13000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.7	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-W124-8618

## Lab Sample ID: 550-107426-15

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3300	D2	200	mg/L	100		300.0	Total/NA
Fluoride	0.68	N1	0.40	mg/L	1		300.0	Total/NA
Sulfate	1300	D2	200	mg/L	100		300.0	Total/NA
Boron	0.38		0.050	mg/L	1		200.7	Total/NA
Calcium	650		2.0	mg/L	1		200.7	Total/NA
Magnesium	210		2.0	mg/L	1		200.7	Total/NA
Sodium	1300	B3	0.50	mg/L	1		200.7	Total/NA
Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	6900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-W125-8218

## Lab Sample ID: 550-107426-16

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	790	D2	100	mg/L	50		300.0	Total/NA
Fluoride	0.55		0.40	mg/L	1		300.0	Total/NA
Sulfate	320	D2	100	mg/L	50		300.0	Total/NA
Boron	0.15		0.050	mg/L	1		200.7	Total/NA
Calcium	110		2.0	mg/L	1		200.7	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Client Sample ID: CH-APP-W125-8218 (Continued)

## Lab Sample ID: 550-107426-16

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Magnesium	45		2.0	mg/L	1		200.7	Total/NA
Sodium	430	B3	0.50	mg/L	1		200.7	Total/NA
Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1800		20	mg/L	1		SM 2540C	Total/NA
pH	7.7	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-APP-W126-8618

## Lab Sample ID: 550-107426-17

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6600	D2	200	mg/L	100		300.0	Total/NA
Fluoride	4.2	D1	2.0	mg/L	5		300.0	Total/NA
Sulfate	4100	D2	200	mg/L	100		300.0	Total/NA
Boron	41		0.050	mg/L	1		200.7	Total/NA
Calcium	680		2.0	mg/L	1		200.7	Total/NA
Magnesium	380		2.0	mg/L	1		200.7	Total/NA
Sodium	4200	D2	1.0	mg/L	2		200.7	Total/NA
Alkalinity as CaCO3	97		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	97		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	14000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	12.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-DM4R-8718**

**Lab Sample ID: 550-107426-1**

Date Collected: 08/07/18 10:09

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	590	D2	200	mg/L			08/08/18 18:51	100
Fluoride	0.45		0.40	mg/L			08/08/18 17:56	1
Sulfate	680	D2	200	mg/L			08/08/18 18:51	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 18:34	1
Boron	0.48		0.050	mg/L		08/08/18 06:07	08/09/18 18:34	1
Calcium	100	M3	2.0	mg/L		08/08/18 06:07	08/09/18 18:34	1
Magnesium	53		2.0	mg/L		08/08/18 06:07	08/09/18 18:34	1
Sodium	600	M3	0.50	mg/L		08/08/18 06:07	08/09/18 18:34	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:08	1
Chromium	0.0018		0.0010	mg/L		08/09/18 08:52	08/15/18 17:08	1
Lead	0.0013		0.00050	mg/L		08/09/18 08:52	08/15/18 17:08	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:08	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	390		6.0	mg/L			08/09/18 16:12	1
Bicarbonate Alkalinity as CaCO3	390		6.0	mg/L			08/09/18 16:12	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 16:12	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 16:12	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 16:12	1
Total Dissolved Solids	2300	D2	40	mg/L			08/09/18 10:01	1
pH	7.9	H5	1.7	SU			08/10/18 11:47	1
Temperature	9.3	H5	0.1	Degrees C			08/10/18 11:47	1

**Client Sample ID: CH-APP-M35-8718**

**Lab Sample ID: 550-107426-2**

Date Collected: 08/07/18 10:30

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	570	D2	200	mg/L			08/08/18 20:05	100
Fluoride	ND		0.40	mg/L			08/08/18 19:46	1
Sulfate	270	D2	200	mg/L			08/08/18 20:05	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 18:37	1
Boron	0.18		0.050	mg/L		08/08/18 06:07	08/09/18 18:37	1
Calcium	79		2.0	mg/L		08/08/18 06:07	08/09/18 18:37	1
Magnesium	40		2.0	mg/L		08/08/18 06:07	08/09/18 18:37	1
Sodium	330		0.50	mg/L		08/08/18 06:07	08/09/18 18:37	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:11	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M35-8718**

**Lab Sample ID: 550-107426-2**

Date Collected: 08/07/18 10:30

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:11	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:11	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:11	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	240		6.0	mg/L			08/09/18 17:16	1
Bicarbonate Alkalinity as CaCO3	240		6.0	mg/L			08/09/18 17:16	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:16	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 17:16	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:16	1
Total Dissolved Solids	1400		20	mg/L			08/09/18 10:01	1
pH	7.8	H5	1.7	SU			08/10/18 11:47	1
Temperature	9.4	H5	0.1	Degrees C			08/10/18 11:47	1

**Client Sample ID: CH-APP-M43A-8718**

**Lab Sample ID: 550-107426-3**

Date Collected: 08/07/18 08:54

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3000	D2	200	mg/L			08/08/18 20:42	100
Fluoride	ND		0.40	mg/L			08/08/18 20:23	1
Sulfate	2100	D2	200	mg/L			08/08/18 20:42	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 18:40	1
Boron	0.44		0.050	mg/L		08/08/18 06:07	08/09/18 18:40	1
Calcium	660		2.0	mg/L		08/08/18 06:07	08/09/18 18:40	1
Magnesium	220		2.0	mg/L		08/08/18 06:07	08/09/18 18:40	1
Sodium	1400		0.50	mg/L		08/08/18 06:07	08/09/18 18:40	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:13	1
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:13	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:13	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:13	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	220		6.0	mg/L			08/09/18 17:25	1
Bicarbonate Alkalinity as CaCO3	220		6.0	mg/L			08/09/18 17:25	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:25	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 17:25	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:25	1
Total Dissolved Solids	7600	D2	100	mg/L			08/09/18 10:01	1
pH	7.5	H5	1.7	SU			08/10/18 11:47	1
Temperature	9.8	H5	0.1	Degrees C			08/10/18 11:47	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M44D-8218**

**Lab Sample ID: 550-107426-4**

Date Collected: 08/02/18 13:19

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1100	D2	200	mg/L			08/08/18 21:55	100
Fluoride	0.78		0.40	mg/L			08/08/18 21:37	1
Sulfate	320	D2	200	mg/L			08/08/18 21:55	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 18:45	1
Boron	0.23		0.050	mg/L		08/08/18 06:07	08/09/18 18:45	1
Calcium	80		2.0	mg/L		08/08/18 06:07	08/09/18 18:45	1
Magnesium	43		2.0	mg/L		08/08/18 06:07	08/09/18 18:45	1
Sodium	600		0.50	mg/L		08/08/18 06:07	08/09/18 18:45	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:15	1
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:15	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:15	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:15	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	120		6.0	mg/L			08/09/18 17:35	1
Bicarbonate Alkalinity as CaCO3	120		6.0	mg/L			08/09/18 17:35	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:35	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 17:35	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:35	1
Total Dissolved Solids	2300	D2	40	mg/L			08/08/18 11:12	1
pH	7.3	H5	1.7	SU			08/10/18 11:47	1
Temperature	10.1	H5	0.1	Degrees C			08/10/18 11:47	1

**Client Sample ID: CH-APP-M44S-8218**

**Lab Sample ID: 550-107426-5**

Date Collected: 08/02/18 14:00

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	7500	D2	200	mg/L			08/08/18 22:32	100
Fluoride	2.9	D1	2.0	mg/L			08/08/18 22:14	5
Sulfate	150	D2	10	mg/L			08/08/18 22:14	5

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 18:51	1
Boron	0.21		0.050	mg/L		08/08/18 06:07	08/09/18 18:51	1
Calcium	840		2.0	mg/L		08/08/18 06:07	08/09/18 18:51	1
Magnesium	92		2.0	mg/L		08/08/18 06:07	08/09/18 18:51	1
Sodium	3100	D2	1.0	mg/L		08/08/18 06:07	08/10/18 18:54	2

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:18	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M44S-8218**

**Lab Sample ID: 550-107426-5**

**Date Collected: 08/02/18 14:00**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:18	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:18	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:18	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:40	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:40	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:40	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 17:40	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:40	1
<b>Total Dissolved Solids</b>	<b>13000</b>	<b>D2</b>	200	mg/L			08/08/18 11:12	1
<b>pH</b>	<b>5.1</b>	<b>H5</b>	1.7	SU			08/10/18 11:47	1
<b>Temperature</b>	<b>10.8</b>	<b>H5</b>	0.1	Degrees C			08/10/18 11:47	1

**Client Sample ID: CH-APP-M45A-8718**

**Lab Sample ID: 550-107426-6**

**Date Collected: 08/07/18 07:29**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Chloride</b>	<b>930</b>	<b>D2</b>	40	mg/L			08/08/18 23:09	20
<b>Fluoride</b>	<b>0.64</b>		0.40	mg/L			08/08/18 22:50	1
<b>Sulfate</b>	<b>2200</b>	<b>D2 N1</b>	100	mg/L			08/22/18 10:17	50

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 18:57	1
<b>Boron</b>	<b>0.99</b>		0.050	mg/L		08/08/18 06:07	08/09/18 18:57	1
<b>Calcium</b>	<b>590</b>		2.0	mg/L		08/08/18 06:07	08/09/18 18:57	1
<b>Magnesium</b>	<b>120</b>		2.0	mg/L		08/08/18 06:07	08/09/18 18:57	1
<b>Sodium</b>	<b>610</b>		0.50	mg/L		08/08/18 06:07	08/09/18 18:57	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:23	1
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:23	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:23	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:23	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Alkalinity as CaCO3</b>	<b>370</b>		6.0	mg/L			08/09/18 18:08	1
<b>Bicarbonate Alkalinity as CaCO3</b>	<b>370</b>		6.0	mg/L			08/09/18 18:08	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:08	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 18:08	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:08	1
<b>Total Dissolved Solids</b>	<b>4700</b>	<b>D2</b>	100	mg/L			08/09/18 10:01	1
<b>pH</b>	<b>7.1</b>	<b>H5</b>	1.7	SU			08/14/18 12:24	1
<b>Temperature</b>	<b>11.2</b>	<b>H5</b>	0.1	Degrees C			08/14/18 12:24	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M46A-8718**

**Lab Sample ID: 550-107426-7**

Date Collected: 08/07/18 09:11

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6700	D2	200	mg/L			08/08/18 23:46	100
Fluoride	ND	D1 D5 N1	0.80	mg/L			08/22/18 08:27	2
Sulfate	2000	D2	200	mg/L			08/08/18 23:46	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:03	1
Boron	0.53		0.050	mg/L		08/08/18 06:07	08/09/18 19:03	1
Calcium	1200		2.0	mg/L		08/08/18 06:07	08/09/18 19:03	1
Magnesium	240		2.0	mg/L		08/08/18 06:07	08/09/18 19:03	1
Sodium	2600	D2	1.0	mg/L		08/08/18 06:07	08/10/18 19:00	2

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:25	1
Chromium	0.0016		0.0010	mg/L		08/09/18 08:52	08/15/18 17:25	1
Lead	0.0011		0.00050	mg/L		08/09/18 08:52	08/15/18 17:25	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:25	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	210		6.0	mg/L			08/09/18 18:27	1
Bicarbonate Alkalinity as CaCO3	210		6.0	mg/L			08/09/18 18:27	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:27	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 18:27	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:27	1
Total Dissolved Solids	13000	D2	200	mg/L			08/09/18 10:01	1
pH	7.3	H5	1.7	SU			08/14/18 12:24	1
Temperature	10.0	H5	0.1	Degrees C			08/14/18 12:24	1

**Client Sample ID: CH-APP-M50A-8618**

**Lab Sample ID: 550-107426-8**

Date Collected: 08/06/18 12:37

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2500	D2	200	mg/L			08/09/18 00:22	100
Fluoride	2.3	D1	0.80	mg/L			08/09/18 00:04	2
Sulfate	3100	D2	200	mg/L			08/09/18 00:22	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:14	1
Boron	2.9		0.050	mg/L		08/08/18 06:07	08/09/18 19:14	1
Calcium	560		2.0	mg/L		08/08/18 06:07	08/09/18 19:14	1
Magnesium	200		2.0	mg/L		08/08/18 06:07	08/09/18 19:14	1
Sodium	1600	B3	0.50	mg/L		08/08/18 06:07	08/09/18 19:14	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:32	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M50A-8618**

**Lab Sample ID: 550-107426-8**

Date Collected: 08/06/18 12:37

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	0.0049		0.0010	mg/L		08/09/18 08:52	08/15/18 17:32	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:32	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:32	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	180		6.0	mg/L			08/09/18 18:36	1
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L			08/09/18 18:36	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:36	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 18:36	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:36	1
Total Dissolved Solids	8000	D2	100	mg/L			08/08/18 11:12	1
pH	7.5	H5	1.7	SU			08/14/18 12:24	1
Temperature	10.7	H5	0.1	Degrees C			08/14/18 12:24	1

**Client Sample ID: CH-APP-M51A-8618**

**Lab Sample ID: 550-107426-9**

Date Collected: 08/06/18 11:58

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5900	D2	200	mg/L			08/09/18 01:36	100
Fluoride	6.2	D1	0.80	mg/L			08/09/18 01:18	2
Sulfate	3100	D2	200	mg/L			08/09/18 01:36	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:20	1
Boron	33		0.050	mg/L		08/08/18 06:07	08/09/18 19:20	1
Calcium	790		2.0	mg/L		08/08/18 06:07	08/09/18 19:20	1
Magnesium	280		2.0	mg/L		08/08/18 06:07	08/09/18 19:20	1
Sodium	3200	D2	1.0	mg/L		08/08/18 06:07	08/10/18 19:06	2

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:34	1
Chromium	0.15	D1	0.010	mg/L		08/09/18 08:52	08/19/18 13:32	10
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:34	1
Thallium	0.00020		0.00010	mg/L		08/09/18 08:52	08/15/18 17:34	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	97		6.0	mg/L			08/09/18 18:45	1
Bicarbonate Alkalinity as CaCO3	97		6.0	mg/L			08/09/18 18:45	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:45	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 18:45	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:45	1
Total Dissolved Solids	12000	D2	200	mg/L			08/08/18 11:12	1
pH	7.3	H5	1.7	SU			08/14/18 12:24	1
Temperature	9.8	H5	0.1	Degrees C			08/14/18 12:24	1

TestAmerica Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-FD02-8618**

**Lab Sample ID: 550-107426-10**

Date Collected: 08/06/18 11:58

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5700	D2	200	mg/L			08/09/18 02:13	100
Fluoride	6.2	D1	0.80	mg/L			08/09/18 01:54	2
Sulfate	3100	D2	200	mg/L			08/09/18 02:13	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:26	1
Boron	33		0.050	mg/L		08/08/18 06:07	08/09/18 19:26	1
Calcium	770		2.0	mg/L		08/08/18 06:07	08/09/18 19:26	1
Magnesium	270		2.0	mg/L		08/08/18 06:07	08/09/18 19:26	1
Sodium	3100	D2	1.0	mg/L		08/08/18 06:07	08/10/18 19:12	2

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:37	1
Chromium	0.093	D1	0.010	mg/L		08/09/18 08:52	08/19/18 13:34	10
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:37	1
Thallium	0.00018		0.00010	mg/L		08/09/18 08:52	08/15/18 17:37	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	96		6.0	mg/L			08/09/18 18:53	1
Bicarbonate Alkalinity as CaCO3	96		6.0	mg/L			08/09/18 18:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 18:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 18:53	1
Total Dissolved Solids	12000	D2	200	mg/L			08/08/18 11:12	1
pH	7.3	H5	1.7	SU			08/14/18 12:24	1
Temperature	13.5	H5	0.1	Degrees C			08/14/18 12:24	1

**Client Sample ID: CH-APP-M62A-8618**

**Lab Sample ID: 550-107426-11**

Date Collected: 08/06/18 14:54

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3100	D2	200	mg/L			08/09/18 02:50	100
Fluoride	ND	N1	0.40	mg/L			08/22/18 07:32	1
Sulfate	560	D2	200	mg/L			08/09/18 02:50	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:31	1
Boron	0.22		0.050	mg/L		08/08/18 06:07	08/09/18 19:31	1
Calcium	420		2.0	mg/L		08/08/18 06:07	08/09/18 19:31	1
Magnesium	150		2.0	mg/L		08/08/18 06:07	08/09/18 19:31	1
Sodium	1200	B3	0.50	mg/L		08/08/18 06:07	08/09/18 19:31	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:39	1

TestAmerica Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M62A-8618**

**Lab Sample ID: 550-107426-11**

Date Collected: 08/06/18 14:54

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:39	1
<b>Lead</b>	<b>0.0010</b>		0.00050	mg/L		08/09/18 08:52	08/15/18 17:39	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:39	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Alkalinity as CaCO3</b>	<b>190</b>		6.0	mg/L			08/09/18 19:02	1
<b>Bicarbonate Alkalinity as CaCO3</b>	<b>190</b>		6.0	mg/L			08/09/18 19:02	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:02	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 19:02	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:02	1
<b>Total Dissolved Solids</b>	<b>5600</b>	<b>D2</b>	100	mg/L			08/08/18 11:12	1
<b>pH</b>	<b>7.5</b>	<b>H5</b>	1.7	SU			08/14/18 12:24	1
<b>Temperature</b>	<b>12.7</b>	<b>H5</b>	0.1	Degrees C			08/14/18 12:24	1

**Client Sample ID: CH-APP-M64A-8218**

**Lab Sample ID: 550-107426-12**

Date Collected: 08/02/18 11:19

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Chloride</b>	<b>4500</b>	<b>D2</b>	200	mg/L			08/09/18 03:26	100
Fluoride	ND	D1 D5	0.80	mg/L			08/09/18 03:08	2
<b>Sulfate</b>	<b>4300</b>	<b>D2</b>	200	mg/L			08/09/18 03:26	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:37	1
<b>Boron</b>	<b>1.2</b>		0.050	mg/L		08/08/18 06:07	08/09/18 19:37	1
<b>Calcium</b>	<b>470</b>		2.0	mg/L		08/08/18 06:07	08/09/18 19:37	1
<b>Magnesium</b>	<b>190</b>		2.0	mg/L		08/08/18 06:07	08/09/18 19:37	1
<b>Sodium</b>	<b>3500</b>	<b>D2</b>	1.0	mg/L		08/08/18 06:07	08/10/18 19:17	2

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:41	1
<b>Chromium</b>	<b>0.0015</b>		0.0010	mg/L		08/09/18 08:52	08/15/18 17:41	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:41	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:41	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Alkalinity as CaCO3</b>	<b>500</b>		6.0	mg/L			08/09/18 19:14	1
<b>Bicarbonate Alkalinity as CaCO3</b>	<b>500</b>		6.0	mg/L			08/09/18 19:14	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:14	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 19:14	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:14	1
<b>Total Dissolved Solids</b>	<b>12000</b>	<b>D2</b>	200	mg/L			08/08/18 11:12	1
<b>pH</b>	<b>7.4</b>	<b>H5</b>	1.7	SU			08/14/18 12:24	1
<b>Temperature</b>	<b>12.9</b>	<b>H5</b>	0.1	Degrees C			08/14/18 12:24	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-FD01-8218**

**Lab Sample ID: 550-107426-13**

Date Collected: 08/02/18 11:19

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4500	D2	200	mg/L			08/09/18 04:03	100
Fluoride	ND	D1 D5	0.80	mg/L			08/09/18 03:45	2
Sulfate	4300	D2	200	mg/L			08/09/18 04:03	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:43	1
Boron	1.2		0.050	mg/L		08/08/18 06:07	08/09/18 19:43	1
Calcium	480		2.0	mg/L		08/08/18 06:07	08/09/18 19:43	1
Magnesium	190		2.0	mg/L		08/08/18 06:07	08/09/18 19:43	1
Sodium	3400	D2	1.0	mg/L		08/08/18 06:07	08/10/18 19:23	2

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:44	1
Chromium	0.0027		0.0010	mg/L		08/09/18 08:52	08/15/18 17:44	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:44	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:44	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	500		6.0	mg/L			08/09/18 19:24	1
Bicarbonate Alkalinity as CaCO3	500		6.0	mg/L			08/09/18 19:24	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:24	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 19:24	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:24	1
Total Dissolved Solids	12000	D2	200	mg/L			08/08/18 11:12	1
pH	7.3	H5	1.7	SU			08/14/18 12:24	1
Temperature	13.0	H5	0.1	Degrees C			08/14/18 12:24	1

**Client Sample ID: CH-APP-W123-8618**

**Lab Sample ID: 550-107426-14**

Date Collected: 08/06/18 13:44

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6500	D2	200	mg/L			08/09/18 05:17	100
Fluoride	4.2	D1	2.0	mg/L			08/09/18 04:58	5
Sulfate	3700	D2	200	mg/L			08/09/18 05:17	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:49	1
Boron	34		0.050	mg/L		08/08/18 06:07	08/09/18 19:49	1
Calcium	750		2.0	mg/L		08/08/18 06:07	08/09/18 19:49	1
Magnesium	280		2.0	mg/L		08/08/18 06:07	08/09/18 19:49	1
Sodium	4000	D2	1.0	mg/L		08/08/18 06:07	08/10/18 19:29	2

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:46	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-W123-8618**

**Lab Sample ID: 550-107426-14**

Date Collected: 08/06/18 13:44

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	0.047		0.0010	mg/L		08/09/18 08:52	08/15/18 17:46	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:46	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:46	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	77		6.0	mg/L			08/09/18 19:32	1
Bicarbonate Alkalinity as CaCO3	77		6.0	mg/L			08/09/18 19:32	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:32	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 19:32	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:32	1
Total Dissolved Solids	13000	D2	200	mg/L			08/08/18 11:12	1
pH	7.7	H5	1.7	SU			08/14/18 12:24	1
Temperature	12.9	H5	0.1	Degrees C			08/14/18 12:24	1

**Client Sample ID: CH-APP-W124-8618**

**Lab Sample ID: 550-107426-15**

Date Collected: 08/06/18 13:13

Matrix: Water

Date Received: 08/07/18 16:30

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3300	D2	200	mg/L			08/09/18 05:54	100
Fluoride	0.68	N1	0.40	mg/L			08/22/18 08:00	1
Sulfate	1300	D2	200	mg/L			08/09/18 05:54	100

**Method: 200.7 - Total Recoverable Metals by ICP**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 19:55	1
Boron	0.38		0.050	mg/L		08/08/18 06:07	08/09/18 19:55	1
Calcium	650		2.0	mg/L		08/08/18 06:07	08/09/18 19:55	1
Magnesium	210		2.0	mg/L		08/08/18 06:07	08/09/18 19:55	1
Sodium	1300	B3	0.50	mg/L		08/08/18 06:07	08/09/18 19:55	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:48	1
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:48	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:48	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:48	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	140		6.0	mg/L			08/09/18 19:41	1
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L			08/09/18 19:41	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:41	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 19:41	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 19:41	1
Total Dissolved Solids	6900	D2	100	mg/L			08/08/18 11:12	1
pH	7.4	H5	1.7	SU			08/14/18 12:24	1
Temperature	13.1	H5	0.1	Degrees C			08/14/18 12:24	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-W125-8218**

**Lab Sample ID: 550-107426-16**

Date Collected: 08/02/18 15:09

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	790	D2	100	mg/L			08/09/18 06:30	50
Fluoride	0.55		0.40	mg/L			08/09/18 06:12	1
Sulfate	320	D2	100	mg/L			08/09/18 06:30	50

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 20:01	1
Boron	0.15		0.050	mg/L		08/08/18 06:07	08/09/18 20:01	1
Calcium	110		2.0	mg/L		08/08/18 06:07	08/09/18 20:01	1
Magnesium	45		2.0	mg/L		08/08/18 06:07	08/09/18 20:01	1
Sodium	430	B3	0.50	mg/L		08/08/18 06:07	08/09/18 20:01	1

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:50	1
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:50	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:50	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:50	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	180		6.0	mg/L			08/09/18 20:08	1
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L			08/09/18 20:08	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 20:08	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 20:08	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 20:08	1
Total Dissolved Solids	1800		20	mg/L			08/08/18 11:12	1
pH	7.7	H5	1.7	SU			08/14/18 12:24	1
Temperature	12.6	H5	0.1	Degrees C			08/14/18 12:24	1

**Client Sample ID: CH-APP-W126-8618**

**Lab Sample ID: 550-107426-17**

Date Collected: 08/06/18 14:15

Matrix: Water

Date Received: 08/07/18 16:30

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6600	D2	200	mg/L			08/09/18 07:07	100
Fluoride	4.2	D1	2.0	mg/L			08/09/18 06:49	5
Sulfate	4100	D2	200	mg/L			08/09/18 07:07	100

### Method: 200.7 - Total Recoverable Metals by ICP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 20:04	1
Boron	41		0.050	mg/L		08/08/18 06:07	08/09/18 20:04	1
Calcium	680		2.0	mg/L		08/08/18 06:07	08/09/18 20:04	1
Magnesium	380		2.0	mg/L		08/08/18 06:07	08/09/18 20:04	1
Sodium	4200	D2	1.0	mg/L		08/08/18 06:07	08/10/18 19:35	2

### Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:53	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-W126-8618**

**Lab Sample ID: 550-107426-17**

**Date Collected: 08/06/18 14:15**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

**Method: 200.8 LL - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 17:53	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 17:53	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 17:53	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Alkalinity as CaCO3</b>	<b>97</b>		6.0	mg/L			08/09/18 20:26	1
<b>Bicarbonate Alkalinity as CaCO3</b>	<b>97</b>		6.0	mg/L			08/09/18 20:26	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 20:26	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 20:26	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 20:26	1
<b>Total Dissolved Solids</b>	<b>14000</b>	<b>D2</b>	200	mg/L			08/08/18 11:12	1
<b>pH</b>	<b>7.5</b>	<b>H5</b>	1.7	SU			08/14/18 12:24	1
<b>Temperature</b>	<b>12.5</b>	<b>H5</b>	0.1	Degrees C			08/14/18 12:24	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-154510/2**

**Matrix: Water**

**Analysis Batch: 154510**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			08/08/18 16:24	1
Fluoride	ND		0.40	mg/L			08/08/18 16:24	1
Sulfate	ND		2.0	mg/L			08/08/18 16:24	1

**Lab Sample ID: LCS 550-154510/5**

**Matrix: Water**

**Analysis Batch: 154510**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.2		mg/L		106	90 - 110
Fluoride	4.00	4.15		mg/L		104	90 - 110
Sulfate	20.0	20.5		mg/L		103	90 - 110

**Lab Sample ID: LCSD 550-154510/6**

**Matrix: Water**

**Analysis Batch: 154510**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.2		mg/L		106	90 - 110	0	20
Fluoride	4.00	4.15		mg/L		104	90 - 110	0	20
Sulfate	20.0	20.5		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-107426-1 MS**

**Matrix: Water**

**Analysis Batch: 154510**

**Client Sample ID: CH-APP-DM4R-8718**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	0.45		4.00	4.64		mg/L		105	80 - 120

**Lab Sample ID: 550-107426-1 MS**

**Matrix: Water**

**Analysis Batch: 154510**

**Client Sample ID: CH-APP-DM4R-8718**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	590	D2	2000	2860	D2	mg/L		113	80 - 120
Sulfate	680	D2	2000	2810	D2	mg/L		106	80 - 120

**Lab Sample ID: 550-107426-1 MSD**

**Matrix: Water**

**Analysis Batch: 154510**

**Client Sample ID: CH-APP-DM4R-8718**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	0.45		4.00	4.61		mg/L		104	80 - 120	1	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-107426-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 154510**

**Client Sample ID: CH-APP-DM4R-8718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	590	D2	2000	2880	D2	mg/L		114	80 - 120	1	20
Sulfate	680	D2	2000	2830	D2	mg/L		107	80 - 120	1	20

**Lab Sample ID: MB 550-154735/2**  
**Matrix: Water**  
**Analysis Batch: 154735**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			08/21/18 23:46	1
Fluoride	ND		0.40	mg/L			08/21/18 23:46	1
Sulfate	ND		2.0	mg/L			08/21/18 23:46	1

**Lab Sample ID: LCS 550-154735/5**  
**Matrix: Water**  
**Analysis Batch: 154735**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	20.6		mg/L		103	90 - 110
Fluoride	4.00	4.10		mg/L		103	90 - 110
Sulfate	20.0	20.2		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-154735/6**  
**Matrix: Water**  
**Analysis Batch: 154735**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	20.6		mg/L		103	90 - 110	0	20
Fluoride	4.00	4.12		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.2		mg/L		101	90 - 110	0	20

## Method: 200.7 - Total Recoverable Metals by ICP

**Lab Sample ID: MB 550-153477/1-A**  
**Matrix: Water**  
**Analysis Batch: 153712**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 153477**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		08/08/18 06:07	08/09/18 18:20	1
Boron	ND		0.050	mg/L		08/08/18 06:07	08/09/18 18:20	1
Calcium	ND		2.0	mg/L		08/08/18 06:07	08/09/18 18:20	1
Magnesium	ND		2.0	mg/L		08/08/18 06:07	08/09/18 18:20	1
Sodium	ND		0.50	mg/L		08/08/18 06:07	08/09/18 18:20	1

**Lab Sample ID: LCS 550-153477/2-A**  
**Matrix: Water**  
**Analysis Batch: 153712**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 153477**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	1.00	0.906		mg/L		91	85 - 115

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Method: 200.7 - Total Recoverable Metals by ICP (Continued)

**Lab Sample ID: LCS 550-153477/2-A**  
**Matrix: Water**  
**Analysis Batch: 153712**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 153477**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.	Limits
Boron	1.00	0.918		mg/L		92		85 - 115
Calcium	21.0	19.0		mg/L		91		85 - 115
Magnesium	21.0	18.9		mg/L		90		85 - 115
Sodium	20.0	18.0		mg/L		90		85 - 115

**Lab Sample ID: LCSD 550-153477/3-A**  
**Matrix: Water**  
**Analysis Batch: 153712**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 153477**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.	Limits	RPD	Limit
Beryllium	1.00	0.924		mg/L		92		85 - 115	2	20
Boron	1.00	0.920		mg/L		92		85 - 115	0	20
Calcium	21.0	19.5		mg/L		93		85 - 115	2	20
Magnesium	21.0	19.3		mg/L		92		85 - 115	2	20
Sodium	20.0	17.9		mg/L		90		85 - 115	0	20

**Lab Sample ID: 550-107426-1 MS**  
**Matrix: Water**  
**Analysis Batch: 153712**

**Client Sample ID: CH-APP-DM4R-8718**  
**Prep Type: Total/NA**  
**Prep Batch: 153477**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec.	Limits
Beryllium	ND		1.00	0.937		mg/L		94		70 - 130
Boron	0.48		1.00	1.44		mg/L		96		70 - 130
Calcium	100	M3	21.0	117	M3	mg/L		79		70 - 130
Magnesium	53		21.0	71.0		mg/L		87		70 - 130
Sodium	600	M3	20.0	597	M3	mg/L		-6		70 - 130

**Lab Sample ID: 550-107426-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 153712**

**Client Sample ID: CH-APP-DM4R-8718**  
**Prep Type: Total/NA**  
**Prep Batch: 153477**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec.	Limits	RPD	Limit
Beryllium	ND		1.00	0.919		mg/L		92		70 - 130	2	20
Boron	0.48		1.00	1.40		mg/L		92		70 - 130	3	20
Calcium	100	M3	21.0	114	M3	mg/L		67		70 - 130	2	20
Magnesium	53		21.0	69.4		mg/L		80		70 - 130	2	20
Sodium	600	M3	20.0	586	M3	mg/L		-58		70 - 130	2	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-153585/1-A**  
**Matrix: Water**  
**Analysis Batch: 154164**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 153585**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 16:53	1
Chromium	ND		0.0010	mg/L		08/09/18 08:52	08/15/18 16:53	1
Lead	ND		0.00050	mg/L		08/09/18 08:52	08/15/18 16:53	1
Thallium	ND		0.00010	mg/L		08/09/18 08:52	08/15/18 16:53	1

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Lab Sample ID: LCS 550-153585/2-A**  
**Matrix: Water**  
**Analysis Batch: 154164**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 153585**  
**%Rec. Limits**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.100	0.100		mg/L		100	85 - 115
Chromium	0.100	0.101		mg/L		101	85 - 115
Lead	0.100	0.100		mg/L		100	85 - 115
Thallium	0.100	0.0990		mg/L		99	85 - 115

**Lab Sample ID: LCSD 550-153585/3-A**  
**Matrix: Water**  
**Analysis Batch: 154164**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 153585**  
**%Rec. RPD Limit**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	0.100	0.100		mg/L		100	85 - 115	0	20
Chromium	0.100	0.101		mg/L		101	85 - 115	0	20
Lead	0.100	0.0990		mg/L		99	85 - 115	1	20
Thallium	0.100	0.0994		mg/L		99	85 - 115	0	20

**Lab Sample ID: 550-107559-A-2-B MS**  
**Matrix: Water**  
**Analysis Batch: 154164**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 153585**  
**%Rec. Limits**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	ND		0.100	0.0976		mg/L		98	70 - 130
Chromium	ND		0.100	0.100		mg/L		100	70 - 130
Lead	ND		0.100	0.0941		mg/L		94	70 - 130
Thallium	ND		0.100	0.0943		mg/L		94	70 - 130

**Lab Sample ID: 550-107559-A-2-C MSD**  
**Matrix: Water**  
**Analysis Batch: 154164**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 153585**  
**%Rec. RPD Limit**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	ND		0.100	0.0949		mg/L		95	70 - 130	3	20
Chromium	ND		0.100	0.0999		mg/L		99	70 - 130	1	20
Lead	ND		0.100	0.0914		mg/L		91	70 - 130	3	20
Thallium	ND		0.100	0.0918		mg/L		92	70 - 130	3	20

## Method: SM 2320B - Alkalinity

**Lab Sample ID: MB 550-153805/35**  
**Matrix: Water**  
**Analysis Batch: 153805**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:58	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:58	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:58	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 17:58	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 17:58	1

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Method: SM 2320B - Alkalinity (Continued)

**Lab Sample ID: MB 550-153805/7**

**Matrix: Water**

**Analysis Batch: 153805**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 14:06	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 14:06	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 14:06	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			08/09/18 14:06	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			08/09/18 14:06	1

**Lab Sample ID: LCS 550-153805/34**

**Matrix: Water**

**Analysis Batch: 153805**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity as CaCO3	250	258		mg/L		103	90 - 110

**Lab Sample ID: LCS 550-153805/6**

**Matrix: Water**

**Analysis Batch: 153805**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity as CaCO3	250	257		mg/L		103	90 - 110

**Lab Sample ID: LCSD 550-153805/20**

**Matrix: Water**

**Analysis Batch: 153805**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	258		mg/L		103	90 - 110	0	20

**Lab Sample ID: LCSD 550-153805/48**

**Matrix: Water**

**Analysis Batch: 153805**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	258		mg/L		103	90 - 110	0	20

**Lab Sample ID: 550-107426-1 DU**

**Matrix: Water**

**Analysis Batch: 153805**

**Client Sample ID: CH-APP-DM4R-8718**

**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity as CaCO3	390		396		mg/L		0.4	20
Bicarbonate Alkalinity as CaCO3	390		396		mg/L		0.4	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Method: SM 2320B - Alkalinity (Continued)

**Lab Sample ID: 550-107426-6 DU**  
**Matrix: Water**  
**Analysis Batch: 153805**

**Client Sample ID: CH-APP-M45A-8718**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
Alkalinity as CaCO3	370		372		mg/L		1	20	
Bicarbonate Alkalinity as CaCO3	370		372		mg/L		1	20	
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20	
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20	
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20	

**Lab Sample ID: 550-107426-16 DU**  
**Matrix: Water**  
**Analysis Batch: 153805**

**Client Sample ID: CH-APP-W125-8218**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
Alkalinity as CaCO3	180		177		mg/L		0.8	20	
Bicarbonate Alkalinity as CaCO3	180		177		mg/L		0.8	20	
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20	
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20	
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20	

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-153512/1**  
**Matrix: Water**  
**Analysis Batch: 153512**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Total Dissolved Solids	ND		20	mg/L			08/08/18 11:12	1

**Lab Sample ID: LCS 550-153512/2**  
**Matrix: Water**  
**Analysis Batch: 153512**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits

**Lab Sample ID: LCSD 550-153512/3**  
**Matrix: Water**  
**Analysis Batch: 153512**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit

**Lab Sample ID: 550-107426-4 DU**  
**Matrix: Water**  
**Analysis Batch: 153512**

**Client Sample ID: CH-APP-M44D-8218**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
Total Dissolved Solids	2300	D2	2230	D2	mg/L		2	10	

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

**Lab Sample ID: 550-107426-15 DU**  
**Matrix: Water**  
**Analysis Batch: 153512**

**Client Sample ID: CH-APP-W124-8618**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	6900	D2	7390	D2	mg/L		7	10

**Lab Sample ID: MB 550-153605/1**  
**Matrix: Water**  
**Analysis Batch: 153605**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			08/09/18 10:01	1

**Lab Sample ID: LCS 550-153605/2**  
**Matrix: Water**  
**Analysis Batch: 153605**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	978		mg/L		98	90 - 110

**Lab Sample ID: LCSD 550-153605/3**  
**Matrix: Water**  
**Analysis Batch: 153605**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	990		mg/L		99	90 - 110	1	10

**Lab Sample ID: 550-107426-1 DU**  
**Matrix: Water**  
**Analysis Batch: 153605**

**Client Sample ID: CH-APP-DM4R-8718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	2300	D2	2340	D2	mg/L		2	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-153722/24**  
**Matrix: Water**  
**Analysis Batch: 153722**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.0	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-153722/36**  
**Matrix: Water**  
**Analysis Batch: 153722**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.9	98.5 - 101.5

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: 550-107426-1 DU**  
**Matrix: Water**  
**Analysis Batch: 153722**

**Client Sample ID: CH-APP-DM4R-8718**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
pH	7.9	H5	7.9	H5	SU		0.1	5
Temperature	9.3	H5	9.6	H5	Degrees C		3	

**Lab Sample ID: LCSSRM 550-153976/1**  
**Matrix: Water**  
**Analysis Batch: 153976**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits

**Lab Sample ID: LCSSRM 550-153976/13**  
**Matrix: Water**  
**Analysis Batch: 153976**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits

**Lab Sample ID: LCSSRM 550-153976/25**  
**Matrix: Water**  
**Analysis Batch: 153976**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits

**Lab Sample ID: 550-107426-6 DU**  
**Matrix: Water**  
**Analysis Batch: 153976**

**Client Sample ID: CH-APP-M45A-8718**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
pH	7.1	H5	7.1	H5	SU		0.1	5
Temperature	11.2	H5	10.8	H5	Degrees C		4	

**Lab Sample ID: 550-107426-10 DU**  
**Matrix: Water**  
**Analysis Batch: 153976**

**Client Sample ID: CH-APP-FD02-8618**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
pH	7.3	H5	7.3	H5	SU		0	5
Temperature	13.5	H5	13.4	H5	Degrees C		0.7	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## HPLC/IC

### Analysis Batch: 154510

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	300.0	
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	300.0	
550-107426-2	CH-APP-M35-8718	Total/NA	Water	300.0	
550-107426-2	CH-APP-M35-8718	Total/NA	Water	300.0	
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	300.0	
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	300.0	
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	300.0	
550-107426-4	CH-APP-M44S-8218	Total/NA	Water	300.0	
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	300.0	
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	300.0	
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	300.0	
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	300.0	
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	300.0	
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	300.0	
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	300.0	
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	300.0	
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	300.0	
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	300.0	
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	300.0	
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	300.0	
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	300.0	
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	300.0	
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	300.0	
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	300.0	
550-107426-14	CH-APP-W123-8618	Total/NA	Water	300.0	
550-107426-14	CH-APP-W123-8618	Total/NA	Water	300.0	
550-107426-15	CH-APP-W124-8618	Total/NA	Water	300.0	
550-107426-16	CH-APP-W125-8218	Total/NA	Water	300.0	
550-107426-16	CH-APP-W125-8218	Total/NA	Water	300.0	
550-107426-17	CH-APP-W126-8618	Total/NA	Water	300.0	
550-107426-17	CH-APP-W126-8618	Total/NA	Water	300.0	
MB 550-154510/2	Method Blank	Total/NA	Water	300.0	
LCS 550-154510/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-154510/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-107426-1 MS	CH-APP-DM4R-8718	Total/NA	Water	300.0	
550-107426-1 MS	CH-APP-DM4R-8718	Total/NA	Water	300.0	
550-107426-1 MSD	CH-APP-DM4R-8718	Total/NA	Water	300.0	
550-107426-1 MSD	CH-APP-DM4R-8718	Total/NA	Water	300.0	

### Analysis Batch: 154735

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	300.0	
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	300.0	
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	300.0	
550-107426-15	CH-APP-W124-8618	Total/NA	Water	300.0	
MB 550-154735/2	Method Blank	Total/NA	Water	300.0	
LCS 550-154735/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-154735/6	Lab Control Sample Dup	Total/NA	Water	300.0	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Metals

### Prep Batch: 153477

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	200.7	
550-107426-2	CH-APP-M35-8718	Total/NA	Water	200.7	
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	200.7	
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	200.7	
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	200.7	
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	200.7	
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	200.7	
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	200.7	
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	200.7	
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	200.7	
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	200.7	
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	200.7	
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	200.7	
550-107426-14	CH-APP-W123-8618	Total/NA	Water	200.7	
550-107426-15	CH-APP-W124-8618	Total/NA	Water	200.7	
550-107426-16	CH-APP-W125-8218	Total/NA	Water	200.7	
550-107426-17	CH-APP-W126-8618	Total/NA	Water	200.7	
MB 550-153477/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-153477/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-153477/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-107426-1 MS	CH-APP-DM4R-8718	Total/NA	Water	200.7	
550-107426-1 MSD	CH-APP-DM4R-8718	Total/NA	Water	200.7	

### Prep Batch: 153585

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	200.8	
550-107426-2	CH-APP-M35-8718	Total/NA	Water	200.8	
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	200.8	
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	200.8	
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	200.8	
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	200.8	
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	200.8	
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	200.8	
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	200.8	
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	200.8	
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	200.8	
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	200.8	
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	200.8	
550-107426-14	CH-APP-W123-8618	Total/NA	Water	200.8	
550-107426-15	CH-APP-W124-8618	Total/NA	Water	200.8	
550-107426-16	CH-APP-W125-8218	Total/NA	Water	200.8	
550-107426-17	CH-APP-W126-8618	Total/NA	Water	200.8	
MB 550-153585/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-153585/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-153585/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-107559-A-2-B MS	Matrix Spike	Total/NA	Water	200.8	
550-107559-A-2-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8	

### Analysis Batch: 153712

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	200.7	153477

TestAmerica Phoenix



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Metals (Continued)

### Analysis Batch: 153712 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-2	CH-APP-M35-8718	Total/NA	Water	200.7	153477
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	200.7	153477
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	200.7	153477
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	200.7	153477
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	200.7	153477
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	200.7	153477
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	200.7	153477
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	200.7	153477
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	200.7	153477
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	200.7	153477
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	200.7	153477
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	200.7	153477
550-107426-14	CH-APP-W123-8618	Total/NA	Water	200.7	153477
550-107426-15	CH-APP-W124-8618	Total/NA	Water	200.7	153477
550-107426-16	CH-APP-W125-8218	Total/NA	Water	200.7	153477
550-107426-17	CH-APP-W126-8618	Total/NA	Water	200.7	153477
MB 550-153477/1-A	Method Blank	Total/NA	Water	200.7	153477
LCS 550-153477/2-A	Lab Control Sample	Total/NA	Water	200.7	153477
LCSD 550-153477/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	153477
550-107426-1 MS	CH-APP-DM4R-8718	Total/NA	Water	200.7	153477
550-107426-1 MSD	CH-APP-DM4R-8718	Total/NA	Water	200.7	153477

### Analysis Batch: 153860

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	200.7	153477
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	200.7	153477
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	200.7	153477
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	200.7	153477
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	200.7	153477
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	200.7	153477
550-107426-14	CH-APP-W123-8618	Total/NA	Water	200.7	153477
550-107426-17	CH-APP-W126-8618	Total/NA	Water	200.7	153477

### Analysis Batch: 154164

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	200.8 LL	153585
550-107426-2	CH-APP-M35-8718	Total/NA	Water	200.8 LL	153585
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	200.8 LL	153585
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	200.8 LL	153585
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	200.8 LL	153585
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	200.8 LL	153585
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	200.8 LL	153585
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	200.8 LL	153585
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	200.8 LL	153585
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	200.8 LL	153585
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	200.8 LL	153585
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	200.8 LL	153585
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	200.8 LL	153585
550-107426-14	CH-APP-W123-8618	Total/NA	Water	200.8 LL	153585
550-107426-15	CH-APP-W124-8618	Total/NA	Water	200.8 LL	153585
550-107426-16	CH-APP-W125-8218	Total/NA	Water	200.8 LL	153585

TestAmerica Phoenix



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Metals (Continued)

### Analysis Batch: 154164 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-17	CH-APP-W126-8618	Total/NA	Water	200.8 LL	153585
MB 550-153585/1-A	Method Blank	Total/NA	Water	200.8 LL	153585
LCS 550-153585/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	153585
LCSD 550-153585/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	153585
550-107559-A-2-B MS	Matrix Spike	Total/NA	Water	200.8 LL	153585
550-107559-A-2-C MSD	Matrix Spike Duplicate	Total/NA	Water	200.8 LL	153585

### Analysis Batch: 154406

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	200.8 LL	153585
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	200.8 LL	153585

## General Chemistry

### Analysis Batch: 153512

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	SM 2540C	
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	SM 2540C	
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	SM 2540C	
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	SM 2540C	
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	SM 2540C	
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	SM 2540C	
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	SM 2540C	
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	SM 2540C	
550-107426-14	CH-APP-W123-8618	Total/NA	Water	SM 2540C	
550-107426-15	CH-APP-W124-8618	Total/NA	Water	SM 2540C	
550-107426-16	CH-APP-W125-8218	Total/NA	Water	SM 2540C	
550-107426-17	CH-APP-W126-8618	Total/NA	Water	SM 2540C	
MB 550-153512/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-153512/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-153512/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-107426-4 DU	CH-APP-M44D-8218	Total/NA	Water	SM 2540C	
550-107426-15 DU	CH-APP-W124-8618	Total/NA	Water	SM 2540C	

### Analysis Batch: 153605

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	SM 2540C	
550-107426-2	CH-APP-M35-8718	Total/NA	Water	SM 2540C	
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	SM 2540C	
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	SM 2540C	
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	SM 2540C	
MB 550-153605/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-153605/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-153605/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-107426-1 DU	CH-APP-DM4R-8718	Total/NA	Water	SM 2540C	

### Analysis Batch: 153722

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	SM 4500 H+ B	
550-107426-2	CH-APP-M35-8718	Total/NA	Water	SM 4500 H+ B	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## General Chemistry (Continued)

### Analysis Batch: 153722 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	SM 4500 H+ B	
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	SM 4500 H+ B	
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-153722/24	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-153722/36	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-107426-1 DU	CH-APP-DM4R-8718	Total/NA	Water	SM 4500 H+ B	

### Analysis Batch: 153805

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-1	CH-APP-DM4R-8718	Total/NA	Water	SM 2320B	
550-107426-2	CH-APP-M35-8718	Total/NA	Water	SM 2320B	
550-107426-3	CH-APP-M43A-8718	Total/NA	Water	SM 2320B	
550-107426-4	CH-APP-M44D-8218	Total/NA	Water	SM 2320B	
550-107426-5	CH-APP-M44S-8218	Total/NA	Water	SM 2320B	
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	SM 2320B	
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	SM 2320B	
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	SM 2320B	
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	SM 2320B	
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	SM 2320B	
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	SM 2320B	
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	SM 2320B	
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	SM 2320B	
550-107426-14	CH-APP-W123-8618	Total/NA	Water	SM 2320B	
550-107426-15	CH-APP-W124-8618	Total/NA	Water	SM 2320B	
550-107426-16	CH-APP-W125-8218	Total/NA	Water	SM 2320B	
550-107426-17	CH-APP-W126-8618	Total/NA	Water	SM 2320B	
MB 550-153805/35	Method Blank	Total/NA	Water	SM 2320B	
MB 550-153805/7	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-153805/34	Lab Control Sample	Total/NA	Water	SM 2320B	
LCS 550-153805/6	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-153805/20	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
LCSD 550-153805/48	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-107426-1 DU	CH-APP-DM4R-8718	Total/NA	Water	SM 2320B	
550-107426-6 DU	CH-APP-M45A-8718	Total/NA	Water	SM 2320B	
550-107426-16 DU	CH-APP-W125-8218	Total/NA	Water	SM 2320B	

### Analysis Batch: 153976

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-107426-6	CH-APP-M45A-8718	Total/NA	Water	SM 4500 H+ B	
550-107426-7	CH-APP-M46A-8718	Total/NA	Water	SM 4500 H+ B	
550-107426-8	CH-APP-M50A-8618	Total/NA	Water	SM 4500 H+ B	
550-107426-9	CH-APP-M51A-8618	Total/NA	Water	SM 4500 H+ B	
550-107426-10	CH-APP-FD02-8618	Total/NA	Water	SM 4500 H+ B	
550-107426-11	CH-APP-M62A-8618	Total/NA	Water	SM 4500 H+ B	
550-107426-12	CH-APP-M64A-8218	Total/NA	Water	SM 4500 H+ B	
550-107426-13	CH-APP-FD01-8218	Total/NA	Water	SM 4500 H+ B	
550-107426-14	CH-APP-W123-8618	Total/NA	Water	SM 4500 H+ B	
550-107426-15	CH-APP-W124-8618	Total/NA	Water	SM 4500 H+ B	
550-107426-16	CH-APP-W125-8218	Total/NA	Water	SM 4500 H+ B	
550-107426-17	CH-APP-W126-8618	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-153976/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## General Chemistry (Continued)

### Analysis Batch: 153976 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSSRM 550-153976/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-153976/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-107426-6 DU	CH-APP-M45A-8718	Total/NA	Water	SM 4500 H+ B	
550-107426-10 DU	CH-APP-FD02-8618	Total/NA	Water	SM 4500 H+ B	

- 1
- 2
- 3
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- 11
- 12
- 13
- 14

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-DM4R-8718**

**Lab Sample ID: 550-107426-1**

**Date Collected: 08/07/18 10:09**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	154510	08/08/18 17:56	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/08/18 18:51	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 18:34	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:08	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 16:12	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153605	08/09/18 10:01 08/10/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153722	08/10/18 11:47	MRR	TAL PHX

**Client Sample ID: CH-APP-M35-8718**

**Lab Sample ID: 550-107426-2**

**Date Collected: 08/07/18 10:30**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	154510	08/08/18 19:46	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/08/18 20:05	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 18:37	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:11	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 17:16	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153605	08/09/18 10:01 08/10/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153722	08/10/18 11:47	MRR	TAL PHX

**Client Sample ID: CH-APP-M43A-8718**

**Lab Sample ID: 550-107426-3**

**Date Collected: 08/07/18 08:54**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	154510	08/08/18 20:23	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/08/18 20:42	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 18:40	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:13	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 17:25	DGS	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M43A-8718**

**Lab Sample ID: 550-107426-3**

**Date Collected: 08/07/18 08:54**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	153605	08/09/18 10:01 (Start) 08/10/18 11:25 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153722	08/10/18 11:47	MRR	TAL PHX

**Client Sample ID: CH-APP-M44D-8218**

**Lab Sample ID: 550-107426-4**

**Date Collected: 08/02/18 13:19**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	154510	08/08/18 21:37	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/08/18 21:55	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 18:45	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:15	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 17:35	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 (Start) 08/09/18 11:25 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153722	08/10/18 11:47	MRR	TAL PHX

**Client Sample ID: CH-APP-M44S-8218**

**Lab Sample ID: 550-107426-5**

**Date Collected: 08/02/18 14:00**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	154510	08/08/18 22:14	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/08/18 22:32	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 18:51	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 18:54	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:18	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 17:40	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 (Start) 08/09/18 11:25 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153722	08/10/18 11:47	MRR	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M45A-8718**

**Lab Sample ID: 550-107426-6**

**Date Collected: 08/07/18 07:29**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	154510	08/08/18 22:50	NEL	TAL PHX
Total/NA	Analysis	300.0		20	154510	08/08/18 23:09	NEL	TAL PHX
Total/NA	Analysis	300.0		50	154735	08/22/18 10:17	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 18:57	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:23	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 18:08	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153605	08/09/18 10:01 (End) 08/10/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-M46A-8718**

**Lab Sample ID: 550-107426-7**

**Date Collected: 08/07/18 09:11**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		100	154510	08/08/18 23:46	NEL	TAL PHX
Total/NA	Analysis	300.0		2	154735	08/22/18 08:27	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:03	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 19:00	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:25	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 18:27	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153605	08/09/18 10:01 (End) 08/10/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-M50A-8618**

**Lab Sample ID: 550-107426-8**

**Date Collected: 08/06/18 12:37**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	154510	08/09/18 00:04	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/09/18 00:22	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:14	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-M50A-8618**

**Lab Sample ID: 550-107426-8**

**Date Collected: 08/06/18 12:37**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:32	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 18:36	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-M51A-8618**

**Lab Sample ID: 550-107426-9**

**Date Collected: 08/06/18 11:58**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	154510	08/09/18 01:18	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/09/18 01:36	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:20	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 19:06	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:34	TEK	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		10	154406	08/19/18 13:32	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 18:45	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-FD02-8618**

**Lab Sample ID: 550-107426-10**

**Date Collected: 08/06/18 11:58**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	154510	08/09/18 01:54	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/09/18 02:13	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:26	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 19:12	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:37	TEK	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		10	154406	08/19/18 13:34	TEK	TAL PHX

TestAmerica Phoenix



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 18:53	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-M62A-8618**

**Lab Sample ID: 550-107426-11**

**Date Collected: 08/06/18 14:54**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		100	154510	08/09/18 02:50	NEL	TAL PHX
Total/NA	Analysis	300.0		1	154735	08/22/18 07:32	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:31	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:39	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 19:02	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-M64A-8218**

**Lab Sample ID: 550-107426-12**

**Date Collected: 08/02/18 11:19**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	154510	08/09/18 03:08	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/09/18 03:26	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:37	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 19:17	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:41	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 19:14	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-FD01-8218**

**Lab Sample ID: 550-107426-13**

**Date Collected: 08/02/18 11:19**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	154510	08/09/18 03:45	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/09/18 04:03	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:43	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 19:23	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:44	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 19:24	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512		YET	TAL PHX
					(Start)	08/08/18 11:12		
					(End)	08/09/18 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-W123-8618**

**Lab Sample ID: 550-107426-14**

**Date Collected: 08/06/18 13:44**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	154510	08/09/18 04:58	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/09/18 05:17	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:49	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 19:29	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:46	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 19:32	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512		YET	TAL PHX
					(Start)	08/08/18 11:12		
					(End)	08/09/18 11:25		
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-W124-8618**

**Lab Sample ID: 550-107426-15**

**Date Collected: 08/06/18 13:13**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		100	154510	08/09/18 05:54	NEL	TAL PHX
Total/NA	Analysis	300.0		1	154735	08/22/18 08:00	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 19:55	ARE	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Client Sample ID: CH-APP-W124-8618**

**Lab Sample ID: 550-107426-15**

**Date Collected: 08/06/18 13:13**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:48	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 19:41	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-W125-8218**

**Lab Sample ID: 550-107426-16**

**Date Collected: 08/02/18 15:09**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	154510	08/09/18 06:12	NEL	TAL PHX
Total/NA	Analysis	300.0		50	154510	08/09/18 06:30	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 20:01	ARE	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:50	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 20:08	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

**Client Sample ID: CH-APP-W126-8618**

**Lab Sample ID: 550-107426-17**

**Date Collected: 08/06/18 14:15**

**Matrix: Water**

**Date Received: 08/07/18 16:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	154510	08/09/18 06:49	NEL	TAL PHX
Total/NA	Analysis	300.0		100	154510	08/09/18 07:07	NEL	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		1	153712	08/09/18 20:04	ARE	TAL PHX
Total/NA	Prep	200.7			153477	08/08/18 06:07	SGO	TAL PHX
Total/NA	Analysis	200.7		2	153860	08/10/18 19:35	EXZ	TAL PHX
Total/NA	Prep	200.8			153585	08/09/18 08:52	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	154164	08/15/18 17:53	TEK	TAL PHX
Total/NA	Analysis	SM 2320B		1	153805	08/09/18 20:26	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	153512	08/08/18 11:12 08/09/18 11:25	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	153976	08/14/18 12:24	MRR	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

**Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

- 1
- 2
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# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

- 1
- 2
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# Method Summary

Client: Arizona Public Service Company  
Project/Site: APP

TestAmerica Job ID: 550-107426-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7	Total Recoverable Metals by ICP	EPA	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
SM 2320B	Alkalinity	SM	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

**TestAmerica Phoenix**  
4645 E Cotton Cir Blvd Bldg 3  
Phoenix, AZ 85040

**Chain of Custody Recorder**



550-107426 Chain of Custody

moratories, Inc.

107426

phone 602.437.3340 fax 623.445.6192

Client Contact: **Client Contact** Project Manager: **Doug Lavarnway** Site Contact: **Doug Lavarnway** Carrier: \_\_\_\_\_  
 PO Box 188 Tel/Fax: **928-288-1394** Analysis Turnaround Time: \_\_\_\_\_  
 Joseph city, Az 86032 Calendar (C) or Work Days (W) \_\_\_\_\_  
 Phone: TAT if different from Below: 7 days \_\_\_\_\_  
 Fax: 2 weeks \_\_\_\_\_  
 Project Name: **APP** 1 week \_\_\_\_\_  
 E-Mail Address: 2 days \_\_\_\_\_  
 1 day \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Perform MS / MSD ( Y / N )	EPA 300 (Total Nitrogen, Nitrate (N), Nitrite (N))	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	SM 4500-NH3 (TKN)	EPA 200.7 chromium (Total Dissolved)	EPA 200.8 (Pb,Cd, Cr,Tl,)	EPA 200.7 (Boron)	EPA 200.8 (Uranium)	EPA 200.8 (Cr)	EPA 200.7 (Be,Ca,Mg,Na,)	EPA 310.1 Alkalinity	SDG No.	Job No. P.O.# 300579155	
CH-APP-DM4R-8718 -01	8/7/2018	1009	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M35-8718 -02	8/7/2018	1030	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M43A-8718 -03	8/7/2018	854	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M44D-8218 -04	8/2/2018	1319	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M44S-8218 -05	8/2/2018	1400	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M45A-8718 -06	8/7/2018	729	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M46A-8718 -07	8/7/2018	911	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M50A-8618 -08	8/6/2018	1237	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M51A-8618 -09	8/6/2018	1158	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-FD02-8618 -10	8/6/2018	1158	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M62A-8618 -11	8/6/2018	1454	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			
CH-APP-M64A-8218 -12	8/2/2018	1119	G	W	2	N	X	X	X	X	X	X	X	X	X	X	X	X	X			

Possible Hazard Identification: **Flammable Skin Irritant Poison B Unknown**

Special Instructions/QC Requirements & Comments: **Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)**  
 Return To Client \_\_\_\_\_ Disposal By Lab \_\_\_\_\_ Archive For \_\_\_\_\_ Months \_\_\_\_\_

Requested by: **Bob Lovarney** Company: **APPS** Date/Time: **8/30/15** Received by: **Shelby** Company: **Red J** Date/Time: **8/7/18** 11:57am

Requested by: **[Signature]** Company: **Red J** Date/Time: **08/07** Received by: **[Signature]** Company: **APPN** Date/Time: **8-7-18** 1630



# Chain of Custody Record

phone 602.437.3340 fax 623.445.6192

107425

TestAmerica Laboratories, Inc.

Client Contact		Project Manager: Doug Lavarnway		Site Contact: Doug Lavarnway		Carrier:		8/7/2018		COC No: 2 of 2 COCs																																																																									
APPS Cholla		Tel/Fax: 928-288-1394		Lab Contact: Ken Baker						Job No. P.O.# 300579155																																																																									
PO Box 188		Analysis Turnaround Time								SDG No.																																																																									
Joseph city, Az 86032		Calendar (C) or Work Days (W)								Sample Specific Notes:																																																																									
Phone:		TAT if different from Below ___ 7 Days																																																																																	
Fax:		2 weeks																																																																																	
Project Name: APP		1 week																																																																																	
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		1 day																																																																																	
Sample Identification				Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample																																																																										
CH-APP-FD01-8218	-13	8/2/2018	1119	G	W	2	N	X	Perform MS / MSD (Y / N)																																																																										
CH-APP-W123-8618	-14	8/6/2018	1344	G	W	2	N	X	EPA 300 (Total Nitrogen, Nitrate (N), Nitrite (N))																																																																										
CH-APP-W124-8618	-15	8/6/2018	1313	G	W	2	N	X	EPA 300.0 (Cl, F, SO4)																																																																										
CH-APP-W125-8218	-16	8/2/2018	1509	G	W	2	N	X	SM 2540C (TDS)																																																																										
CH-APP-W126-8618	-17	8/6/2018	1415	G	W	2	N	X	SM 4500-HB (pH)																																																																										
									SM 4500-NH3 (TKN)																																																																										
									EPA 200.7 chromium (Total Dissolved)																																																																										
									EPA 200.8 (Pb,Cd, Cr, Tl,)																																																																										
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									EPA 310.1 Alkalinity																																																																										
Possible Hazard Identification				Non-Hazard				Flammable				Skin Irritant				Poison B				Unknown																																																															
Special Instructions/QC Requirements & Comments:												Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)																																																																							
Relinquished by: Doug Lavarnway												Company: APPS												Date/Time: 8/7/15												Received by: [Signature]												Company: Red J												Date/Time: 8/7/18												11.57g											
Relinquished by: [Signature]												Company: Red J												Date/Time: 08/07/18												Received by: [Signature]												Company: APPK												Date/Time: 8-7-18												1630											

(1.6 oz) RC

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-107426-1

**Login Number: 107426**

**List Source: TestAmerica Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.





# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-114628-1

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

1/14/2019 3:23:17 PM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
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[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.
D2	Sample required dilution due to high concentration of analyte.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.
D2	Sample required dilution due to high concentration of analyte.
B3	Target analyte detected in calibration blank at or above the method reporting limit.

### General Chemistry

Qualifier	Qualifier Description
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
D2	Sample required dilution due to high concentration of analyte.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Job ID: 550-114628-1**

**Laboratory: TestAmerica Phoenix**

## Narrative

### Job Narrative 550-114628-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 12/10/2018 11:16 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.6° C, 1.8° C, 2.0° C and 2.2° C.

#### Receipt Exceptions

Several of the sample sites were missing from the pick list.

CH-CCR-W301-12718 (550-114628-1), CH-CCR-W301-12718 (550-114628-1[DUJ]), CH-CCR-W301-12718 (550-114628-1[MS]), CH-CCR-W301-12718 (550-114628-1[MSD]), CH-CCR-W302-12718 (550-114628-2), CH-CCR-W304-12718 (550-114628-3), CH-CCR-W305-12718 (550-114628-4), CH-CCR-W306-12718 (550-114628-5), CH-CCR-W307-12818 (550-114628-6), CH-CCR-W308-12818 (550-114628-7), CH-CCR-W309-12818 (550-114628-8), CH-CCR-M52A-12818 (550-114628-9), CH-CCR-M53A-12718 (550-114628-10), CH-CCR-FD02-12718 (550-114628-11), CH-CCR-M55A-12818 (550-114628-12) and CH-CCR-W314-12818 (550-114628-13)

#### HPLC/IC

Method(s) 300.0: The following samples were diluted for Fluoride my method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W301-12718 (550-114628-1), CH-CCR-W305-12718 (550-114628-4) and CH-CCR-M55A-12818 (550-114628-12). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

Method(s) 300.0: The following samples were diluted for Fluoride my method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W304-12718 (550-114628-3), CH-CCR-W307-12818 (550-114628-6) and CH-CCR-W308-12818 (550-114628-7). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method(s) 200.7 Rev 4.4: The continuing calibration blank (CCB) for analytical batch 550-164399 contained sodium above the reporting limit (RL). All reported samples associated with this CCB were either ND for this analyte or contained this analyte at a concentration greater than 10X the value found in the CCB; therefore, re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-114628-1	CH-CCR-W301-12718	Water	12/07/18 14:19	12/10/18 11:16
550-114628-2	CH-CCR-W302-12718	Water	12/07/18 15:05	12/10/18 11:16
550-114628-3	CH-CCR-W304-12718	Water	12/07/18 15:59	12/10/18 11:16
550-114628-4	CH-CCR-W305-12718	Water	12/07/18 13:06	12/10/18 11:16
550-114628-5	CH-CCR-W306-12718	Water	12/07/18 12:28	12/10/18 11:16
550-114628-6	CH-CCR-W307-12818	Water	12/08/18 13:58	12/10/18 11:16
550-114628-7	CH-CCR-W308-12818	Water	12/08/18 12:42	12/10/18 11:16
550-114628-8	CH-CCR-W309-12818	Water	12/08/18 11:25	12/10/18 11:16
550-114628-9	CH-CCR-M52A-12818	Water	12/08/18 14:54	12/10/18 11:16
550-114628-10	CH-CCR-M53A-12718	Water	12/07/18 11:14	12/10/18 11:16
550-114628-11	CH-CCR-FD02-12718	Water	12/07/18 11:14	12/10/18 11:16
550-114628-12	CH-CCR-M55A-12818	Water	12/08/18 16:50	12/10/18 11:16
550-114628-13	CH-CCR-W314-12818	Water	12/08/18 15:27	12/10/18 11:16

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Client Sample ID: CH-CCR-W301-12718

## Lab Sample ID: 550-114628-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4000	D2	100	mg/L	50		300.0	Total/NA
Sulfate	3300	D2	100	mg/L	50		300.0	Total/NA
Boron	2.4		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	760	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	170	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	4.6		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2600	D2 M3	1.0	mg/L	2		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	10000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W302-12718

## Lab Sample ID: 550-114628-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.98	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2400	D2	400	mg/L	200		300.0	Total/NA
Boron	0.64		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	560		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	120		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	5.5		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1800		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	7200	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W304-12718

## Lab Sample ID: 550-114628-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2900	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	0.50		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	590		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	100		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	5.8		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2100		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	8100	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.5	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W305-12718

## Lab Sample ID: 550-114628-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2400	D2	400	mg/L	200		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Client Sample ID: CH-CCR-W305-12718 (Continued)

## Lab Sample ID: 550-114628-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	2300	D2	400	mg/L	200		300.0	Total/NA
Boron	0.35		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	710		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	110		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	3.0		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1500		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	99		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	99		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	7000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	15.8	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W306-12718

## Lab Sample ID: 550-114628-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1900	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.4	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200		300.0	Total/NA
Boron	1.1		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	410		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	230		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	2.6		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	5700	D2	2.0	mg/L	4		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	130		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	130		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	19000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W307-12818

## Lab Sample ID: 550-114628-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2700	D2	400	mg/L	200		300.0	Total/NA
Sulfate	2600	D2	400	mg/L	200		300.0	Total/NA
Boron	2.4		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	790		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	150		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	5.4		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1700		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	100		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	100		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	7800	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.2	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W308-12818

## Lab Sample ID: 550-114628-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2900	D2	400	mg/L	200		300.0	Total/NA
Sulfate	3000	D2	400	mg/L	200		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Client Sample ID: CH-CCR-W308-12818 (Continued)

## Lab Sample ID: 550-114628-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.45		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	730		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	120		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	7.7		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1900		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	160		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	160		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	8300	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.4	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W309-12818

## Lab Sample ID: 550-114628-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1300	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	0.42		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	280		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	34		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	12		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1700		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	55		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	55		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	6500	D2	100	mg/L	1		SM 2540C	Total/NA
pH	8.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M52A-12818

## Lab Sample ID: 550-114628-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4900	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2700	D2	400	mg/L	200		300.0	Total/NA
Boron	4.3		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	920		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	7.1		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2600	D2	1.0	mg/L	2		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	230		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	230		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	11000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	6.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	16.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M53A-12718

## Lab Sample ID: 550-114628-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2300	D2	400	mg/L	200		300.0	Total/NA
Fluoride	2.3	D1	0.80	mg/L	2		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Client Sample ID: CH-CCR-M53A-12718 (Continued)

## Lab Sample ID: 550-114628-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	3000	D2	400	mg/L	200		300.0	Total/NA
Boron	3.4		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	620		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	220		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	13		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1600	B3	0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	92		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	92		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	7600	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	17.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD02-12718

## Lab Sample ID: 550-114628-11

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2300	D2	400	mg/L	200		300.0	Total/NA
Fluoride	2.3	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3100	D2	400	mg/L	200		300.0	Total/NA
Boron	3.3		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	600		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	210		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	13		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1500	B3	0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	91		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	91		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	8000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	17.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-M55A-12818

## Lab Sample ID: 550-114628-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4300	D2	400	mg/L	200		300.0	Total/NA
Sulfate	3400	D2	400	mg/L	200		300.0	Total/NA
Boron	0.43		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	700		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	160		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	3.0		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2900	D2	1.0	mg/L	2		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	190		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	190		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	17.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-W314-12818

## Lab Sample ID: 550-114628-13

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2700	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.89	D1	0.80	mg/L	2		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W314-12818 (Continued)**

**Lab Sample ID: 550-114628-13**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	2100	D2	400	mg/L	200		300.0	Total/NA
Boron	1.1		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	800		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	160		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	1.8		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1500	B3	0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	94		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	94		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	7700	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	18.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W301-12718**

**Lab Sample ID: 550-114628-1**

Date Collected: 12/07/18 14:19

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4000	D2	100	mg/L			12/10/18 23:26	50
Fluoride	ND	D1 D5	0.80	mg/L			12/10/18 23:07	2
Sulfate	3300	D2	100	mg/L			12/10/18 23:26	50

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.4		0.050	mg/L		12/11/18 07:22	12/12/18 15:38	1
Calcium	760	M3	2.0	mg/L		12/11/18 07:22	12/12/18 15:38	1
Magnesium	170	M3	2.0	mg/L		12/11/18 07:22	12/12/18 15:38	1
Potassium	4.6		0.50	mg/L		12/11/18 07:22	12/12/18 15:38	1
Sodium	2600	D2 M3	1.0	mg/L		12/11/18 07:22	12/13/18 20:55	2

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	180		6.0	mg/L			12/11/18 11:20	1
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L			12/11/18 11:20	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 11:20	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 11:20	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 11:20	1
Total Dissolved Solids	10000	D2	100	mg/L			12/11/18 10:42	1
pH	7.2	H5	1.7	SU			12/10/18 19:35	1
Temperature	16.0	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-W302-12718**

**Lab Sample ID: 550-114628-2**

Date Collected: 12/07/18 15:05

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2600	D2	400	mg/L			12/11/18 07:06	200
Fluoride	0.98	D1	0.80	mg/L			12/14/18 00:13	2
Sulfate	2400	D2	400	mg/L			12/11/18 07:06	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.64		0.050	mg/L		12/11/18 07:22	12/12/18 16:02	1
Calcium	560		2.0	mg/L		12/11/18 07:22	12/12/18 16:02	1
Magnesium	120		2.0	mg/L		12/11/18 07:22	12/12/18 16:02	1
Potassium	5.5		0.50	mg/L		12/11/18 07:22	12/12/18 16:02	1
Sodium	1800		0.50	mg/L		12/11/18 07:22	12/12/18 16:02	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	140		6.0	mg/L			12/11/18 12:44	1
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L			12/11/18 12:44	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 12:44	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 12:44	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 12:44	1
Total Dissolved Solids	7200	D2	100	mg/L			12/11/18 10:42	1
pH	7.3	H5	1.7	SU			12/10/18 19:35	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W302-12718**

**Lab Sample ID: 550-114628-2**

Date Collected: 12/07/18 15:05

Matrix: Water

Date Received: 12/10/18 11:16

### General Chemistry (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Temperature	15.2	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-W304-12718**

**Lab Sample ID: 550-114628-3**

Date Collected: 12/07/18 15:59

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2900	D2	400	mg/L			12/11/18 06:29	200
Fluoride	ND	D1 D5	0.80	mg/L			12/14/18 00:32	2
Sulfate	2900	D2	400	mg/L			12/11/18 06:29	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.50		0.050	mg/L		12/11/18 07:22	12/12/18 16:08	1
Calcium	590		2.0	mg/L		12/11/18 07:22	12/12/18 16:08	1
Magnesium	100		2.0	mg/L		12/11/18 07:22	12/12/18 16:08	1
Potassium	5.8		0.50	mg/L		12/11/18 07:22	12/12/18 16:08	1
Sodium	2100		0.50	mg/L		12/11/18 07:22	12/12/18 16:08	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	140		6.0	mg/L			12/11/18 12:53	1
Bicarbonate Alkalinity as CaCO3	140		6.0	mg/L			12/11/18 12:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 12:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 12:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 12:53	1
Total Dissolved Solids	8100	D2	100	mg/L			12/11/18 10:42	1
pH	7.3	H5	1.7	SU			12/10/18 19:35	1
Temperature	16.5	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-W305-12718**

**Lab Sample ID: 550-114628-4**

Date Collected: 12/07/18 13:06

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2400	D2	400	mg/L			12/10/18 22:49	200
Fluoride	ND	D1 D5	0.80	mg/L			12/10/18 22:30	2
Sulfate	2300	D2	400	mg/L			12/10/18 22:49	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.35		0.050	mg/L		12/11/18 07:22	12/12/18 16:14	1
Calcium	710		2.0	mg/L		12/11/18 07:22	12/12/18 16:14	1
Magnesium	110		2.0	mg/L		12/11/18 07:22	12/12/18 16:14	1
Potassium	3.0		0.50	mg/L		12/11/18 07:22	12/12/18 16:14	1
Sodium	1500		0.50	mg/L		12/11/18 07:22	12/12/18 16:14	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W305-12718**

**Lab Sample ID: 550-114628-4**

Date Collected: 12/07/18 13:06

Matrix: Water

Date Received: 12/10/18 11:16

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	99		6.0	mg/L			12/11/18 13:17	1
Bicarbonate Alkalinity as CaCO3	99		6.0	mg/L			12/11/18 13:17	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:17	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 13:17	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:17	1
Total Dissolved Solids	7000	D2	100	mg/L			12/11/18 10:42	1
pH	7.3	H5	1.7	SU			12/10/18 19:35	1
Temperature	15.8	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-W306-12718**

**Lab Sample ID: 550-114628-5**

Date Collected: 12/07/18 12:28

Matrix: Water

Date Received: 12/10/18 11:16

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1900	D2	400	mg/L			12/10/18 22:12	200
Fluoride	1.4	D1	0.80	mg/L			12/10/18 21:54	2
Sulfate	12000	D2	400	mg/L			12/10/18 22:12	200

## Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.1		0.050	mg/L		12/11/18 07:22	12/12/18 16:20	1
Calcium	410		2.0	mg/L		12/11/18 07:22	12/12/18 16:20	1
Magnesium	230		2.0	mg/L		12/11/18 07:22	12/12/18 16:20	1
Potassium	2.6		0.50	mg/L		12/11/18 07:22	12/12/18 16:20	1
Sodium	5700	D2	2.0	mg/L		12/11/18 07:22	12/13/18 21:18	4

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	130		6.0	mg/L			12/11/18 13:36	1
Bicarbonate Alkalinity as CaCO3	130		6.0	mg/L			12/11/18 13:36	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:36	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 13:36	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:36	1
Total Dissolved Solids	19000	D2	200	mg/L			12/11/18 10:42	1
pH	7.9	H5	1.7	SU			12/10/18 19:35	1
Temperature	16.0	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-W307-12818**

**Lab Sample ID: 550-114628-6**

Date Collected: 12/08/18 13:58

Matrix: Water

Date Received: 12/10/18 11:16

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2700	D2	400	mg/L			12/11/18 19:16	200
Fluoride	ND	D1 D5	0.80	mg/L			12/14/18 01:08	2
Sulfate	2600	D2	400	mg/L			12/11/18 19:16	200

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W307-12818**

**Lab Sample ID: 550-114628-6**

Date Collected: 12/08/18 13:58

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.4		0.050	mg/L		12/11/18 07:22	12/12/18 16:25	1
Calcium	790		2.0	mg/L		12/11/18 07:22	12/12/18 16:25	1
Magnesium	150		2.0	mg/L		12/11/18 07:22	12/12/18 16:25	1
Potassium	5.4		0.50	mg/L		12/11/18 07:22	12/12/18 16:25	1
Sodium	1700		0.50	mg/L		12/11/18 07:22	12/12/18 16:25	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	100		6.0	mg/L			12/11/18 13:44	1
Bicarbonate Alkalinity as CaCO3	100		6.0	mg/L			12/11/18 13:44	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:44	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 13:44	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:44	1
Total Dissolved Solids	7800	D2	100	mg/L			12/11/18 10:42	1
pH	7.2	H5	1.7	SU			12/10/18 19:35	1
Temperature	16.1	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-W308-12818**

**Lab Sample ID: 550-114628-7**

Date Collected: 12/08/18 12:42

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2900	D2	400	mg/L			12/11/18 05:34	200
Fluoride	ND	D1 D5	0.80	mg/L			12/14/18 01:27	2
Sulfate	3000	D2	400	mg/L			12/11/18 05:34	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.45		0.050	mg/L		12/11/18 07:22	12/12/18 16:31	1
Calcium	730		2.0	mg/L		12/11/18 07:22	12/12/18 16:31	1
Magnesium	120		2.0	mg/L		12/11/18 07:22	12/12/18 16:31	1
Potassium	7.7		0.50	mg/L		12/11/18 07:22	12/12/18 16:31	1
Sodium	1900		0.50	mg/L		12/11/18 07:22	12/12/18 16:31	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	160		6.0	mg/L			12/11/18 13:53	1
Bicarbonate Alkalinity as CaCO3	160		6.0	mg/L			12/11/18 13:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 13:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 13:53	1
Total Dissolved Solids	8300	D2	100	mg/L			12/11/18 10:42	1
pH	7.1	H5	1.7	SU			12/10/18 19:35	1
Temperature	16.4	H5	0.1	Degrees C			12/10/18 19:35	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W309-12818**

**Lab Sample ID: 550-114628-8**

Date Collected: 12/08/18 11:25

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1300	D2	400	mg/L			12/10/18 21:35	200
Fluoride	1.0	D1	0.80	mg/L			12/10/18 21:17	2
Sulfate	2900	D2	400	mg/L			12/10/18 21:35	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.42		0.050	mg/L		12/11/18 07:22	12/12/18 16:37	1
Calcium	280		2.0	mg/L		12/11/18 07:22	12/12/18 16:37	1
Magnesium	34		2.0	mg/L		12/11/18 07:22	12/12/18 16:37	1
Potassium	12		0.50	mg/L		12/11/18 07:22	12/12/18 16:37	1
Sodium	1700		0.50	mg/L		12/11/18 07:22	12/12/18 16:37	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	55		6.0	mg/L			12/11/18 14:01	1
Bicarbonate Alkalinity as CaCO3	55		6.0	mg/L			12/11/18 14:01	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:01	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 14:01	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:01	1
Total Dissolved Solids	6500	D2	100	mg/L			12/11/18 10:42	1
pH	8.1	H5	1.7	SU			12/10/18 19:35	1
Temperature	16.2	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-M52A-12818**

**Lab Sample ID: 550-114628-9**

Date Collected: 12/08/18 14:54

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4900	D2	400	mg/L			12/10/18 20:22	200
Fluoride	1.0	D1	0.80	mg/L			12/10/18 20:03	2
Sulfate	2700	D2	400	mg/L			12/10/18 20:22	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	4.3		0.050	mg/L		12/11/18 07:22	12/12/18 16:49	1
Calcium	920		2.0	mg/L		12/11/18 07:22	12/12/18 16:49	1
Magnesium	300		2.0	mg/L		12/11/18 07:22	12/12/18 16:49	1
Potassium	7.1		0.50	mg/L		12/11/18 07:22	12/12/18 16:49	1
Sodium	2600	D2	1.0	mg/L		12/11/18 07:22	12/13/18 21:24	2

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	230		6.0	mg/L			12/11/18 14:09	1
Bicarbonate Alkalinity as CaCO3	230		6.0	mg/L			12/11/18 14:09	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:09	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 14:09	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:09	1
Total Dissolved Solids	11000	D2	200	mg/L			12/11/18 10:42	1
pH	6.8	H5	1.7	SU			12/10/18 19:35	1

TestAmerica Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-M52A-12818**

**Lab Sample ID: 550-114628-9**

Date Collected: 12/08/18 14:54

Matrix: Water

Date Received: 12/10/18 11:16

### General Chemistry (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Temperature	16.6	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-M53A-12718**

**Lab Sample ID: 550-114628-10**

Date Collected: 12/07/18 11:14

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2300	D2	400	mg/L			12/10/18 19:45	200
Fluoride	2.3	D1	0.80	mg/L			12/10/18 19:26	2
Sulfate	3000	D2	400	mg/L			12/10/18 19:45	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.4		0.050	mg/L		12/11/18 07:22	12/12/18 16:55	1
Calcium	620		2.0	mg/L		12/11/18 07:22	12/12/18 16:55	1
Magnesium	220		2.0	mg/L		12/11/18 07:22	12/12/18 16:55	1
Potassium	13		0.50	mg/L		12/11/18 07:22	12/12/18 16:55	1
Sodium	1600	B3	0.50	mg/L		12/11/18 07:22	12/12/18 16:55	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	92		6.0	mg/L			12/11/18 14:18	1
Bicarbonate Alkalinity as CaCO3	92		6.0	mg/L			12/11/18 14:18	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:18	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 14:18	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:18	1
Total Dissolved Solids	7600	D2	100	mg/L			12/11/18 10:42	1
pH	7.4	H5	1.7	SU			12/10/18 19:35	1
Temperature	17.9	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-FD02-12718**

**Lab Sample ID: 550-114628-11**

Date Collected: 12/07/18 11:14

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2300	D2	400	mg/L			12/11/18 04:57	200
Fluoride	2.3	D1	0.80	mg/L			12/14/18 01:45	2
Sulfate	3100	D2	400	mg/L			12/11/18 04:57	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.3		0.050	mg/L		12/11/18 07:22	12/12/18 17:01	1
Calcium	600		2.0	mg/L		12/11/18 07:22	12/12/18 17:01	1
Magnesium	210		2.0	mg/L		12/11/18 07:22	12/12/18 17:01	1
Potassium	13		0.50	mg/L		12/11/18 07:22	12/12/18 17:01	1
Sodium	1500	B3	0.50	mg/L		12/11/18 07:22	12/12/18 17:01	1



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-FD02-12718**

**Lab Sample ID: 550-114628-11**

Date Collected: 12/07/18 11:14

Matrix: Water

Date Received: 12/10/18 11:16

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	91		6.0	mg/L			12/11/18 14:27	1
Bicarbonate Alkalinity as CaCO3	91		6.0	mg/L			12/11/18 14:27	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:27	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 14:27	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:27	1
<b>Total Dissolved Solids</b>	<b>8000</b>	<b>D2</b>	100	mg/L			12/11/18 10:42	1
pH	7.4	H5	1.7	SU			12/10/18 19:35	1
Temperature	17.6	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-M55A-12818**

**Lab Sample ID: 550-114628-12**

Date Collected: 12/08/18 16:50

Matrix: Water

Date Received: 12/10/18 11:16

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4300	D2	400	mg/L			12/10/18 19:08	200
Fluoride	ND	D1 D5	0.80	mg/L			12/10/18 18:50	2
Sulfate	3400	D2	400	mg/L			12/10/18 19:08	200

## Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.43		0.050	mg/L		12/11/18 07:22	12/12/18 17:07	1
Calcium	700		2.0	mg/L		12/11/18 07:22	12/12/18 17:07	1
Magnesium	160		2.0	mg/L		12/11/18 07:22	12/12/18 17:07	1
Potassium	3.0		0.50	mg/L		12/11/18 07:22	12/12/18 17:07	1
Sodium	2900	D2	1.0	mg/L		12/11/18 07:22	12/13/18 21:47	2

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	190		6.0	mg/L			12/11/18 14:37	1
Bicarbonate Alkalinity as CaCO3	190		6.0	mg/L			12/11/18 14:37	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:37	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 14:37	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:37	1
<b>Total Dissolved Solids</b>	<b>11000</b>	<b>D2</b>	100	mg/L			12/11/18 10:42	1
pH	7.3	H5	1.7	SU			12/10/18 19:35	1
Temperature	17.2	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-W314-12818**

**Lab Sample ID: 550-114628-13**

Date Collected: 12/08/18 15:27

Matrix: Water

Date Received: 12/10/18 11:16

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2700	D2	400	mg/L			12/10/18 18:31	200
Fluoride	0.89	D1	0.80	mg/L			12/10/18 18:13	2
Sulfate	2100	D2	400	mg/L			12/10/18 18:31	200

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W314-12818**

**Lab Sample ID: 550-114628-13**

Date Collected: 12/08/18 15:27

Matrix: Water

Date Received: 12/10/18 11:16

## Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.1		0.050	mg/L		12/11/18 07:22	12/12/18 17:13	1
Calcium	800		2.0	mg/L		12/11/18 07:22	12/12/18 17:13	1
Magnesium	160		2.0	mg/L		12/11/18 07:22	12/12/18 17:13	1
Potassium	1.8		0.50	mg/L		12/11/18 07:22	12/12/18 17:13	1
Sodium	1500	B3	0.50	mg/L		12/11/18 07:22	12/12/18 17:13	1

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	94		6.0	mg/L			12/11/18 14:45	1
Bicarbonate Alkalinity as CaCO3	94		6.0	mg/L			12/11/18 14:45	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:45	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 14:45	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 14:45	1
Total Dissolved Solids	7700	D2	100	mg/L			12/11/18 10:42	1
pH	7.3	H5	1.7	SU			12/10/18 19:35	1
Temperature	18.9	H5	0.1	Degrees C			12/10/18 19:35	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-164154/2**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/10/18 16:04	1
Fluoride	ND		0.40	mg/L			12/10/18 16:04	1
Sulfate	ND		2.0	mg/L			12/10/18 16:04	1

**Lab Sample ID: LCS 550-164154/5**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.5		mg/L		107	90 - 110
Fluoride	4.00	4.15		mg/L		104	90 - 110
Sulfate	20.0	20.5		mg/L		103	90 - 110

**Lab Sample ID: LCSD 550-164154/6**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.5		mg/L		107	90 - 110	0	20
Fluoride	4.00	4.04		mg/L		101	90 - 110	3	20
Sulfate	20.0	20.5		mg/L		103	90 - 110	0	20

**Lab Sample ID: 550-114628-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	4000	D2	1000	4770	D2	mg/L		81	80 - 120
Sulfate	3300	D2	1000	4190	D2	mg/L		91	80 - 120

**Lab Sample ID: 550-114628-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND	D1 D5	8.00	8.64	D1	mg/L		101	80 - 120

**Lab Sample ID: 550-114628-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	4000	D2	1000	4850	D2	mg/L		89	80 - 120	2	20
Sulfate	3300	D2	1000	4270	D2	mg/L		99	80 - 120	2	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-114628-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND	D1 D5	8.00	8.69	D1	mg/L		101	80 - 120	1	20

**Lab Sample ID: MB 550-164284/2**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/11/18 15:16	1
Fluoride	ND		0.40	mg/L			12/11/18 15:16	1
Sulfate	ND		2.0	mg/L			12/11/18 15:16	1

**Lab Sample ID: LCS 550-164284/5**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.3		mg/L		107	90 - 110
Fluoride	4.00	4.10		mg/L		103	90 - 110
Sulfate	20.0	20.4		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-164284/6**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.3		mg/L		107	90 - 110	0	20
Fluoride	4.00	4.11		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-114686-A-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND		4.00	4.18		mg/L		102	80 - 120
Sulfate	72		20.0	88.7		mg/L		81	80 - 120

**Lab Sample ID: 550-114686-A-1 MS ^10**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	250	D2	200	478	D2	mg/L		113	80 - 120

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-114686-A-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND		4.00	4.24		mg/L		104	80 - 120	2	20
Sulfate	72		20.0	88.9		mg/L		82	80 - 120	0	20

**Lab Sample ID: 550-114686-A-1 MSD ^10**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	250	D2	200	475	D2	mg/L		111	80 - 120	1	20

**Lab Sample ID: MB 550-164511/2**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/13/18 18:23	1
Fluoride	ND		0.40	mg/L			12/13/18 18:23	1
Sulfate	ND		2.0	mg/L			12/13/18 18:23	1

**Lab Sample ID: LCS 550-164511/5**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.2		mg/L		106	90 - 110
Fluoride	4.00	4.07		mg/L		102	90 - 110
Sulfate	20.0	20.3		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-164511/6**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.2		mg/L		106	90 - 110	0	20
Fluoride	4.00	4.08		mg/L		102	90 - 110	0	20
Sulfate	20.0	20.3		mg/L		101	90 - 110	0	20

**Lab Sample ID: 550-114843-A-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	59		20.0	76.8		mg/L		87	80 - 120
Fluoride	ND		4.00	4.39		mg/L		102	80 - 120
Sulfate	33		20.0	52.7		mg/L		100	80 - 120

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-114843-A-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	59		20.0	77.1		mg/L		88	80 - 120	0	20
Fluoride	ND		4.00	4.47		mg/L		104	80 - 120	2	20
Sulfate	33		20.0	53.1		mg/L		102	80 - 120	1	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-164126/1-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		12/11/18 07:22	12/12/18 15:18	1
Calcium	ND		2.0	mg/L		12/11/18 07:22	12/12/18 15:18	1
Magnesium	ND		2.0	mg/L		12/11/18 07:22	12/12/18 15:18	1
Potassium	ND		0.50	mg/L		12/11/18 07:22	12/12/18 15:18	1
Sodium	ND		0.50	mg/L		12/11/18 07:22	12/12/18 15:18	1

**Lab Sample ID: LCS 550-164126/2-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.950		mg/L		95	85 - 115
Calcium	21.0	20.7		mg/L		99	85 - 115
Magnesium	21.0	21.1		mg/L		100	85 - 115
Potassium	20.0	20.2		mg/L		101	85 - 115
Sodium	20.0	19.7		mg/L		99	85 - 115

**Lab Sample ID: LCSD 550-164126/3-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.933		mg/L		93	85 - 115	2	20
Calcium	21.0	20.5		mg/L		98	85 - 115	1	20
Magnesium	21.0	20.9		mg/L		99	85 - 115	1	20
Potassium	20.0	19.9		mg/L		100	85 - 115	1	20
Sodium	20.0	19.5		mg/L		97	85 - 115	1	20

**Lab Sample ID: 550-114628-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	2.4		1.00	3.34		mg/L		93	70 - 130
Calcium	760	M3	21.0	743	M3	mg/L		-87	70 - 130
Magnesium	170	M3	21.0	185	M3	mg/L		56	70 - 130
Potassium	4.6		20.0	26.0		mg/L		107	70 - 130

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-114628-1 MS**

**Matrix: Water**

**Analysis Batch: 164498**

**Client Sample ID: CH-CCR-W301-12718**

**Prep Type: Total/NA**

**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Sodium	2600	M3 D2	20.0	2490	M3	mg/L		-313	70 - 130

**Lab Sample ID: 550-114628-1 MSD**

**Matrix: Water**

**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W301-12718**

**Prep Type: Total/NA**

**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	2.4		1.00	3.40		mg/L		98	70 - 130	2	20
Calcium	760	M3	21.0	740	M3	mg/L		-102	70 - 130	0	20
Magnesium	170	M3	21.0	183	M3	mg/L		47	70 - 130	1	20
Potassium	4.6		20.0	25.8		mg/L		106	70 - 130	1	20

**Lab Sample ID: 550-114628-1 MSD**

**Matrix: Water**

**Analysis Batch: 164498**

**Client Sample ID: CH-CCR-W301-12718**

**Prep Type: Total/NA**

**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Sodium	2600	M3 D2	20.0	2500	M3	mg/L		-269	70 - 130	0	20

**Lab Sample ID: 550-114629-C-1-A MS ^2**

**Matrix: Water**

**Analysis Batch: 164498**

**Client Sample ID: Matrix Spike**

**Prep Type: Total/NA**

**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Sodium	4000	M3 D2	20.0	3990	M3	mg/L		-37	70 - 130

**Lab Sample ID: 550-114629-C-1-B MSD ^2**

**Matrix: Water**

**Analysis Batch: 164498**

**Client Sample ID: Matrix Spike Duplicate**

**Prep Type: Total/NA**

**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Sodium	4000	M3 D2	20.0	3920	M3	mg/L		-366	70 - 130	2	20

## Method: SM 2320B - Alkalinity

**Lab Sample ID: MB 550-164215/6**

**Matrix: Water**

**Analysis Batch: 164215**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 11:12	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 11:12	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 11:12	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 11:12	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 11:12	1

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Method: SM 2320B - Alkalinity (Continued)

**Lab Sample ID: LCS 550-164215/5**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity as CaCO3	250	249		mg/L		100	90 - 110

**Lab Sample ID: LCSD 550-164215/18**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	250	247		mg/L		99	90 - 110	1	20

**Lab Sample ID: 550-114628-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity as CaCO3	180		181		mg/L		1	20
Bicarbonate Alkalinity as CaCO3	180		181		mg/L		1	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

**Lab Sample ID: 550-114628-4 DU**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: CH-CCR-W305-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity as CaCO3	99		101		mg/L		2	20
Bicarbonate Alkalinity as CaCO3	99		101		mg/L		2	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-164156/1**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			12/11/18 10:42	1

**Lab Sample ID: LCS 550-164156/2**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	970		mg/L		97	90 - 110

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

**Lab Sample ID: LCSD 550-164156/3**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	1000	940		mg/L		94	90 - 110	3	10

**Lab Sample ID: 550-114628-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	10000	D2	10200	D2	mg/L		0	10

**Lab Sample ID: 550-114629-A-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	17000	D2	15300	D2	mg/L		8	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-164118/13**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.4	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-164118/24**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.1	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-164118/36**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100.1	98.5 - 101.5

**Lab Sample ID: LCSSRM 550-164118/47**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.7	98.5 - 101.5

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
 SDG: Cholla

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: 550-114628-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU		Unit	D	RPD	RPD Limit
			Result	Qualifier				
pH	7.2	H5	7.2	H5	SU		0.1	5
Temperature	16.0	H5	15.9	H5	Degrees C		0.6	

**Lab Sample ID: 550-114628-12 DU**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: CH-CCR-M55A-12818**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU		Unit	D	RPD	RPD Limit
			Result	Qualifier				
pH	7.3	H5	7.3	H5	SU		0.1	5
Temperature	17.2	H5	17.4	H5	Degrees C		1	

**Lab Sample ID: 550-114629-A-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU		Unit	D	RPD	RPD Limit
			Result	Qualifier				
pH	7.4	H5	7.4	H5	SU		0.1	5
Temperature	19.2	H5	19.4	H5	Degrees C		1	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## HPLC/IC

### Analysis Batch: 164154

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	300.0	
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	300.0	
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	300.0	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	300.0	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	300.0	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	300.0	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	300.0	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	300.0	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	300.0	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	300.0	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	300.0	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	300.0	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	300.0	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	300.0	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	300.0	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	300.0	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	300.0	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	300.0	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	300.0	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	300.0	
MB 550-164154/2	Method Blank	Total/NA	Water	300.0	
LCS 550-164154/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-164154/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	300.0	
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	300.0	
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	300.0	
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	300.0	

### Analysis Batch: 164284

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	300.0	
MB 550-164284/2	Method Blank	Total/NA	Water	300.0	
LCS 550-164284/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-164284/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-114686-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-114686-A-1 MS ^10	Matrix Spike	Total/NA	Water	300.0	
550-114686-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-114686-A-1 MSD ^10	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 164511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	300.0	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	300.0	
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	300.0	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	300.0	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	300.0	
MB 550-164511/2	Method Blank	Total/NA	Water	300.0	
LCS 550-164511/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-164511/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-114843-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-114843-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Metals

### Prep Batch: 164126

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	200.7	
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	200.7	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	200.7	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	200.7	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	200.7	
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	200.7	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	200.7	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	200.7	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	200.7	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	200.7	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	200.7	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	200.7	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	200.7	
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	200.7	
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	200.7	
550-114629-C-1-A MS ^2	Matrix Spike	Total/NA	Water	200.7	
550-114629-C-1-B MSD ^2	Matrix Spike Duplicate	Total/NA	Water	200.7	

### Analysis Batch: 164399

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	200.7 Rev 4.4	164126
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164126
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164126
LCSD 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126

### Analysis Batch: 164498

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-C-1-A MS ^2	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	164126

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Metals (Continued)

### Analysis Batch: 164498 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-C-1-B MSD ^2	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	164126

## General Chemistry

### Analysis Batch: 164118

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	SM 4500 H+ B	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	SM 4500 H+ B	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	SM 4500 H+ B	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	SM 4500 H+ B	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	SM 4500 H+ B	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-164118/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-164118/24	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-164118/36	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-164118/47	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-114628-1 DU	CH-CCR-W301-12718	Total/NA	Water	SM 4500 H+ B	
550-114628-12 DU	CH-CCR-M55A-12818	Total/NA	Water	SM 4500 H+ B	
550-114629-A-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	

### Analysis Batch: 164156

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	SM 2540C	
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	SM 2540C	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	SM 2540C	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	SM 2540C	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	SM 2540C	
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	SM 2540C	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	SM 2540C	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	SM 2540C	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	SM 2540C	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	SM 2540C	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	SM 2540C	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	SM 2540C	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	SM 2540C	
MB 550-164156/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-164156/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-164156/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-114628-1 DU	CH-CCR-W301-12718	Total/NA	Water	SM 2540C	
550-114629-A-1 DU	Duplicate	Total/NA	Water	SM 2540C	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## General Chemistry (Continued)

### Analysis Batch: 164215

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	SM 2320B	
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	SM 2320B	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	SM 2320B	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	SM 2320B	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	SM 2320B	
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	SM 2320B	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	SM 2320B	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	SM 2320B	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	SM 2320B	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	SM 2320B	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	SM 2320B	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	SM 2320B	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	SM 2320B	
MB 550-164215/6	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-164215/5	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-164215/18	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-114628-1 DU	CH-CCR-W301-12718	Total/NA	Water	SM 2320B	
550-114628-4 DU	CH-CCR-W305-12718	Total/NA	Water	SM 2320B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W301-12718**

**Lab Sample ID: 550-114628-1**

**Date Collected: 12/07/18 14:19**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 23:07	NEL	TAL PHX
Total/NA	Analysis	300.0		50	164154	12/10/18 23:26	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 15:38	SRA	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	164498	12/13/18 20:55	ARE	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 11:20	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 (Start) 12/12/18 11:45 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-W302-12718**

**Lab Sample ID: 550-114628-2**

**Date Collected: 12/07/18 15:05**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 07:06	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/14/18 00:13	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:02	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 12:44	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 (Start) 12/12/18 11:45 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-W304-12718**

**Lab Sample ID: 550-114628-3**

**Date Collected: 12/07/18 15:59**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 06:29	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/14/18 00:32	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:08	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 12:53	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 (Start) 12/12/18 11:45 (End)	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W305-12718**

**Lab Sample ID: 550-114628-4**

**Date Collected: 12/07/18 13:06**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 22:30	NEL	TAL PHX
Total/NA	Analysis	300.0		200	164154	12/10/18 22:49	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:14	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 13:17	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-W306-12718**

**Lab Sample ID: 550-114628-5**

**Date Collected: 12/07/18 12:28**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 21:54	NEL	TAL PHX
Total/NA	Analysis	300.0		200	164154	12/10/18 22:12	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:20	SRA	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	164498	12/13/18 21:18	ARE	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 13:36	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-W307-12818**

**Lab Sample ID: 550-114628-6**

**Date Collected: 12/08/18 13:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164284	12/11/18 19:16	KJS	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/14/18 01:08	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:25	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 13:44	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W308-12818**

**Lab Sample ID: 550-114628-7**

**Date Collected: 12/08/18 12:42**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 05:34	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/14/18 01:27	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:31	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 13:53	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-W309-12818**

**Lab Sample ID: 550-114628-8**

**Date Collected: 12/08/18 11:25**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 21:17	NEL	TAL PHX
Total/NA	Analysis	300.0		200	164154	12/10/18 21:35	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:37	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 14:01	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-M52A-12818**

**Lab Sample ID: 550-114628-9**

**Date Collected: 12/08/18 14:54**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 20:03	NEL	TAL PHX
Total/NA	Analysis	300.0		200	164154	12/10/18 20:22	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:49	SRA	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	164498	12/13/18 21:24	ARE	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 14:09	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-M53A-12718**

**Lab Sample ID: 550-114628-10**

**Date Collected: 12/07/18 11:14**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 19:26	NEL	TAL PHX
Total/NA	Analysis	300.0		200	164154	12/10/18 19:45	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:55	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 14:18	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156		YET	TAL PHX
					(Start)	12/11/18 10:42		
					(End)	12/12/18 11:45		
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD02-12718**

**Lab Sample ID: 550-114628-11**

**Date Collected: 12/07/18 11:14**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 04:57	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/14/18 01:45	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:01	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 14:27	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156		YET	TAL PHX
					(Start)	12/11/18 10:42		
					(End)	12/12/18 11:45		
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-M55A-12818**

**Lab Sample ID: 550-114628-12**

**Date Collected: 12/08/18 16:50**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 18:50	NEL	TAL PHX
Total/NA	Analysis	300.0		200	164154	12/10/18 19:08	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:07	SRA	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	164498	12/13/18 21:47	ARE	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 14:37	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156		YET	TAL PHX
					(Start)	12/11/18 10:42		
					(End)	12/12/18 11:45		
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W314-12818**

**Lab Sample ID: 550-114628-13**

**Date Collected: 12/08/18 15:27**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 18:13	NEL	TAL PHX
Total/NA	Analysis	300.0		200	164154	12/10/18 18:31	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:13	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 14:45	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156		YET	TAL PHX
					(Start)	12/11/18 10:42		
					(End)	12/12/18 11:45		
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

1

2

3

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# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-1  
SDG: Cholla

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
SM 2320B	Alkalinity	SM	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX

## Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

## Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

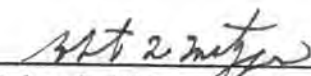
(480) 897-9459  
FAX (480) 892-5446

### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W301-12718 (550-114628-1)	< 0.6	< 0.7	< 0.7
Date of Analysis	12/14/2018	12/14/2018	12/14/2018

  
Robert L. Metzger, Ph.D., C.H.P.      12/26/2018      Date  
Laboratory License Number AZ0462



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

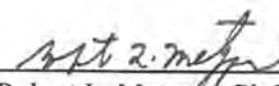
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W302-12718 (550-114628-2)	< 0.6	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462





# Radiation Safety Engineering, Inc.

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Website: www.radsafe.com

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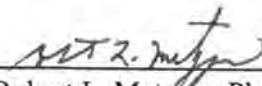
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W304-12718 (550-114628-3)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462





## Radiation Safety Engineering, Inc.

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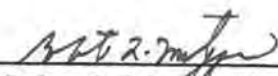
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W305-12718 (550-114628-4)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
Date  
Laboratory License Number AZ0462



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
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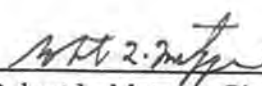
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W306-12718 (550-114628-5)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W307-12818 (550-114628-6)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018  
Date

Laboratory License Number AZ0462



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

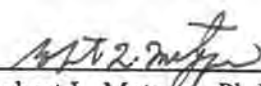
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W308-12818 (550-114628-7)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462





## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

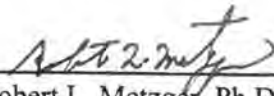
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W309-12818 (550-114628-8)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

Date

Laboratory License Number AZ0462



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

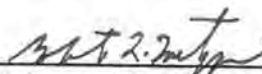
## Radiochemical Activity in Water (pCi/L)

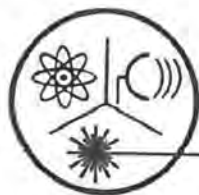
TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-M52A-12818 (550-114628-9)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

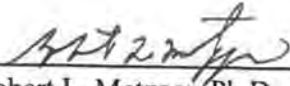
(480) 897-9459  
FAX (480) 892-5446

### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-M53A-12718 (550-114628-10)	< 0.5	1.1 ± 0.3	1.1 ± 0.3
Date of Analysis	12/14/2018	12/14/2018	12/14/2018

  
Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

Date

Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

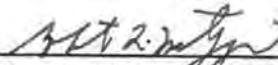
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-FD02-12718 (550-114628-11)	< 0.5	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018  
Date

Laboratory License Number AZ0462





## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

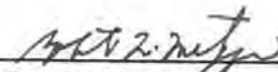
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-M55A-12818 (550-114628-12)	< 0.5	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.      12/26/2018      Date  
Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W314-12818 (550-114628-13)	< 0.5	0.7 ± 0.3	0.7 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

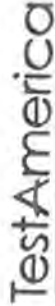
Date

Laboratory License Number AZ0462

**TestAmerica Phoenix**

4625 East Cotton Cir Blvd Suite 189  
 Phoenix, AZ 85040  
 Phone (602) 437-3340 Fax (602) 454-9303

**Chain of Custody Record**



<b>Client Information (Sub Contract Lab)</b> Client Contact: Baker, Ken Shipping/Receiving: ken.baker@testamericainc.com Company: Radiation Safety Eng., Inc. Address: 3245 North Washington Street, City: Chandler State, Zip: AZ, 85225 Phone: Email: Project Name: APS - Cholla CCR Site: Arizona Public Service		Lab PM: Baker, Ken E-Mail: ken.baker@testamericainc.com Accreditations Required (See note): State Program - Arizona State of Origin: Arizona Carmer Tracking No(s): COC No: 550-23057-1 Page: Page 1 of 2 Job #: 550-114628-1 Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other: M - Hexane N - None O - Acetic Acid P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecalhydrate U - Acetone V - MCAA W - pH 4.5 Z - other (specify)						
Due Date Requested: 12/19/2018 TAT Requested (days): PO #: WO #: Project #: 55009651 SSOW#:		<b>Analysis Requested</b> Total Number of Containers:						
Sample ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, E=soils, D=dusts, O=other)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUB (Radium 226/228) Radium 226/228	Special Instructions/Note:
CH-CCR-W301-12718 (550-114628-1) <i>611418</i>	12/7/18	14:19	Water	Water	X	X	2	Job 3
CH-CCR-W302-12718 (550-114628-2) <i>611419</i>	12/7/18	15:05	Water	Water	X	X	2	Job 3
CH-CCR-W304-12718 (550-114628-3) <i>611420</i>	12/7/18	15:59	Water	Water	X	X	2	Job 3
CH-CCR-W305-12718 (550-114628-4) <i>611421</i>	12/7/18	13:06	Water	Water	X	X	2	Job 3
CH-CCR-W306-12718 (550-114628-5) <i>611422</i>	12/7/18	12:28	Water	Water	X	X	2	Job 3
CH-CCR-W307-12818 (550-114628-6) <i>611423</i>	12/8/18	13:58	Water	Water	X	X	2	Job 3
CH-CCR-W308-12818 (550-114628-7) <i>611424</i>	12/8/18	12:42	Water	Water	X	X	2	Job 3
CH-CCR-W309-12818 (550-114628-8) <i>611425</i>	12/8/18	11:25	Water	Water	X	X	2	Job 3
CH-CCR-M52A-12818 (550-114628-9) <i>611426</i>	12/8/18	14:54	Water	Water	X	X	2	Job 3

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

**Possible Hazard Identification**  
 Unconfirmed  
 Deliverable Requested: I, II, III, IV, Other (specify)  
 Primary Deliverable Rank: 2  
 Empty Kit Relinquished by:  
 Relinquished by: *BATEMAN DCS* Date: *12/11/18*  
 Relinquished by: *AMC/MAD* Date: *12-11-18*  
 Relinquished by: Date: Company: *L.S.E*  
 Relinquished by: Date: Company:  
 Relinquished by: Date: Company:  
 Custody Seals Intact:  Yes  No  
 Cooler Temperature(s) °C and Other Remarks:





**TestAmerica Phoenix**

4625 East Colton Cir Blvd Suite 189  
Phoenix, AZ 85040  
Phone (602) 437-3340 Fax (602) 454-9303

**Chain of Custody Record**



Client Information (Sub Contract Lab)		Sampler:	Lab PM:	Carrier Tracking No(s):	COC No:				
Client Contact: Shipping/Receiving		Phone:	Baker, Ken		550-23057.2				
Company:		E-Mail:	ken.baker@testamericainc.com	State of Origin:	Page				
Radiation Safety Eng., Inc.		Accreditations Required (See note): State Program - Arizona		Arizona	Page 2 of 2				
Address: 3245 North Washington Street, City		Due Date Requested: 12/19/2018	Job #: 550-114628-1						
State, Zip AZ, 85225		TAT Requested (days):	Preservation Codes: M - Hexane N - None O - AshNaO2 P - Na2OMs Q - Na2SO3 R - Na2SO4 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4.5 Z - other (specify)						
Phone:		PO #:	Other:						
Email:		W/O #:							
Project #: 55009651		Project #:							
Site: Arizona Public Service		SSOW#:							
Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, B=soil, O=other, A=air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUB (Radium 226/228) Radium 226/228	Total Number of Containers	Special Instructions/Note:
CH-CCR-M53A-12718 (550-114628-10) <i>61427</i>	12/7/18	11:14 Arizona	Water	Water	X	X		2	Job 3
CH-CCR-FD02-12718 (550-114628-11) <i>61428</i>	12/7/18	11:14 Arizona	Water	Water	X	X		2	Job 3
CH-CCR-M55A-12818 (550-114628-12) <i>61429</i>	12/8/18	16:50 Arizona	Water	Water	X	X		2	Job 3
CH-CCR-W314-12818 (550-114628-13) <i>61430</i>	12/8/18	15:27 Arizona	Water	Water	X	X		2	Job 3

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody.

**Possible Hazard Identification**

Unconfirmed

Deliverable Requested: I, II, III, IV, Other (specify)

Primary Deliverable Rank: 2

Sample Disposal / A fee may be assessed if samples are retained longer than 1 month

Return To Client  Disposal By Lab  Archive For  Months

Special Instructions/QC Requirements:

Method of Shipment:

Received by: *AMK HARC*

Date/Time: *12-11-18 14:15*

Company: *K.S.E*

Received by:

Date/Time:

Company:

Received by:

Date/Time:

Company:

Custody Seal Intact: Custody Seal No.  Yes  No

Cooler Temperature(s) °C and Other Remarks:



**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

**Chain of Custody Record**

114628

Regulatory Program:

CCR

**TestAmerica**  
 THE LEADER IN ENVIRONMENTAL TESTING  
 TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarway 928-587-0319  
 Analysis Turnaround Time  
 TAT if different from Below  
 Project Name: CCR  
 Site: Cholla  
 P O #

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	SM 2320B (HCO3)	Alkalinity	Carbonate as CaCO3	Bicarbonate as CaCO3
CH-CCR-W301-12718	12/7/2018	1419	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-W302-12718	12/7/2018	1505	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-W304-12718	12/7/2018	1559	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-W305-12718	12/7/2018	1306	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-W306-12718	12/7/2018	1228	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-W307-12818	12/8/2018	1356	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-W308-12818	12/8/2018	1242	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-W309-12818	12/8/2018	1124	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-M52A-12818	12/8/2018	1454	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-M53A-12718	12/7/2018	1114	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-FD02-12718	12/7/2018	1114	G	W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-M55A-12818	12/8/2018	1650	G	W	2	N	X	X	X	X	X	X	X	X	X

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other  
 Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:  
 Non-hazard  Flammable  Skin Irritant  Poison B  Unknown  
 Return to Client  Dispose by Lab  Archive for \_\_\_\_\_ Months

2.0°C, 2-2-c, 1.8-c, 1.6-c



Custody Seals Intact:  Yes  No  
 Relinquished by: Doug Lavarway  
 Relinquished by: [Signature]  
 Relinquished by: [Signature]  
 Company: APS  
 Date/Time: 1/10/18  
 Received by: [Signature]  
 Received in Laboratory by: TA-PHX  
 Company: [Signature]  
 Date/Time: 12-10-18  
 Cooler Temp (°C): Obs'd: \_\_\_\_\_  
 Therm ID No.: \_\_\_\_\_  
 Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

**TestAmerica Phoenix**

**Chain of Custody Record**

4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114628

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.



Client Contact

Doug Lavarney  
928-587-0319

Lab Contact:

Carrier:

12/9/2018

COC No: 1 of 2 COCs

4801 Cholla Lake Road  
Joseph City, AZ 86032

Phone

FAX

Project Name: CCR

Site: Cholla

P O #

TAT if different from Below

Analysis Turnaround Time

Perform MS / MSD ( Y / N )

EPA 200.7 ( Li, Mg, SiO2)

200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Ti)

EPA 300.0 (F)

Sampler:

For Lab Use Only:

Walk-in Client:

Lab Sampling:

Job / SDG No.:

Sample Specific Notes:

**Sample Identification**

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 ( Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Ti)	EPA 300.0 (F)
CH-CCR-W301-12718	12/7/2018	1419	G	W	2	N	X	X	X	X
CH-CCR-W302-12718	12/7/2018	1505	G	W	2	N	X	X	X	X
CH-CCR-W304-12718	12/7/2018	1559	G	W	2	N	X	X	X	X
CH-CCR-W305-12718	12/7/2018	1306	G	W	2	N	X	X	X	X
CH-CCR-W306-12718	12/7/2018	1228	G	W	2	N	X	X	X	X
CH-CCR-W307-12818	12/8/2018	1358	G	W	2	N	X	X	X	X
CH-CCR-W308-12818	12/8/2018	1242	G	W	2	N	X	X	X	X
CH-CCR-W309-12818	12/8/2018	1124	G	W	2	N	X	X	X	X
CH-CCR-M52A-12818	12/8/2018	1454	G	W	2	N	X	X	X	X
CH-CCR-M53A-12718	12/7/2018	1114	G	W	2	N	X	X	X	X
CH-CCR-FD02-12718	12/7/2018	1114	G	W	2	N	X	X	X	X
CH-CCR-M55A-12818	12/9/2018	1650	G	W	2	N	X	X	X	X

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Possible Hazard Identification:  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Special Instructions/QC Requirements & Comments:

2-8-C, 2-2-C, 1-8-C, 1-6-C

Custody Seals Intact:  Yes  No

Cooler Temp. (°C): Obs'd: \_\_\_\_\_

Corrd: \_\_\_\_\_

Therm ID No: \_\_\_\_\_

Relinquished by: *Dave Lavarney*

Company: *APS*

Date/Time: *12/12/18*

Received by: \_\_\_\_\_

Company: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_

Company: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Received by: \_\_\_\_\_

Company: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_

Company: \_\_\_\_\_

Date/Time: \_\_\_\_\_

Received in Laboratory: *PHHX*

Company: *PHHX*

Date/Time: *12/10/18*



TestAmerica Phoenix

4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114628

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.



Client Contact		Doug Lavarnway		928-587-0319		Analysis Turnaround Time		Doug Lavarnway		Lab Contact:		Carrier:		12/9/2018		COC No. 1 of 2 COCs	
4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone		TAT if different from Below		Walk-in Client:		Lab Sampling:		Job / SDG No.:		Sample Specific Notes:	
Project Name: CCR		Site: Cholla		P O #													
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	932.0 Radium 226 and 228									
CH-CCR-W301-12718	12/7/2018	1419	G	W	2	N	X										
CH-CCR-W302-12718	12/7/2018	1505	G	W	2	N	X										
CH-CCR-W304-12718	12/7/2018	1559	G	W	2	N	X										
CH-CCR-W305-12718	12/7/2018	1306	G	W	2	N	X										
CH-CCR-W306-12718	12/7/2018	1228	G	W	2	N	X										
CH-CCR-W307-12818	12/8/2018	1358	G	W	2	N	X										
CH-CCR-W308-12818	12/8/2018	1242	G	W	2	N	X										
CH-CCR-W309-12818	12/8/2018	1124	G	W	2	N	X										
CH-CCR-M52A-12818	12/8/2018	1454	G	W	2	N	X										
CH-CCR-M53A-12718	12/7/2018	1114	G	W	2	N	X										
CH-CCR-FD02-12718	12/7/2018	1114	G	W	2	N	X										
CH-CCR-M55A-12818	12/8/2018	1650	G	W	2	N	X										

Preservation Used: 1= Ice, 2= HCI, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other

Possible Hazard Identification:  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments: Radium shall be sent off to Radiation Safety Engineering for analysis.

Return to Client  Dispose by Lab  Archive for \_\_\_\_\_ Months

Cooler Temp (°C): Obs'd: \_\_\_\_\_ Corrd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_

Relinquished by: Barbara Calverney Company: ADS Date/Time: 12/6/18 Received by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Received in Laboratory: \_\_\_\_\_ Company: MAR Date/Time: 12-10-18



**TestAmerica Phoenix**

**Chain of Custody Record**

4625 E Cotton Center Blvd

Suite 189

Phoenix, AZ 85040

phone 602.437.3340 fax 602.454.9303

114628

Regulatory Program:

CCR

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING  
TestAmerica Laboratories, Inc.

1/14/2019

Client Contact		Doug Lavarway		928-587-0319		Doug Lavarway		12/9/2018		COC No: 2 of 2 COCs							
Analysis Turnaround Time		TAT if different from Below				Lab Contact:		Carrier:		Sampler:							
4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone		FAX		Project Name: CCR							
Site: Cholla		P O #								Job / SDG No.:							
Sample Identification		Sample Date	Sample Time	Sample Type (C=Comp, G=Grav)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	SM 2320B (HCO3)	Alkalinity	Carbonate as CaCO3	Bicarbonate as CaCO3	
CH-CCR-W314-12818 -13		12/8/2018	1527 G	W		2	N	X	X	X	X	X	X	X	X	X	
Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other																	
Possible Hazard Identification:		Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.															
<input checked="" type="checkbox"/> Non-hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Dispose by Lab <input type="checkbox"/> Archive for _____ Months		Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)													
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:				Cooler Temp. (°C): Obs'd:		Cor'd:		Therm ID No.:							
Relinquished by: Doug Lavarway		Company: APS		Date/Time: 12/11/18		Received by:		Company:		Date/Time:							
Relinquished by:		Company:		Date/Time:		Received in Laboratory by: TAPHX		Company: TAPHX		Date/Time: 12-10-18							

Handwritten note: READ 2-0-18, 2-2-18, 1-8-18, 1-6-18



Chain of Custody Record

TestAmerica Phoenix

4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114628  
Regulatory Program:

CCR

TestAmerica  
THE LEADER IN ENVIRONMENTAL TESTING  
TestAmerica Laboratories, Inc.  
1/14/2019

Client Contact		Doug Lavarnway		928-587-0319		Analysis Turnaround Time		Doug Lavarnway		Lab Contact:		Carrier:		12/9/2018		COC No: 2 of 2 COCs	
4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone FAX		TAT if different from Below		EPA 200.7 ( Li, Mg, SiO2)		EPA 200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)		EPA 300.0 (F)		Sample Specific Notes:	
Project Name: CCR		Site: Cholla		PO #		Sample Identification		Sample Date		Sample Time		Sample Type (C=Comp, G=Grab)		Matrix		# of Cont.	
CH-CCR-W314-12818		-17		12/8/2018		1527 G		W		2		N		X		X	
Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other		Possible Hazard Identification:		Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.		Special Instructions/QC Requirements & Comments:		Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)		Return to Client		Disposal by Lab		Archive for		Months	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obs'd:		Corrd:		Therm ID No.:		Received by:		Company:		Date/Time:		Received in Laboratory by:	
Relinquished by: <i>Dave Lavarnway</i>		Company: <i>APS</i>		Date/Time: <i>12/10/18</i>		Received by:		Company:		Date/Time:		Received in Laboratory by: <i>TAPHX</i>		Company: <i>APS</i>		Date/Time: <i>12-10-18</i>	
Relinquished by:		Company:		Date/Time:		Received in Laboratory by:		Company:		Date/Time:		Received in Laboratory by:		Company:		Date/Time:	





# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114628-1

SDG Number: Cholla

**Login Number: 114628**

**List Number: 1**

**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-114628-2

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

1/29/2019 9:05:59 AM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

Total Access

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D5	Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was non-detect in the sample.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Job ID: 550-114628-2**

**Laboratory: TestAmerica Phoenix**

## Narrative

### Job Narrative 550-114628-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 12/10/2018 11:16 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.6° C, 1.8° C, 2.0° C and 2.2° C.

#### Receipt Exceptions

Several of the sample sites were missing from the pick list.

CH-CCR-W301-12718 (550-114628-1), CH-CCR-W301-12718 (550-114628-1[DU]), CH-CCR-W301-12718 (550-114628-1[MS]), CH-CCR-W301-12718 (550-114628-1[MSD]), CH-CCR-W302-12718 (550-114628-2), CH-CCR-W304-12718 (550-114628-3), CH-CCR-W305-12718 (550-114628-4), CH-CCR-W306-12718 (550-114628-5), CH-CCR-W307-12818 (550-114628-6), CH-CCR-W308-12818 (550-114628-7), CH-CCR-W309-12818 (550-114628-8), CH-CCR-M52A-12818 (550-114628-9), CH-CCR-M53A-12718 (550-114628-10), CH-CCR-FD02-12718 (550-114628-11), CH-CCR-M55A-12818 (550-114628-12) and CH-CCR-W314-12818 (550-114628-13)

#### HPLC/IC

Method(s) 300.0: The following samples were diluted for Fluoride my method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W301-12718 (550-114628-1), CH-CCR-W305-12718 (550-114628-4) and CH-CCR-M55A-12818 (550-114628-12). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

Method(s) 300.0: The following samples were diluted for Fluoride my method EPA 300.0 due to the nature of the sample matrix: CH-CCR-W304-12718 (550-114628-3), CH-CCR-W307-12818 (550-114628-6) and CH-CCR-W308-12818 (550-114628-7). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method(s) 200.8 LL: The following samples were diluted due to the nature of the sample matrix: CH-CCR-W301-12718 (550-114628-1), CH-CCR-W302-12718 (550-114628-2), CH-CCR-W304-12718 (550-114628-3), CH-CCR-W305-12718 (550-114628-4), CH-CCR-W306-12718 (550-114628-5), CH-CCR-W307-12818 (550-114628-6), CH-CCR-W308-12818 (550-114628-7), CH-CCR-W309-12818 (550-114628-8), CH-CCR-M52A-12818 (550-114628-9), CH-CCR-M53A-12718 (550-114628-10), CH-CCR-FD02-12718 (550-114628-11), CH-CCR-M55A-12818 (550-114628-12) and CH-CCR-W314-12818 (550-114628-13). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-114628-1	CH-CCR-W301-12718	Water	12/07/18 14:19	12/10/18 11:16
550-114628-2	CH-CCR-W302-12718	Water	12/07/18 15:05	12/10/18 11:16
550-114628-3	CH-CCR-W304-12718	Water	12/07/18 15:59	12/10/18 11:16
550-114628-4	CH-CCR-W305-12718	Water	12/07/18 13:06	12/10/18 11:16
550-114628-5	CH-CCR-W306-12718	Water	12/07/18 12:28	12/10/18 11:16
550-114628-6	CH-CCR-W307-12818	Water	12/08/18 13:58	12/10/18 11:16
550-114628-7	CH-CCR-W308-12818	Water	12/08/18 12:42	12/10/18 11:16
550-114628-8	CH-CCR-W309-12818	Water	12/08/18 11:25	12/10/18 11:16
550-114628-9	CH-CCR-M52A-12818	Water	12/08/18 14:54	12/10/18 11:16
550-114628-10	CH-CCR-M53A-12718	Water	12/07/18 11:14	12/10/18 11:16
550-114628-11	CH-CCR-FD02-12718	Water	12/07/18 11:14	12/10/18 11:16
550-114628-12	CH-CCR-M55A-12818	Water	12/08/18 16:50	12/10/18 11:16
550-114628-13	CH-CCR-W314-12818	Water	12/08/18 15:27	12/10/18 11:16



# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Client Sample ID: CH-CCR-W301-12718

## Lab Sample ID: 550-114628-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.43		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	170		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	14		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.013		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.017		0.0020	mg/L	10		200.8 LL	Total Recoverable
Lead	0.0012		0.0010	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.080		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-W302-12718

## Lab Sample ID: 550-114628-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.98	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.32		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	120		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	12		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.014		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.0049		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.068		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-W304-12718

## Lab Sample ID: 550-114628-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.40		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	100		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	9.6		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.0083		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.0034		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.026		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-W305-12718

## Lab Sample ID: 550-114628-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.21		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	110		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	11		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.012		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.018		0.0020	mg/L	10		200.8 LL	Total Recoverable
Lead	0.0030		0.0010	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.021		0.0020	mg/L	10		200.8 LL	Total Recoverable

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Client Sample ID: CH-CCR-W306-12718

## Lab Sample ID: 550-114628-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.4	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.73		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	230		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	12		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0041		0.0020	mg/L	10		200.8 LL	Total Recoverable
Barium	0.010		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.028		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-W307-12818

## Lab Sample ID: 550-114628-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.24		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	150		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	13		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.012		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.076		0.0020	mg/L	10		200.8 LL	Total Recoverable
Lead	0.0020		0.0010	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.0044		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-W308-12818

## Lab Sample ID: 550-114628-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.37		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	120		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	12		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0023		0.0020	mg/L	10		200.8 LL	Total Recoverable
Barium	0.0082		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.0033		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.032		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-W309-12818

## Lab Sample ID: 550-114628-8

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Magnesium	34		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	22		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0044		0.0020	mg/L	10		200.8 LL	Total Recoverable
Barium	0.011		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.024		0.0020	mg/L	10		200.8 LL	Total Recoverable

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Client Sample ID: CH-CCR-M52A-12818

## Lab Sample ID: 550-114628-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.29		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	300		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	14		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0022		0.0020	mg/L	10		200.8 LL	Total Recoverable
Barium	0.019		0.0020	mg/L	10		200.8 LL	Total Recoverable
Chromium	0.043		0.0050	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.036		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.031		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-M53A-12718

## Lab Sample ID: 550-114628-10

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	2.3	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.20		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	220		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	9.4		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.0085		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cadmium	0.0014		0.0010	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.014		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.042		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-FD02-12718

## Lab Sample ID: 550-114628-11

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	2.3	D1	0.80	mg/L	2		300.0	Total/NA
Magnesium	210		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	8.9		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.0087		0.0020	mg/L	10		200.8 LL	Total Recoverable
Cadmium	0.0012		0.0010	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.013		0.0020	mg/L	10		200.8 LL	Total Recoverable
Lead	0.0014		0.0010	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.039		0.0020	mg/L	10		200.8 LL	Total Recoverable

## Client Sample ID: CH-CCR-M55A-12818

## Lab Sample ID: 550-114628-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.39		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	160		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	12		0.21	mg/L	1		200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

## Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

### Client Sample ID: CH-CCR-M55A-12818 (Continued)

### Lab Sample ID: 550-114628-12

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.014		0.0020	mg/L	10		200.8 LL	Total Recoverable
Chromium	0.17		0.0050	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.020		0.0020	mg/L	10		200.8 LL	Total Recoverable
Selenium	0.083		0.0060	mg/L	10		200.8 LL	Total Recoverable

### Client Sample ID: CH-CCR-W314-12818

### Lab Sample ID: 550-114628-13

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.89	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.32		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	160		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO <sub>2</sub> , Silica	8.9		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Barium	0.013		0.0020	mg/L	10		200.8 LL	Total Recoverable
Chromium	0.014		0.0050	mg/L	10		200.8 LL	Total Recoverable
Cobalt	0.014		0.0020	mg/L	10		200.8 LL	Total Recoverable
Molybdenum	0.0087		0.0020	mg/L	10		200.8 LL	Total Recoverable

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W301-12718**

**Lab Sample ID: 550-114628-1**

Date Collected: 12/07/18 14:19

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/10/18 23:07	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.43		0.20	mg/L		12/11/18 07:22	12/12/18 15:38	1
Magnesium	170		2.0	mg/L		12/11/18 07:22	12/12/18 15:38	1
SiO2, Silica	14		0.21	mg/L		12/11/18 07:22	12/12/18 15:38	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 17:44	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 17:44	10
Barium	0.013		0.0020	mg/L		01/18/19 09:43	01/20/19 17:44	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:44	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 17:44	10
Cobalt	0.017		0.0020	mg/L		01/18/19 09:43	01/20/19 17:44	10
Lead	0.0012		0.0010	mg/L		01/18/19 09:43	01/20/19 17:44	10
Molybdenum	0.080		0.0020	mg/L		01/18/19 09:43	01/20/19 17:44	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 17:44	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:44	10

**Client Sample ID: CH-CCR-W302-12718**

**Lab Sample ID: 550-114628-2**

Date Collected: 12/07/18 15:05

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.98	D1	0.80	mg/L			12/14/18 00:13	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.32		0.20	mg/L		12/11/18 07:22	12/12/18 16:02	1
Magnesium	120		2.0	mg/L		12/11/18 07:22	12/12/18 16:02	1
SiO2, Silica	12		0.21	mg/L		12/11/18 07:22	12/12/18 16:02	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 17:50	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 17:50	10
Barium	0.014		0.0020	mg/L		01/18/19 09:43	01/20/19 17:50	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:50	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 17:50	10
Cobalt	0.0049		0.0020	mg/L		01/18/19 09:43	01/20/19 17:50	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:50	10
Molybdenum	0.068		0.0020	mg/L		01/18/19 09:43	01/20/19 17:50	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 17:50	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:50	10

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W304-12718**

**Lab Sample ID: 550-114628-3**

Date Collected: 12/07/18 15:59

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/14/18 00:32	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.40		0.20	mg/L		12/11/18 07:22	12/12/18 16:08	1
Magnesium	100		2.0	mg/L		12/11/18 07:22	12/12/18 16:08	1
SiO2, Silica	9.6		0.21	mg/L		12/11/18 07:22	12/12/18 16:08	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 17:52	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 17:52	10
Barium	0.0083		0.0020	mg/L		01/18/19 09:43	01/20/19 17:52	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:52	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 17:52	10
Cobalt	0.0034		0.0020	mg/L		01/18/19 09:43	01/20/19 17:52	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:52	10
Molybdenum	0.026		0.0020	mg/L		01/18/19 09:43	01/20/19 17:52	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 17:52	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 17:52	10

**Client Sample ID: CH-CCR-W305-12718**

**Lab Sample ID: 550-114628-4**

Date Collected: 12/07/18 13:06

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/10/18 22:30	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.21		0.20	mg/L		12/11/18 07:22	12/12/18 16:14	1
Magnesium	110		2.0	mg/L		12/11/18 07:22	12/12/18 16:14	1
SiO2, Silica	11		0.21	mg/L		12/11/18 07:22	12/12/18 16:14	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:21	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:21	10
Barium	0.012		0.0020	mg/L		01/18/19 09:43	01/20/19 18:21	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:21	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:21	10
Cobalt	0.018		0.0020	mg/L		01/18/19 09:43	01/20/19 18:21	10
Lead	0.0030		0.0010	mg/L		01/18/19 09:43	01/20/19 18:21	10
Molybdenum	0.021		0.0020	mg/L		01/18/19 09:43	01/20/19 18:21	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:21	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:21	10

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W306-12718**

**Lab Sample ID: 550-114628-5**

Date Collected: 12/07/18 12:28

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.4	D1	0.80	mg/L			12/10/18 21:54	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.73		0.20	mg/L		12/11/18 07:22	12/12/18 16:20	1
Magnesium	230		2.0	mg/L		12/11/18 07:22	12/12/18 16:20	1
SiO2, Silica	12		0.21	mg/L		12/11/18 07:22	12/12/18 16:20	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:23	10
Arsenic	0.0041		0.0020	mg/L		01/18/19 09:43	01/20/19 18:23	10
Barium	0.010		0.0020	mg/L		01/18/19 09:43	01/20/19 18:23	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:23	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:23	10
Cobalt	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:23	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:23	10
Molybdenum	0.028		0.0020	mg/L		01/18/19 09:43	01/20/19 18:23	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:23	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:23	10

**Client Sample ID: CH-CCR-W307-12818**

**Lab Sample ID: 550-114628-6**

Date Collected: 12/08/18 13:58

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/14/18 01:08	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.24		0.20	mg/L		12/11/18 07:22	12/12/18 16:25	1
Magnesium	150		2.0	mg/L		12/11/18 07:22	12/12/18 16:25	1
SiO2, Silica	13		0.21	mg/L		12/11/18 07:22	12/12/18 16:25	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:25	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:25	10
Barium	0.012		0.0020	mg/L		01/18/19 09:43	01/20/19 18:25	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:25	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:25	10
Cobalt	0.076		0.0020	mg/L		01/18/19 09:43	01/20/19 18:25	10
Lead	0.0020		0.0010	mg/L		01/18/19 09:43	01/20/19 18:25	10
Molybdenum	0.0044		0.0020	mg/L		01/18/19 09:43	01/20/19 18:25	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:25	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:25	10

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W308-12818**

**Lab Sample ID: 550-114628-7**

Date Collected: 12/08/18 12:42

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/14/18 01:27	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.37		0.20	mg/L		12/11/18 07:22	12/12/18 16:31	1
Magnesium	120		2.0	mg/L		12/11/18 07:22	12/12/18 16:31	1
SiO2, Silica	12		0.21	mg/L		12/11/18 07:22	12/12/18 16:31	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:27	10
Arsenic	0.0023		0.0020	mg/L		01/18/19 09:43	01/20/19 18:27	10
Barium	0.0082		0.0020	mg/L		01/18/19 09:43	01/20/19 18:27	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:27	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:27	10
Cobalt	0.0033		0.0020	mg/L		01/18/19 09:43	01/20/19 18:27	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:27	10
Molybdenum	0.032		0.0020	mg/L		01/18/19 09:43	01/20/19 18:27	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:27	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:27	10

**Client Sample ID: CH-CCR-W309-12818**

**Lab Sample ID: 550-114628-8**

Date Collected: 12/08/18 11:25

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.0	D1	0.80	mg/L			12/10/18 21:17	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		12/11/18 07:22	12/12/18 16:37	1
Magnesium	34		2.0	mg/L		12/11/18 07:22	12/12/18 16:37	1
SiO2, Silica	22		0.21	mg/L		12/11/18 07:22	12/12/18 16:37	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:29	10
Arsenic	0.0044		0.0020	mg/L		01/18/19 09:43	01/20/19 18:29	10
Barium	0.011		0.0020	mg/L		01/18/19 09:43	01/20/19 18:29	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:29	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:29	10
Cobalt	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:29	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:29	10
Molybdenum	0.024		0.0020	mg/L		01/18/19 09:43	01/20/19 18:29	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:29	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:29	10

TestAmerica Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-M52A-12818**

**Lab Sample ID: 550-114628-9**

Date Collected: 12/08/18 14:54

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.0	D1	0.80	mg/L			12/10/18 20:03	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.29		0.20	mg/L		12/11/18 07:22	12/12/18 16:49	1
Magnesium	300		2.0	mg/L		12/11/18 07:22	12/12/18 16:49	1
SiO2, Silica	14		0.21	mg/L		12/11/18 07:22	12/12/18 16:49	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:31	10
Arsenic	0.0022		0.0020	mg/L		01/18/19 09:43	01/20/19 18:31	10
Barium	0.019		0.0020	mg/L		01/18/19 09:43	01/20/19 18:31	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:31	10
Chromium	0.043		0.0050	mg/L		01/18/19 09:43	01/20/19 18:31	10
Cobalt	0.036		0.0020	mg/L		01/18/19 09:43	01/20/19 18:31	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:31	10
Molybdenum	0.031		0.0020	mg/L		01/18/19 09:43	01/20/19 18:31	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:31	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:31	10

**Client Sample ID: CH-CCR-M53A-12718**

**Lab Sample ID: 550-114628-10**

Date Collected: 12/07/18 11:14

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.3	D1	0.80	mg/L			12/10/18 19:26	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.20		0.20	mg/L		12/11/18 07:22	12/12/18 16:55	1
Magnesium	220		2.0	mg/L		12/11/18 07:22	12/12/18 16:55	1
SiO2, Silica	9.4		0.21	mg/L		12/11/18 07:22	12/12/18 16:55	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:33	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:33	10
Barium	0.0085		0.0020	mg/L		01/18/19 09:43	01/20/19 18:33	10
Cadmium	0.0014		0.0010	mg/L		01/18/19 09:43	01/20/19 18:33	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:33	10
Cobalt	0.014		0.0020	mg/L		01/18/19 09:43	01/20/19 18:33	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:33	10
Molybdenum	0.042		0.0020	mg/L		01/18/19 09:43	01/20/19 18:33	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:33	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:33	10

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-FD02-12718**

**Lab Sample ID: 550-114628-11**

Date Collected: 12/07/18 11:14

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.3	D1	0.80	mg/L			12/14/18 01:45	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		12/11/18 07:22	12/12/18 17:01	1
Magnesium	210		2.0	mg/L		12/11/18 07:22	12/12/18 17:01	1
SiO2, Silica	8.9		0.21	mg/L		12/11/18 07:22	12/12/18 17:01	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:46	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:46	10
Barium	0.0087		0.0020	mg/L		01/18/19 09:43	01/20/19 18:46	10
Cadmium	0.0012		0.0010	mg/L		01/18/19 09:43	01/20/19 18:46	10
Chromium	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:46	10
Cobalt	0.013		0.0020	mg/L		01/18/19 09:43	01/20/19 18:46	10
Lead	0.0014		0.0010	mg/L		01/18/19 09:43	01/20/19 18:46	10
Molybdenum	0.039		0.0020	mg/L		01/18/19 09:43	01/20/19 18:46	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:46	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:46	10

**Client Sample ID: CH-CCR-M55A-12818**

**Lab Sample ID: 550-114628-12**

Date Collected: 12/08/18 16:50

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/10/18 18:50	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.39		0.20	mg/L		12/11/18 07:22	12/12/18 17:07	1
Magnesium	160		2.0	mg/L		12/11/18 07:22	12/12/18 17:07	1
SiO2, Silica	12		0.21	mg/L		12/11/18 07:22	12/12/18 17:07	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:48	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:48	10
Barium	0.014		0.0020	mg/L		01/18/19 09:43	01/20/19 18:48	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:48	10
Chromium	0.17		0.0050	mg/L		01/18/19 09:43	01/20/19 18:48	10
Cobalt	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:48	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:48	10
Molybdenum	0.020		0.0020	mg/L		01/18/19 09:43	01/20/19 18:48	10
Selenium	0.083		0.0060	mg/L		01/18/19 09:43	01/20/19 18:48	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:48	10

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W314-12818**

**Lab Sample ID: 550-114628-13**

Date Collected: 12/08/18 15:27

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.89	D1	0.80	mg/L			12/10/18 18:13	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.32		0.20	mg/L		12/11/18 07:22	12/12/18 17:13	1
Magnesium	160		2.0	mg/L		12/11/18 07:22	12/12/18 17:13	1
SiO <sub>2</sub> , Silica	8.9		0.21	mg/L		12/11/18 07:22	12/12/18 17:13	1

**Method: 200.8 LL - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0050	mg/L		01/18/19 09:43	01/20/19 18:50	10
Arsenic	ND		0.0020	mg/L		01/18/19 09:43	01/20/19 18:50	10
Barium	0.013		0.0020	mg/L		01/18/19 09:43	01/20/19 18:50	10
Cadmium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:50	10
Chromium	0.014		0.0050	mg/L		01/18/19 09:43	01/20/19 18:50	10
Cobalt	0.014		0.0020	mg/L		01/18/19 09:43	01/20/19 18:50	10
Lead	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:50	10
Molybdenum	0.0087		0.0020	mg/L		01/18/19 09:43	01/20/19 18:50	10
Selenium	ND		0.0060	mg/L		01/18/19 09:43	01/20/19 18:50	10
Thallium	ND		0.0010	mg/L		01/18/19 09:43	01/20/19 18:50	10

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: 550-114628-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND	D1 D5	8.00	8.64	D1	mg/L		101	80 - 120

**Lab Sample ID: 550-114628-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND	D1 D5	8.00	8.69	D1	mg/L		101	80 - 120	1	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-164126/1-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		12/11/18 07:22	12/12/18 15:18	1
Magnesium	ND		2.0	mg/L		12/11/18 07:22	12/12/18 15:18	1
SiO2, Silica	ND		0.21	mg/L		12/11/18 07:22	12/12/18 15:18	1

**Lab Sample ID: LCS 550-164126/2-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	1.00	1.02		mg/L		102	85 - 115
Magnesium	21.0	21.1		mg/L		100	85 - 115
SiO2, Silica	10.7	9.78		mg/L		91	85 - 115

**Lab Sample ID: LCSD 550-164126/3-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lithium	1.00	1.00		mg/L		100	85 - 115	1	20
Magnesium	21.0	20.9		mg/L		99	85 - 115	1	20
SiO2, Silica	10.7	9.63		mg/L		90	85 - 115	2	20

**Lab Sample ID: 550-114628-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.433		1.00	1.42		mg/L		99	70 - 130
Magnesium	174		21.0	185	M3	mg/L		56	70 - 130
SiO2, Silica	13.6		10.7	23.5		mg/L		92	70 - 130

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-114628-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Lithium	0.433		1.00	1.41		mg/L		98	70 - 130	1	20
Magnesium	174		21.0	183	M3	mg/L		47	70 - 130	1	20
SiO2, Silica	13.6		10.7	23.8		mg/L		94	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 440-523365/1-A**  
**Matrix: Water**  
**Analysis Batch: 523766**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 523365**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.00050	mg/L		01/18/19 09:43	01/20/19 17:38	1
Arsenic	ND		0.00020	mg/L		01/18/19 09:43	01/20/19 17:38	1
Barium	ND		0.00020	mg/L		01/18/19 09:43	01/20/19 17:38	1
Cadmium	ND		0.00010	mg/L		01/18/19 09:43	01/20/19 17:38	1
Chromium	ND		0.00050	mg/L		01/18/19 09:43	01/20/19 17:38	1
Cobalt	ND		0.00020	mg/L		01/18/19 09:43	01/20/19 17:38	1
Lead	ND		0.00010	mg/L		01/18/19 09:43	01/20/19 17:38	1
Molybdenum	ND		0.00020	mg/L		01/18/19 09:43	01/20/19 17:38	1
Selenium	ND		0.00060	mg/L		01/18/19 09:43	01/20/19 17:38	1
Thallium	ND		0.00010	mg/L		01/18/19 09:43	01/20/19 17:38	1

**Lab Sample ID: LCS 440-523365/2-A**  
**Matrix: Water**  
**Analysis Batch: 523766**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 523365**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	0.0800	0.0834		mg/L		104	85 - 115
Arsenic	0.0800	0.0782		mg/L		98	85 - 115
Barium	0.0800	0.0777		mg/L		97	85 - 115
Cadmium	0.0800	0.0792		mg/L		99	85 - 115
Chromium	0.0800	0.0774		mg/L		97	85 - 115
Cobalt	0.0800	0.0778		mg/L		97	85 - 115
Lead	0.0800	0.0780		mg/L		97	85 - 115
Molybdenum	0.0800	0.0791		mg/L		99	85 - 115
Selenium	0.0800	0.0772		mg/L		97	85 - 115
Thallium	0.0800	0.0772		mg/L		97	85 - 115

**Lab Sample ID: LCSD 440-523365/3-A**  
**Matrix: Water**  
**Analysis Batch: 523766**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total Recoverable**  
**Prep Batch: 523365**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Antimony	0.0800	0.0884		mg/L		111	85 - 115	6	20
Arsenic	0.0800	0.0792		mg/L		99	85 - 115	1	20
Barium	0.0800	0.0793		mg/L		99	85 - 115	2	20
Cadmium	0.0800	0.0803		mg/L		100	85 - 115	1	20
Chromium	0.0800	0.0798		mg/L		100	85 - 115	3	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCSD 440-523365/3-A**  
**Matrix: Water**  
**Analysis Batch: 523766**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total Recoverable**  
**Prep Batch: 523365**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cobalt	0.0800	0.0796		mg/L		99	85 - 115	2	20
Lead	0.0800	0.0795		mg/L		99	85 - 115	2	20
Molybdenum	0.0800	0.0796		mg/L		99	85 - 115	1	20
Selenium	0.0800	0.0797		mg/L		100	85 - 115	3	20
Thallium	0.0800	0.0790		mg/L		99	85 - 115	2	20

**Lab Sample ID: 550-114628-1 MS**  
**Matrix: Water**  
**Analysis Batch: 523766**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total Recoverable**  
**Prep Batch: 523365**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	ND		0.0800	0.0887		mg/L		111	70 - 130		
Arsenic	ND		0.0800	0.0791		mg/L		97	70 - 130		
Barium	0.013		0.0800	0.0871		mg/L		93	70 - 130		
Cadmium	ND		0.0800	0.0770		mg/L		96	70 - 130		
Chromium	ND		0.0800	0.0754		mg/L		94	70 - 130		
Cobalt	0.017		0.0800	0.0911		mg/L		93	70 - 130		
Lead	0.0012		0.0800	0.0753		mg/L		93	70 - 130		
Molybdenum	0.080		0.0800	0.160		mg/L		99	70 - 130		
Selenium	ND		0.0800	0.0739		mg/L		92	70 - 130		
Thallium	ND		0.0800	0.0742		mg/L		93	70 - 130		

**Lab Sample ID: 550-114628-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 523766**

**Client Sample ID: CH-CCR-W301-12718**  
**Prep Type: Total Recoverable**  
**Prep Batch: 523365**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	ND		0.0800	0.0882		mg/L		110	70 - 130	1	20
Arsenic	ND		0.0800	0.0771		mg/L		95	70 - 130	3	20
Barium	0.013		0.0800	0.0839		mg/L		88	70 - 130	4	20
Cadmium	ND		0.0800	0.0751		mg/L		94	70 - 130	2	20
Chromium	ND		0.0800	0.0744		mg/L		93	70 - 130	1	20
Cobalt	0.017		0.0800	0.0887		mg/L		90	70 - 130	3	20
Lead	0.0012		0.0800	0.0733		mg/L		90	70 - 130	3	20
Molybdenum	0.080		0.0800	0.154		mg/L		92	70 - 130	4	20
Selenium	ND		0.0800	0.0728		mg/L		91	70 - 130	1	20
Thallium	ND		0.0800	0.0717		mg/L		90	70 - 130	3	20

**Lab Sample ID: 550-114628-10 MS**  
**Matrix: Water**  
**Analysis Batch: 523766**

**Client Sample ID: CH-CCR-M53A-12718**  
**Prep Type: Total Recoverable**  
**Prep Batch: 523365**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	ND		0.0800	0.0921		mg/L		115	70 - 130		
Arsenic	ND		0.0800	0.0812		mg/L		100	70 - 130		
Barium	0.0085		0.0800	0.0902		mg/L		102	70 - 130		
Cadmium	0.0014		0.0800	0.0797		mg/L		98	70 - 130		
Chromium	ND		0.0800	0.0776		mg/L		97	70 - 130		
Cobalt	0.014		0.0800	0.0904		mg/L		96	70 - 130		

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

Lab Sample ID: 550-114628-10 MS

Matrix: Water

Analysis Batch: 523766

Client Sample ID: CH-CCR-M53A-12718

Prep Type: Total Recoverable

Prep Batch: 523365

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.	
	Result	Qualifier		Result	Qualifier				Limits	RPD
Lead	ND		0.0800	0.0775		mg/L		96	70 - 130	
Molybdenum	0.042		0.0800	0.122		mg/L		99	70 - 130	
Selenium	ND		0.0800	0.0783		mg/L		98	70 - 130	
Thallium	ND		0.0800	0.0757		mg/L		95	70 - 130	

Lab Sample ID: 550-114628-10 MSD

Matrix: Water

Analysis Batch: 523766

Client Sample ID: CH-CCR-M53A-12718

Prep Type: Total Recoverable

Prep Batch: 523365

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.		RPD	Limit
	Result	Qualifier		Result	Qualifier				Limits	RPD	Limit	
Antimony	ND		0.0800	0.0912		mg/L		114	70 - 130	1	20	
Arsenic	ND		0.0800	0.0821		mg/L		101	70 - 130	1	20	
Barium	0.0085		0.0800	0.0911		mg/L		103	70 - 130	1	20	
Cadmium	0.0014		0.0800	0.0797		mg/L		98	70 - 130	0	20	
Chromium	ND		0.0800	0.0780		mg/L		98	70 - 130	1	20	
Cobalt	0.014		0.0800	0.0913		mg/L		97	70 - 130	1	20	
Lead	ND		0.0800	0.0778		mg/L		96	70 - 130	0	20	
Molybdenum	0.042		0.0800	0.123		mg/L		101	70 - 130	1	20	
Selenium	ND		0.0800	0.0777		mg/L		97	70 - 130	1	20	
Thallium	ND		0.0800	0.0757		mg/L		95	70 - 130	0	20	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## HPLC/IC

### Analysis Batch: 164154

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	300.0	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	300.0	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	300.0	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	300.0	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	300.0	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	300.0	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	300.0	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	300.0	
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	300.0	
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	300.0	

### Analysis Batch: 164511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	300.0	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	300.0	
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	300.0	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	300.0	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	300.0	

## Metals

### Prep Batch: 164126

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	200.7	
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	200.7	
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	200.7	
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	200.7	
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	200.7	
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	200.7	
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	200.7	
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	200.7	
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	200.7	
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	200.7	
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	200.7	
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	200.7	
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	200.7	
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	200.7	
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	200.7	

### Analysis Batch: 164399

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-2	CH-CCR-W302-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-3	CH-CCR-W304-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-4	CH-CCR-W305-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-5	CH-CCR-W306-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-6	CH-CCR-W307-12818	Total/NA	Water	200.7 Rev 4.4	164126

TestAmerica Phoenix



# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Metals (Continued)

### Analysis Batch: 164399 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-7	CH-CCR-W308-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-8	CH-CCR-W309-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-9	CH-CCR-M52A-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-10	CH-CCR-M53A-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-11	CH-CCR-FD02-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-12	CH-CCR-M55A-12818	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-13	CH-CCR-W314-12818	Total/NA	Water	200.7 Rev 4.4	164126
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164126
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164126
LCS 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-1 MS	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126
550-114628-1 MSD	CH-CCR-W301-12718	Total/NA	Water	200.7 Rev 4.4	164126

### Prep Batch: 523365

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total Recoverable	Water	200.2	
550-114628-2	CH-CCR-W302-12718	Total Recoverable	Water	200.2	
550-114628-3	CH-CCR-W304-12718	Total Recoverable	Water	200.2	
550-114628-4	CH-CCR-W305-12718	Total Recoverable	Water	200.2	
550-114628-5	CH-CCR-W306-12718	Total Recoverable	Water	200.2	
550-114628-6	CH-CCR-W307-12818	Total Recoverable	Water	200.2	
550-114628-7	CH-CCR-W308-12818	Total Recoverable	Water	200.2	
550-114628-8	CH-CCR-W309-12818	Total Recoverable	Water	200.2	
550-114628-9	CH-CCR-M52A-12818	Total Recoverable	Water	200.2	
550-114628-10	CH-CCR-M53A-12718	Total Recoverable	Water	200.2	
550-114628-11	CH-CCR-FD02-12718	Total Recoverable	Water	200.2	
550-114628-12	CH-CCR-M55A-12818	Total Recoverable	Water	200.2	
550-114628-13	CH-CCR-W314-12818	Total Recoverable	Water	200.2	
MB 440-523365/1-A	Method Blank	Total Recoverable	Water	200.2	
LCS 440-523365/2-A	Lab Control Sample	Total Recoverable	Water	200.2	
LCS 440-523365/3-A	Lab Control Sample Dup	Total Recoverable	Water	200.2	
550-114628-1 MS	CH-CCR-W301-12718	Total Recoverable	Water	200.2	
550-114628-1 MSD	CH-CCR-W301-12718	Total Recoverable	Water	200.2	
550-114628-10 MS	CH-CCR-M53A-12718	Total Recoverable	Water	200.2	
550-114628-10 MSD	CH-CCR-M53A-12718	Total Recoverable	Water	200.2	

### Analysis Batch: 523766

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114628-1	CH-CCR-W301-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-2	CH-CCR-W302-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-3	CH-CCR-W304-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-4	CH-CCR-W305-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-5	CH-CCR-W306-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-6	CH-CCR-W307-12818	Total Recoverable	Water	200.8 LL	523365
550-114628-7	CH-CCR-W308-12818	Total Recoverable	Water	200.8 LL	523365
550-114628-8	CH-CCR-W309-12818	Total Recoverable	Water	200.8 LL	523365
550-114628-9	CH-CCR-M52A-12818	Total Recoverable	Water	200.8 LL	523365
550-114628-10	CH-CCR-M53A-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-11	CH-CCR-FD02-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-12	CH-CCR-M55A-12818	Total Recoverable	Water	200.8 LL	523365
550-114628-13	CH-CCR-W314-12818	Total Recoverable	Water	200.8 LL	523365

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Metals (Continued)

### Analysis Batch: 523766 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 440-523365/1-A	Method Blank	Total Recoverable	Water	200.8 LL	523365
LCS 440-523365/2-A	Lab Control Sample	Total Recoverable	Water	200.8 LL	523365
LCSD 440-523365/3-A	Lab Control Sample Dup	Total Recoverable	Water	200.8 LL	523365
550-114628-1 MS	CH-CCR-W301-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-1 MSD	CH-CCR-W301-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-10 MS	CH-CCR-M53A-12718	Total Recoverable	Water	200.8 LL	523365
550-114628-10 MSD	CH-CCR-M53A-12718	Total Recoverable	Water	200.8 LL	523365



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W301-12718**

**Lab Sample ID: 550-114628-1**

**Date Collected: 12/07/18 14:19**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 23:07	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 15:38	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 17:44	MQP	TAL IRV

**Client Sample ID: CH-CCR-W302-12718**

**Lab Sample ID: 550-114628-2**

**Date Collected: 12/07/18 15:05**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/14/18 00:13	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:02	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 17:50	MQP	TAL IRV

**Client Sample ID: CH-CCR-W304-12718**

**Lab Sample ID: 550-114628-3**

**Date Collected: 12/07/18 15:59**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/14/18 00:32	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:08	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 17:52	MQP	TAL IRV

**Client Sample ID: CH-CCR-W305-12718**

**Lab Sample ID: 550-114628-4**

**Date Collected: 12/07/18 13:06**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 22:30	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:14	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:21	MQP	TAL IRV

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W306-12718**

**Lab Sample ID: 550-114628-5**

**Date Collected: 12/07/18 12:28**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 21:54	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:20	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:23	MQP	TAL IRV

**Client Sample ID: CH-CCR-W307-12818**

**Lab Sample ID: 550-114628-6**

**Date Collected: 12/08/18 13:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/14/18 01:08	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:25	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:25	MQP	TAL IRV

**Client Sample ID: CH-CCR-W308-12818**

**Lab Sample ID: 550-114628-7**

**Date Collected: 12/08/18 12:42**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/14/18 01:27	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:31	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:27	MQP	TAL IRV

**Client Sample ID: CH-CCR-W309-12818**

**Lab Sample ID: 550-114628-8**

**Date Collected: 12/08/18 11:25**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 21:17	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:37	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:29	MQP	TAL IRV

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-M52A-12818**

**Lab Sample ID: 550-114628-9**

**Date Collected: 12/08/18 14:54**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 20:03	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:49	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:31	MQP	TAL IRV

**Client Sample ID: CH-CCR-M53A-12718**

**Lab Sample ID: 550-114628-10**

**Date Collected: 12/07/18 11:14**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 19:26	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 16:55	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:33	MQP	TAL IRV

**Client Sample ID: CH-CCR-FD02-12718**

**Lab Sample ID: 550-114628-11**

**Date Collected: 12/07/18 11:14**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/14/18 01:45	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:01	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:46	MQP	TAL IRV

**Client Sample ID: CH-CCR-M55A-12818**

**Lab Sample ID: 550-114628-12**

**Date Collected: 12/08/18 16:50**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 18:50	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:07	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:48	MQP	TAL IRV

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W314-12818**

**Lab Sample ID: 550-114628-13**

**Date Collected: 12/08/18 15:27**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 18:13	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:13	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		10	523766	01/20/19 18:50	MQP	TAL IRV

## Laboratory References:

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

## Laboratory: TestAmerica Irvine

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0671	10-14-19

- 1
- 2
- 3
- 4
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- 9
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- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-2  
SDG: Cholla

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL IRV
200.2	Preparation, Total Recoverable Metals	EPA	TAL IRV
200.7	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



**TestAmerica Phoenix**

4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

**Chain of Custody Record**

Regulatory Program:

CCR

114628



TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarway, 928-587-0319, Analysis Turnaround Time

Lab Contact: Doug Lavarway, 12/9/2018

Carrier: 12/9/2018

COC No: 1 of 2 COCs

Sampler: \_\_\_\_\_

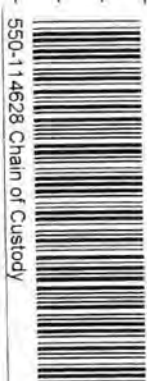
For Lab Use Only: Walk-In Client: \_\_\_\_\_

Lab Sampling: \_\_\_\_\_

Job / SDG No.: \_\_\_\_\_

Sample Specific Notes: \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )		Perform MS / MSD ( Y / N )		EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)		EPA 300.0 (Cl, F, SO4)		SM 2540C (TDS)		SM 4500-HB (pH)		SM 2320B (HCO3)		Alkalinity		Carbonate as CaCO3		Bicarbonate as CaCO3			
						Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
CH-CCR-W301-12718	12/7/2018	1419	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W302-12718	12/7/2018	1505	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W304-12718	12/7/2018	1559	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W305-12718	12/7/2018	1306	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W306-12718	12/7/2018	1228	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W307-12818	12/8/2018	1356	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W308-12818	12/8/2018	1242	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W309-12818	12/8/2018	1124	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-M52A-12818	12/8/2018	1454	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-M53A-12718	12/7/2018	1114	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-FD02-12718	12/7/2018	1114	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-M55A-12818	12/8/2018	1650	G	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X



Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Dispose by Lab  Archive for \_\_\_\_\_ Months

2.0°C, 2-2°C, 1.8-2°C, 1.6-2°C

Custody Seals Intact:  Yes  No

Relinquished by: Doug Lavarway, Company: APS, Date/Time: 12/11/18, Received by: \_\_\_\_\_, Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_, Company: \_\_\_\_\_, Date/Time: \_\_\_\_\_, Received in Laboratory by: TA-PHX, Company: \_\_\_\_\_, Date/Time: 12-10-18



# Chain of Custody Record

TestAmerica Phoenix  
4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114628

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.



Client Contact: Doug Lavarney 928-587-0319  
 Analysis Turnaround Time: \_\_\_\_\_  
 TAT if different from Below: \_\_\_\_\_  
 Lab Contact: Doug Lavarney  
 Carrier: \_\_\_\_\_  
 Date: 12/9/2018  
 COC No.: 1 of 2 COCS  
 Sampler: \_\_\_\_\_  
 For Lab Use Only:  
 Walk-in Client: \_\_\_\_\_  
 Lab Sampling: \_\_\_\_\_  
 Job / SDG No.: \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 (Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Ti)	EPA 300.0 (F)
CH-CCR-W301-12718	12/7/2018	1419	G	W	2	N	X	X	X	X
CH-CCR-W302-12718	12/7/2018	1505	G	W	2	N	X	X	X	X
CH-CCR-W304-12718	12/7/2018	1559	G	W	2	N	X	X	X	X
CH-CCR-W305-12718	12/7/2018	1306	G	W	2	N	X	X	X	X
CH-CCR-W306-12718	12/7/2018	1228	G	W	2	N	X	X	X	X
CH-CCR-W307-12818	12/8/2018	1358	G	W	2	N	X	X	X	X
CH-CCR-W308-12818	12/8/2018	1242	G	W	2	N	X	X	X	X
CH-CCR-W309-12818	12/8/2018	1124	G	W	2	N	X	X	X	X
CH-CCR-M52A-12818	12/8/2018	1454	G	W	2	N	X	X	X	X
CH-CCR-M53A-12718	12/7/2018	1114	G	W	2	N	X	X	X	X
CH-CCR-FD02-12718	12/7/2018	1114	G	W	2	N	X	X	X	X
CH-CCR-M55A-12818	12/9/2018	1650	G	W	2	N	X	X	X	X

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other \_\_\_\_\_  
 Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

2-0-C, 2-2-C, 1-8-C, 1-6-C

Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Corrd: \_\_\_\_\_ Therm ID No: \_\_\_\_\_

Relinquished by: Doug Lavarney  
 Company: APS  
 Date/Time: 12/12/18

Received by: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_



TestAmerica Phoenix

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THE LEADER IN ENVIRONMENTAL TESTING

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CCR

TestAmerica Laboratories, Inc.

114628

Regulatory Program:

Client Contact: Doug Lavarnway 928-587-0319  
Analysis Turnaround Time  
Lab Contact: Doug Lavarnway 12/9/2018  
Carrier: 12/9/2018  
COC No: 1 of 2 COCs

4801 Cholla Lake Road  
Joseph City, Az 86032  
(928) 587-0319 Phone  
(xxx) xxx-xxxx FAX  
Project Name: CCR  
Site: Cholla  
P O #

Sample Identification  
Sample Date  
Sample Time  
Sample Type (C=Comp, G=Grab)  
Matrix  
# of Cont.  
Filtered Sample ( Y / N )  
Perform MS / MSD ( Y / N )  
932.0 Radium 226 and 228  
Sample Specific Notes:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	932.0 Radium 226 and 228
CH-CCR-W301-12718	12/7/2018	1419	G	W	2	N	X	
CH-CCR-W302-12718	12/7/2018	1505	G	W	2	N	X	
CH-CCR-W304-12718	12/7/2018	1559	G	W	2	N	X	
CH-CCR-W305-12718	12/7/2018	1306	G	W	2	N	X	
CH-CCR-W306-12718	12/7/2018	1228	G	W	2	N	X	
CH-CCR-W307-12818	12/8/2018	1358	G	W	2	N	X	
CH-CCR-W308-12818	12/8/2018	1242	G	W	2	N	X	
CH-CCR-W309-12818	12/8/2018	1124	G	W	2	N	X	
CH-CCR-M52A-12818	12/8/2018	1454	G	W	2	N	X	
CH-CCR-M53A-12718	12/7/2018	1114	G	W	2	N	X	
CH-CCR-FD02-12718	12/7/2018	1114	G	W	2	N	X	
CH-CCR-M55A-12818	12/8/2018	1650	G	W	2	N	X	

Preservation Used: 1= Ice, 2= HCI, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other  
Possible Hazard Identification:  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments: Radium shall be sent off to Radiation Safety Engineering for analysis.  
Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Custody Seals Intact:  Yes  No  
Cooler Temp (C): Obs'd: 1.0-2.0, 2.0-2.2, 1.8-2.2  
Therm ID No.:  
Received by: [Signature] Company: AFS Date/Time: 12/6/18  
Received in Laboratory: [Signature] Company: MAB Date/Time: 12-10-18

Relinquished by: [Signature] Company: AFS Date/Time: 12-10-18  
Relinquished by: [Signature] Company: MAB Date/Time: 12-10-18



**TestAmerica Phoenix**

**Chain of Custody Record**

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114628

Regulatory Program:

CCR

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING  
TestAmerica Laboratories, Inc.

1/29/2019

Client Contact		Doug Lavarway		928-587-0319		Doug Lavarway		12/9/2018		COC No: 2 of 2 COCs	
Analysis Turnaround Time		TAT if different from Below				Lab Contact:		Carrier:		Sampler:	
4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone		FAX		Project Name: CCR	
Site: Cholla		P O #								Job / SDG No.:	
Sample Identification		Sample Date	Sample Time	Sample Type (C=Comp, G=Grav)	Matrix	# of Cont.	Sample Specific Notes:				
CH-CCR-W314-12818 -13		12/8/2018	1527 G	W		2					
Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other											
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.											
<input checked="" type="checkbox"/> Non-hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Dispose by Lab <input type="checkbox"/> Archive for _____ Months									
Special Instructions/QC Requirements & Comments:		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) Yield 2.0-c, 2.2-c, 1.8-c, 1.6-c									
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:				Cooler Temp. (°C): Obs'd:		Cor'd:		Therm ID No.:	
Relinquished by: Doug Lavarway		Company: APS		Date/Time: 12/11/18		Received by:		Company:		Date/Time:	
Relinquished by:		Company:		Date/Time:		Received in Laboratory by: TAPHX		Company: TAPHX		Date/Time: 12-10-18	

# Chain of Custody Record

**TestAmerica Phoenix**  
 4625 E Colton Center Blvd  
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**TestAmerica**  
 THE LEADER IN ENVIRONMENTAL TESTING  
 TestAmerica Laboratories, Inc.

Regulatory Program: **114628**

CCR

1/29/2019

Client Contact		Doug Lavarnway		928-587-0319		Analysis Turnaround Time		Doug Lavarnway		Lab Contact:		Carrier:		12/9/2018		COC No: 2 of 2 COCs							
4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone FAX		TAT if different from Below		EPA 200.7 ( Li, Mg, SiO2)		EPA 200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)		EPA 300.0 (F)		Sample Specific Notes:							
Project Name: CCR		Site: Cholla		PO #		Sample Identification		Sample Date		Sample Time		Sample Type (C=Comp, G=Grab)		Matrix		# of Cont.							
CH-CCR-W314-12818		-17		12/8/2018		1527 G		W		2		N		X		X							
Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other		Possible Hazard Identification:		Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.		Special Instructions/QC Requirements & Comments:		Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)		Return to Client		Disposal by Lab		Archive for		Months							
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obs'd:		Corrd:		Therm ID No.:		Received by:		Company:		Date/Time:		Received in Laboratory by:		Company:		Date/Time:			
Relinquished by: <i>Dave Lavarnway</i>		Company: <i>APS</i>		Date/Time: <i>12/10/18</i>		Received by: <i>[Signature]</i>		Company: <i>IA-PHX</i>		Date/Time: <i>12-10-18</i>		Received in Laboratory by: <i>[Signature]</i>		Company: <i>IA-PHX</i>		Date/Time: <i>11-16</i>		Relinquished by: <i>[Signature]</i>		Company: <i>[Signature]</i>		Date/Time: <i>11-16</i>	



**TestAmerica Phoenix**

**Chain of Custody Record**



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114628

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarnway 928-587-0319  
 Analysis Turnaround Time: TAT if different from Below \_\_\_\_\_  
 Doug Lavarnway 928-587-0319  
 Carrier: 12/9/2018  
 COC No.: 2 of 2 COCS  
 Sample Specific Notes: \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )		Perform MS / MSD ( Y / N )	
						932.0 Radium 226 and 228			
CH-CCR-W314-12818		-13							
		12/8/2018	1527 G	W	2	N	X	X	

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other \_\_\_\_\_

Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments: Radium shall be sent off to Radiation Safety Engineering for analysis.  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month )

Cooler Temp. (°C): Obs'd: 1.6°C, 2.0°C, 2.2°C, 1.8°C  
 Corr'd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_

Custody Seals Intact:  Yes  No

Relinquished by: Doug Lavarnway Company: APS Date/Time: 12/11/18 Received by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Received in Laboratory by: JAPHX Company: \_\_\_\_\_ Date/Time: 12/10/18



Chain of Custody Record

<b>Client Information (Sub Contract Lab)</b> Shipping/Receiving Company TestAmerica Laboratories, Inc Address 17461 Dentan Ave, Suite 100, Irvine State, Zip CA, 92614-5817 Phone 949-261-1022(Tel) 949-260-3297(Fax) Email Project Name CCR Site Arizona Public Service		Lab PM Baker, Ken E-Mail ken.baker@testamericainc.com Accreditations Required (See note) State Program - Arizona		Camer Tracking No(s) 1296 9530 9150 State of Origin Arizona Job # 550-114628-1		COC No 550-23338 2 Page Page 2 of 2	
Due Date Requested: 12/17/2018 TAT Requested (days): PO # WO # Project # 55009651 SSOV#		Analysis Requested 200.8.CWA.LL/200.2.200.8 Metals		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHCO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other: M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2SO3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4.5 Z - other (specify)		Special Instructions/Note: AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible!	
<b>Sample Identification - Client ID (Lab ID)</b> CH-CCR-W309-12818 (550-114628-8) CH-CCR-M52A-12818 (550-114628-9) CH-CCR-M53A-12718 (550-114628-10) CH-CCR-FD02-12718 (550-114628-11) CH-CCR-M55A-12818 (550-114628-12) CH-CCR-W314-12818 (550-114628-13)		Field Filtered Sample (Yes or No) <input checked="" type="checkbox"/> X 200.8.CWA.LL/200.2.200.8 Metals		Total Number of Containers 1 1 1 1 1 1		Matrix (Waters, Excel, One-wat, etc) Water Water Water Water Water Water	
Sample Date 12/8/18 12/8/18 12/7/18 12/7/18 12/8/18 12/8/18		Sample Time 11:25 14:54 11:14 11:14 16:50 15:27		Sample Date 12/8/18 12/8/18 12/7/18 12/7/18 12/8/18 12/8/18		Sample Type (C=Comp, G=grab) Water Water Water Water Water Water	
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody.							
<b>Possible Hazard Identification</b> Unconfirmed Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2							
Empty Kit Relinquished by Date Relinquished by Date/Time Relinquished by Date/Time Custody Seals Intact Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody Seal No 11519 1000 THXU							



## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114628-2

SDG Number: Cholla

**Login Number: 114628**

**List Number: 1**

**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114628-2

SDG Number: Cholla

**Login Number: 114628**

**List Number: 2**

**Creator: Ornelas, Olga**

**List Source: TestAmerica Irvine**

**List Creation: 01/15/19 05:27 PM**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	Not Present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114628-2

SDG Number: Cholla

**Login Number: 114628**

**List Number: 3**

**Creator: Escalante, Maria I**

**List Source: TestAmerica Irvine**

**List Creation: 01/18/19 03:35 PM**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-114628-3

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

1/14/2019 3:49:14 PM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-3  
SDG: Cholla

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-3  
SDG: Cholla

**Job ID: 550-114628-3**

**Laboratory: TestAmerica Phoenix**

## Narrative

**Job Narrative**  
**550-114628-3**

## Comments

No additional comments.

## Receipt

The samples were received on 12/10/2018 11:16 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.6° C, 1.8° C, 2.0° C and 2.2° C.

## Receipt Exceptions

Several of the sample sites were missing from the pick list.

CH-CCR-W301-12718 (550-114628-1), CH-CCR-W301-12718 (550-114628-1[DUJ]), CH-CCR-W301-12718 (550-114628-1[MS]), CH-CCR-W301-12718 (550-114628-1[MSD]), CH-CCR-W302-12718 (550-114628-2), CH-CCR-W304-12718 (550-114628-3), CH-CCR-W305-12718 (550-114628-4), CH-CCR-W306-12718 (550-114628-5), CH-CCR-W307-12818 (550-114628-6), CH-CCR-W308-12818 (550-114628-7), CH-CCR-W309-12818 (550-114628-8), CH-CCR-M52A-12818 (550-114628-9), CH-CCR-M53A-12718 (550-114628-10), CH-CCR-FD02-12718 (550-114628-11), CH-CCR-M55A-12818 (550-114628-12) and CH-CCR-W314-12818 (550-114628-13)

## Lab Admin

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

## Subcontract Work

Method Radium 226/228: This method was subcontracted to Radiation Safety. The subcontract laboratory certification is different from that of the facility issuing the final report.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-3  
SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-114628-1	CH-CCR-W301-12718	Water	12/07/18 14:19	12/10/18 11:16
550-114628-2	CH-CCR-W302-12718	Water	12/07/18 15:05	12/10/18 11:16
550-114628-3	CH-CCR-W304-12718	Water	12/07/18 15:59	12/10/18 11:16
550-114628-4	CH-CCR-W305-12718	Water	12/07/18 13:06	12/10/18 11:16
550-114628-5	CH-CCR-W306-12718	Water	12/07/18 12:28	12/10/18 11:16
550-114628-6	CH-CCR-W307-12818	Water	12/08/18 13:58	12/10/18 11:16
550-114628-7	CH-CCR-W308-12818	Water	12/08/18 12:42	12/10/18 11:16
550-114628-8	CH-CCR-W309-12818	Water	12/08/18 11:25	12/10/18 11:16
550-114628-9	CH-CCR-M52A-12818	Water	12/08/18 14:54	12/10/18 11:16
550-114628-10	CH-CCR-M53A-12718	Water	12/07/18 11:14	12/10/18 11:16
550-114628-11	CH-CCR-FD02-12718	Water	12/07/18 11:14	12/10/18 11:16
550-114628-12	CH-CCR-M55A-12818	Water	12/08/18 16:50	12/10/18 11:16
550-114628-13	CH-CCR-W314-12818	Water	12/08/18 15:27	12/10/18 11:16



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-3  
SDG: Cholla

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

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# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114628-3  
SDG: Cholla

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Method	Method Description	Protocol	Laboratory
Subcontract	Radium 226/228	None	Radiation

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**Protocol References:**

None = None

**Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225





# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

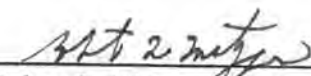
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W301-12718 (550-114628-1)	< 0.6	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018      Date  
 Laboratory License Number AZ0462



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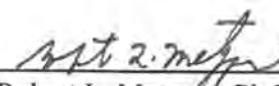
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W302-12718 (550-114628-2)	< 0.6	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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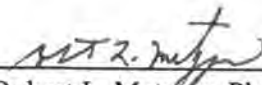
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W304-12718 (550-114628-3)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W305-12718 (550-114628-4)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

Date

Laboratory License Number AZ0462





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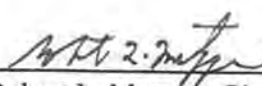
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W306-12718 (550-114628-5)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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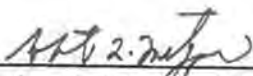
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
 4625 E. Cotton Center Blvd., Suite #189  
 Phoenix, AZ 85040

Sampling Date: December 08, 2018  
 Sample Received: December 11, 2018  
 Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W307-12818 (550-114628-6)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462





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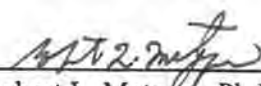
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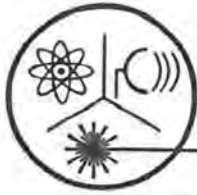
TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W308-12818 (550-114628-7)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018      Date  
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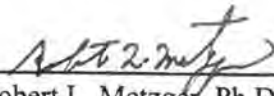
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W309-12818 (550-114628-8)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

Date

Laboratory License Number AZ0462



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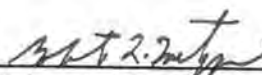
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-M52A-12818 (550-114628-9)	< 0.5	< 0.7	< 0.7

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Website: www.radsafe.com

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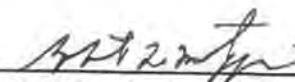
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
 4625 E. Cotton Center Blvd., Suite #189  
 Phoenix, AZ 85040

Sampling Date: December 07, 2018  
 Sample Received: December 11, 2018  
 Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-M53A-12718 (550-114628-10)	< 0.5	1.1 ± 0.3	1.1 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462





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Website: www.radsafe.com

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FAX (480) 892-5446

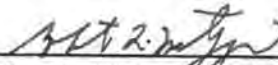
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 07, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-FD02-12718 (550-114628-11)	< 0.5	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018  
Date

Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

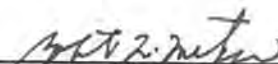
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-M55A-12818 (550-114628-12)	< 0.5	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
Date  
Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

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Website: www.radsafe.com

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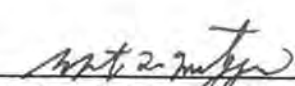
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 08, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W314-12818 (550-114628-13)	< 0.5	0.7 ± 0.3	0.7 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
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Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

Date

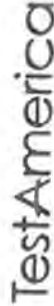
Laboratory License Number AZ0462



**TestAmerica Phoenix**

4625 East Cotton Cir Blvd Suite 189  
Phoenix, AZ 85040  
Phone (602) 437-3340 Fax (602) 454-9303

**Chain of Custody Record**



THE TESTAMERICA TESTING SYSTEM

<b>Client Information (Sub Contract Lab)</b>		Lab PM: Baker, Ken		Carrier Tracking No(s):	
Client Contact: Shipping/Receiving		E-Mail: ken.baker@testamericainc.com		State of Origin: Arizona	
Company: Radiation Safety Eng., Inc.		Accreditations Required (See note): State Program - Arizona		COC No: 550-23057-1	
Address: 3245 North Washington Street, Chandler, AZ, 85225		Due Date Requested: 12/19/2018		Page: Page 1 of 2	
City: Chandler		TAT Requested (days):		Job #: 550-114628-1	
State, Zip: AZ, 85225		PO #:		Preservation Codes:	
Phone:		WO #:		A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA M - Hexane N - None O - Acetic Acid P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecalhydrate U - Acetone V - MCAA W - pH 4.5 Z - other (specify)	
Email:		Project #:		Other:	
APS - Cholla CCR		55009651			
Site: Arizona Public Service		SSOW#:			

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, E=soils, D=dusts, etc.)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUB (Radium 226/228) Radium 226/228	Total Number of Containers	Special Instructions/Note:
CH-CCR-W301-12718 (550-114628-1) <i>611418</i>	12/7/18	14:19	Water	Water	X	X	X	2	Job 3
CH-CCR-W302-12718 (550-114628-2) <i>611419</i>	12/7/18	15:05	Water	Water	X	X	X	2	Job 3
CH-CCR-W304-12718 (550-114628-3) <i>611420</i>	12/7/18	15:59	Water	Water	X	X	X	2	Job 3
CH-CCR-W305-12718 (550-114628-4) <i>611421</i>	12/7/18	13:06	Water	Water	X	X	X	2	Job 3
CH-CCR-W306-12718 (550-114628-5) <i>611422</i>	12/7/18	12:28	Water	Water	X	X	X	2	Job 3
CH-CCR-W307-12818 (550-114628-6) <i>611423</i>	12/8/18	13:58	Water	Water	X	X	X	2	Job 3
CH-CCR-W308-12818 (550-114628-7) <i>611424</i>	12/8/18	12:42	Water	Water	X	X	X	2	Job 3
CH-CCR-W309-12818 (550-114628-8) <i>611425</i>	12/8/18	11:25	Water	Water	X	X	X	2	Job 3
CH-CCR-M52A-12818 (550-114628-9) <i>611426</i>	12/8/18	14:54	Water	Water	X	X	X	2	Job 3

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

**Possible Hazard Identification**

Unconfirmed

Deliverable Requested: I, II, III, IV, Other (specify) \_\_\_\_\_ Primary Deliverable Rank: 2

Empty Kit Relinquished by: \_\_\_\_\_ Date: \_\_\_\_\_

Relinquished by: *BATEMAN DCS* Date/Time: *12/11/18* Company: \_\_\_\_\_

Relinquished by: *AMC/MADL* Date/Time: *12-11-18* Company: *L-S-E*

Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_

Custody Seals Intact: \_\_\_\_\_ Cooler Temperature(s) °C and Other Remarks: \_\_\_\_\_







TestAmerica Phoenix

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114628

Regulatory Program:

CCR

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TestAmerica Laboratories, Inc.

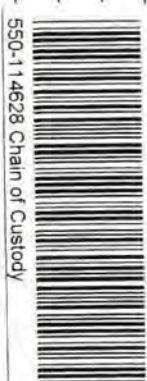
Client Contact: Doug Lavarway 928-587-0319  
Analysis Turnaround Time  
TAT if different from Below

APC Cholla  
4801 Cholla Lake Road  
Joseph City, Az 86032  
(928) 587-0319 Phone  
(xxx) xxx-xxxx FAX  
Project Name: CCR  
Site: Cholla  
P O #

Lab Contact: Doug Lavarway  
Carrier: 12/9/2018  
COC No: 1 of 2 COCs

Sampler:  
For Lab Use Only:  
Walk-In Client:  
Lab Sampling:  
Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )		Perform MS / MSD ( Y / N )		EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)		EPA 300.0 (Cl, F, SO4)		SM 2540C (TDS)		SM 4500-HB (pH)		SM 2320B (HCO3)		Alkalinity		Carbonate as CaCO3		Bicarbonate as CaCO3		
						Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
CH-CCR-W301-12718	12/7/2018	1419 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W302-12718	12/7/2018	1505 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W304-12718	12/7/2018	1559 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W305-12718	12/7/2018	1306 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W306-12718	12/7/2018	1228 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W307-12818	12/8/2018	1356 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W308-12818	12/8/2018	1242 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-W309-12818	12/8/2018	1124 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-M52A-12818	12/8/2018	1454 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-M53A-12718	12/7/2018	1114 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-FD02-12718	12/7/2018	1114 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH-CCR-M55A-12818	12/8/2018	1650 G	W	W	2	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X



Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:

Non-hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Dispose by Lab  Archive for \_\_\_\_\_ Months

2.0°C, 2-2-c, 1-8-c, 1-6-c

Custody Seals Intact:  Yes  No

Relinquished by: Doug Lavarway  
Company: APC  
Date/Time: 12/11/18

Relinquished by: [Signature]  
Company: [Signature]  
Date/Time: 12-10-18

Received by: [Signature]  
Company: [Signature]  
Date/Time: 12-10-18

Received in Laboratory by: TA-PHX  
Company: [Signature]  
Date/Time: 12-10-18

Cooler Temp. (°C): Obs'd: \_\_\_\_\_

Therm ID No.: \_\_\_\_\_



# Chain of Custody Record



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**TestAmerica Phoenix**  
 4625 E Colton Center Blvd  
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 Phoenix, AZ 85040  
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114628

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact: **Doug Lavarney** 928-587-0319 Analysis Turnaround Time: \_\_\_\_\_ Lab Contact: **Doug Lavarney** 12/9/2018 Carrier: \_\_\_\_\_ COC No.: 1 of 2 COCS

Site: Cholla  
 Project Name: CCR  
 P O # \_\_\_\_\_  
 TAT if different from Below: \_\_\_\_\_  
 For Lab Use Only:  
 Walk-in Client: \_\_\_\_\_  
 Lab Sampling: \_\_\_\_\_  
 Job / SDG No.: \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 (Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Ti)	EPA 300.0 (F)
CH-CCR-W301-12718	12/7/2018	1419 G	W	W	2 N	X	X	X	X	X
CH-CCR-W302-12718	12/7/2018	1505 G	W	W	2 N	X	X	X	X	X
CH-CCR-W304-12718	12/7/2018	1559 G	W	W	2 N	X	X	X	X	X
CH-CCR-W305-12718	12/7/2018	1306 G	W	W	2 N	X	X	X	X	X
CH-CCR-W306-12718	12/7/2018	1228 G	W	W	2 N	X	X	X	X	X
CH-CCR-W307-12818	12/8/2018	1358 G	W	W	2 N	X	X	X	X	X
CH-CCR-W308-12818	12/8/2018	1242 G	W	W	2 N	X	X	X	X	X
CH-CCR-W309-12818	12/8/2018	1124 G	W	W	2 N	X	X	X	X	X
CH-CCR-M52A-12818	12/8/2018	1454 G	W	W	2 N	X	X	X	X	X
CH-CCR-M53A-12718	12/7/2018	1114 G	W	W	2 N	X	X	X	X	X
CH-CCR-FD02-12718	12/7/2018	1114 G	W	W	2 N	X	X	X	X	X
CH-CCR-M55A-12818	12/9/2018	1650 G	W	W	2 N	X	X	X	X	X

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other \_\_\_\_\_  
 Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Corrd: \_\_\_\_\_ Therm ID No: \_\_\_\_\_  
 2-8-c, 2-2-c, 1-8-c, 1-6-c

Custody Seal Intact:  Yes  No  
 Relinquished by: **Doug Lavarney** Company: **APS** Date/Time: **12/12/18**  
 Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Received by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Received in Laboratory: **PHHX** Company: **PHHX** Date/Time: **12/10/18**



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114628

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarnway 928-587-0319 Analysis Turnaround Time: Lab Contact: Doug Lavarnway Carrier: 12/9/2018 COC No. 1 of 2 COCs

4801 Cholla Lake Road  
 Joseph City, Az 86032  
 (928) 587-0319 Phone  
 (xxx) xxx-xxxx FAX  
 Project Name: CCR  
 Site: Cholla  
 P O #

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	932.0 Radium 226 and 228	Sample Specific Notes:
CH-CCR-W301-12718	12/7/2018	1419	G	W	2	N	X		
CH-CCR-W302-12718	12/7/2018	1505	G	W	2	N	X		
CH-CCR-W304-12718	12/7/2018	1559	G	W	2	N	X		
CH-CCR-W305-12718	12/7/2018	1306	G	W	2	N	X		
CH-CCR-W306-12718	12/7/2018	1228	G	W	2	N	X		
CH-CCR-W307-12818	12/8/2018	1358	G	W	2	N	X		
CH-CCR-W308-12818	12/8/2018	1242	G	W	2	N	X		
CH-CCR-W309-12818	12/8/2018	1124	G	W	2	N	X		
CH-CCR-M52A-12818	12/8/2018	1454	G	W	2	N	X		
CH-CCR-M53A-12718	12/7/2018	1114	G	W	2	N	X		
CH-CCR-FD02-12718	12/7/2018	1114	G	W	2	N	X		
CH-CCR-M55A-12818	12/8/2018	1650	G	W	2	N	X		

Preservation Used: 1= Ice, 2= HCI, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other  
 Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments: Radium shall be sent off to Radiation Safety Engineering for analysis.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Custody Seals Intact:  Yes  No  
 Cooler Temp (C): Obs'd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_

Relinquished by: *Barbara Calverney* Company: *APDS* Date/Time: *12/6/18* Received by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Received in Laboratory: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013



Chain of Custody Record

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Regulatory Program:

CCR

Client Contact		Doug Lavarway		928-587-0319		Doug Lavarway		12/9/2018		COC No: 2 of 2 COCs	
Analysis Turnaround Time		TAT if different from Below				Lab Contact:		Carrier:		Sampler:	
4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone		FAX		Project Name: CCR	
Site: Cholla		P O #				Job / SDG No.:				For Lab Use Only: Walk-in Client: Lab Sampling:	
Sample Identification		Sample Date	Sample Time	Sample Type (C=Comp, G=Grav)	Matrix	# of Cont.	Sample Specific Notes:				
CH-CCR-W314-12818 -13		12/8/2018	1527 G	W		2					
Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other											
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)									
<input checked="" type="checkbox"/> Non-hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown		<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months									
Special Instructions/QC Requirements & Comments:		Yield 2.0-c, 2.2-c, 1.8-c, 1.6-c									
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obs'd:		Cor'd:		Therm ID No.:			
Relinquished by: Doug Lavarway		Company: APS		Date/Time: 12/11/18		Received by:		Company:		Date/Time:	
Relinquished by:		Company:		Date/Time:		Received in Laboratory by: TAPHX		Company: TAPHX		Date/Time: 12-10-18	



# TestAmerica Phoenix

## Chain of Custody Record

4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114628  
Regulatory Program:

CCR



Client Contact APS Cholla 4801 Cholla Lake Road Joseph City, Az 86032 (928) 587-0319 Phone (xxx) xxx-xxxx FAX Project Name: CCR Site: Cholla P O #	Doug Lavarnway 928-587-0319 Analysis Turnaround Time TAT if different from Below	Doug Lavarnway Lab Contact:	Carrier:	12/9/2018 COG No.: 2 of 2 COCs							
Sample Identification CH-CCR-W314-12818 -17	Sample Date 12/8/2018	Sample Time 1527 G	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 ( Li, Mg, SiO2 )	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Ti)	EPA 300.0 (F)	Sample Specific Notes:

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 ( Li, Mg, SiO2 )	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Ti)	EPA 300.0 (F)	Sample Specific Notes

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification:  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Relinquished by: Dave Lavarnway Company: APS Date/Time: 12/8/16  
Relinquished by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Received by: \_\_\_\_\_ Company: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
Received in Laboratory by: TAPHX Company: AS Date/Time: 12-10-16

Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Cor'd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_

20-2, 2-2-2, 1-8-5, 1-6-5





## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114628-3

SDG Number: Cholla

**Login Number: 114628**

**List Number: 1**

**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.





# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-114629-1

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

1/15/2019 4:27:16 PM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

Total Access

Have a Question?



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[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

- 1
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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of analyte.
M2	Matrix spike recovery was low, the associated blank spike recovery was acceptable.

### Metals

Qualifier	Qualifier Description
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.
D2	Sample required dilution due to high concentration of analyte.
B3	Target analyte detected in calibration blank at or above the method reporting limit.

### General Chemistry

Qualifier	Qualifier Description
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
D2	Sample required dilution due to high concentration of analyte.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Job ID: 550-114629-1**

**Laboratory: TestAmerica Phoenix**

## Narrative

### Job Narrative 550-114629-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 12/10/2018 11:16 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.6° C, 1.8° C, 2.0° C and 2.2° C.

#### Receipt Exceptions

Several of the sample sites were missing from the pick list.

CH-CCR-W-126-125128 (550-114629-1), CH-CCR-W-126-125128 (550-114629-1[DU]), CH-CCR-W-126-125128 (550-114629-1[MS]), CH-CCR-W-126-125128 (550-114629-1[MSD]), CH-CCR-MW65A-2518 (550-114629-2), CH-CCR-MW66A-2518 (550-114629-3), CH-CCR-MW67A-2518 (550-114629-4) and CH-CCR-FD01-12518 (550-114629-5)

#### HPLC/IC

Method(s) 300.0: The following sample was diluted for Fluoride my method EPA 300.0 due to the nature of the sample matrix: (550-114628-C-1 ^2). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

Method(s) 300.0: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for Fluoride associated with analytical batch 550-164796 were outside control limits. Sample matrix interference was suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recoveries were within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method(s) 200.7 Rev 4.4: The continuing calibration blank (CCB) for analytical batch 550-164399 contained sodium above the reporting limit (RL). All reported samples associated with this CCB were either ND for this analyte or contained this analyte at a concentration greater than 10X the value found in the CCB; therefore, re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-114629-1	CH-CCR-W-126-125128	Water	12/05/18 13:49	12/10/18 11:16
550-114629-2	CH-CCR-MW65A-2518	Water	12/05/18 16:42	12/10/18 11:16
550-114629-3	CH-CCR-MW66A-2518	Water	12/05/18 14:58	12/10/18 11:16
550-114629-4	CH-CCR-MW67A-2518	Water	12/05/18 14:58	12/10/18 11:16
550-114629-5	CH-CCR-FD01-12518	Water	12/05/18 13:49	12/10/18 11:16

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W-126-125128**

**Lab Sample ID: 550-114629-1**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	7400	D2	400	mg/L	200		300.0	Total/NA
Fluoride	3.5	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	4200	D2	400	mg/L	200		300.0	Total/NA
Boron	43	M3	0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	760	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	470	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	91	M3	0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	4000	D2 M3	1.0	mg/L	2		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	100		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	100		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	17000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	19.2	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

**Client Sample ID: CH-CCR-MW65A-2518**

**Lab Sample ID: 550-114629-2**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3900	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.9	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2700	D2	400	mg/L	200		300.0	Total/NA
Boron	12		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	780		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	290		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	28		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2000	B3	0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	160		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	160		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	9900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	19.4	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

**Client Sample ID: CH-CCR-MW66A-2518**

**Lab Sample ID: 550-114629-3**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	4600	D2	400	mg/L	200		300.0	Total/NA
Fluoride	0.93	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	2900	D2	400	mg/L	200		300.0	Total/NA
Boron	1.2		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	830		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	280		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	11		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2500	D2	1.0	mg/L	2		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	80		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	80		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	8.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	19.1	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Client Sample ID: CH-CCR-MW67A-2518 (Continued)

## Lab Sample ID: 550-114629-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5000	D2	400	mg/L	200		300.0	Total/NA
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	1500	D2	400	mg/L	200		300.0	Total/NA
Boron	0.38		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	1500		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	270		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	12		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1400	B3	0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	9300	D2	100	mg/L	1		SM 2540C	Total/NA
pH	6.9	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	19.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: CH-CCR-FD01-12518

## Lab Sample ID: 550-114629-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6900	D2	200	mg/L	100		300.0	Total/NA
Fluoride	3.6	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	4100	D2	200	mg/L	100		300.0	Total/NA
Boron	43		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	760		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	470		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	89		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	4000	D2	1.0	mg/L	2		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	100		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	100		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	16000	D2	200	mg/L	1		SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	18.4	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W-126-125128**

**Lab Sample ID: 550-114629-1**

Date Collected: 12/05/18 13:49

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	7400	D2	400	mg/L			12/11/18 03:43	200
Fluoride	3.5	D1	0.80	mg/L			12/13/18 21:09	2
Sulfate	4200	D2	400	mg/L			12/11/18 03:43	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	43	M3	0.050	mg/L		12/11/18 07:22	12/12/18 15:56	1
Calcium	760	M3	2.0	mg/L		12/11/18 07:22	12/12/18 15:56	1
Magnesium	470	M3	2.0	mg/L		12/11/18 07:22	12/12/18 15:56	1
Potassium	91	M3	0.50	mg/L		12/11/18 07:22	12/12/18 15:56	1
Sodium	4000	D2 M3	1.0	mg/L		12/11/18 07:22	12/13/18 21:12	2

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/14/18 16:37	12/17/18 16:18	1

### General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	100		6.0	mg/L			12/11/18 15:09	1
Bicarbonate Alkalinity as CaCO3	100		6.0	mg/L			12/11/18 15:09	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:09	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 15:09	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:09	1
Total Dissolved Solids	17000	D2	200	mg/L			12/11/18 10:42	1
pH	7.4	H5	1.7	SU			12/10/18 19:35	1
Temperature	19.2	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-MW65A-2518**

**Lab Sample ID: 550-114629-2**

Date Collected: 12/05/18 16:42

Matrix: Water

Date Received: 12/10/18 11:16

### Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3900	D2	400	mg/L			12/11/18 03:06	200
Fluoride	1.9	D1	0.80	mg/L			12/13/18 21:27	2
Sulfate	2700	D2	400	mg/L			12/11/18 03:06	200

### Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	12		0.050	mg/L		12/11/18 07:22	12/12/18 17:19	1
Calcium	780		2.0	mg/L		12/11/18 07:22	12/12/18 17:19	1
Magnesium	290		2.0	mg/L		12/11/18 07:22	12/12/18 17:19	1
Potassium	28		0.50	mg/L		12/11/18 07:22	12/12/18 17:19	1
Sodium	2000	B3	0.50	mg/L		12/11/18 07:22	12/12/18 17:19	1

### Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/14/18 16:37	12/17/18 16:19	1

TestAmerica Phoenix



# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Client Sample ID: CH-CCR-MW65A-2518**

**Lab Sample ID: 550-114629-2**

Date Collected: 12/05/18 16:42

Matrix: Water

Date Received: 12/10/18 11:16

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	160		6.0	mg/L			12/11/18 15:26	1
Bicarbonate Alkalinity as CaCO3	160		6.0	mg/L			12/11/18 15:26	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:26	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 15:26	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:26	1
Total Dissolved Solids	9900	D2	100	mg/L			12/11/18 10:42	1
pH	7.3	H5	1.7	SU			12/10/18 19:35	1
Temperature	19.4	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-MW66A-2518**

**Lab Sample ID: 550-114629-3**

Date Collected: 12/05/18 14:58

Matrix: Water

Date Received: 12/10/18 11:16

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4600	D2	400	mg/L			12/11/18 02:30	200
Fluoride	0.93	D1	0.80	mg/L			12/13/18 21:46	2
Sulfate	2900	D2	400	mg/L			12/11/18 02:30	200

## Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.2		0.050	mg/L		12/11/18 07:22	12/12/18 17:25	1
Calcium	830		2.0	mg/L		12/11/18 07:22	12/12/18 17:25	1
Magnesium	280		2.0	mg/L		12/11/18 07:22	12/12/18 17:25	1
Potassium	11		0.50	mg/L		12/11/18 07:22	12/12/18 17:25	1
Sodium	2500	D2	1.0	mg/L		12/11/18 07:22	12/13/18 22:05	2

## Method: 245.1 - Mercury (CVAA)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/14/18 16:37	12/17/18 16:21	1

## General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	80		6.0	mg/L			12/11/18 15:34	1
Bicarbonate Alkalinity as CaCO3	80		6.0	mg/L			12/11/18 15:34	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:34	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 15:34	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:34	1
Total Dissolved Solids	11000	D2	100	mg/L			12/11/18 10:42	1
pH	8.1	H5	1.7	SU			12/10/18 19:35	1
Temperature	19.1	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

Date Collected: 12/05/18 14:58

Matrix: Water

Date Received: 12/10/18 11:16

## Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5000	D2	400	mg/L			12/11/18 01:53	200
Fluoride	1.0	D1	0.80	mg/L			12/13/18 23:55	2

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

Date Collected: 12/05/18 14:58

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography (Continued)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	1500	D2	400	mg/L			12/11/18 01:53	200

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.38		0.050	mg/L		12/11/18 07:22	12/12/18 17:31	1
Calcium	1500		2.0	mg/L		12/11/18 07:22	12/12/18 17:31	1
Magnesium	270		2.0	mg/L		12/11/18 07:22	12/12/18 17:31	1
Potassium	12		0.50	mg/L		12/11/18 07:22	12/12/18 17:31	1
Sodium	1400	B3	0.50	mg/L		12/11/18 07:22	12/12/18 17:31	1

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/14/18 16:37	12/17/18 16:22	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	180		6.0	mg/L			12/11/18 15:43	1
Bicarbonate Alkalinity as CaCO3	180		6.0	mg/L			12/11/18 15:43	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:43	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 15:43	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:43	1
Total Dissolved Solids	9300	D2	100	mg/L			12/11/18 10:42	1
pH	6.9	H5	1.7	SU			12/10/18 19:35	1
Temperature	19.0	H5	0.1	Degrees C			12/10/18 19:35	1

**Client Sample ID: CH-CCR-FD01-12518**

**Lab Sample ID: 550-114629-5**

Date Collected: 12/05/18 13:49

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6900	D2	200	mg/L			12/11/18 18:57	100
Fluoride	3.6	D1	0.80	mg/L			12/10/18 17:36	2
Sulfate	4100	D2	200	mg/L			12/11/18 18:57	100

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	43		0.050	mg/L		12/11/18 07:22	12/12/18 17:36	1
Calcium	760		2.0	mg/L		12/11/18 07:22	12/12/18 17:36	1
Magnesium	470		2.0	mg/L		12/11/18 07:22	12/12/18 17:36	1
Potassium	89		0.50	mg/L		12/11/18 07:22	12/12/18 17:36	1
Sodium	4000	D2	1.0	mg/L		12/11/18 07:22	12/13/18 22:17	2

**Method: 245.1 - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		12/14/18 16:37	12/17/18 16:24	1

**General Chemistry**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	100		6.0	mg/L			12/11/18 15:52	1
Bicarbonate Alkalinity as CaCO3	100		6.0	mg/L			12/11/18 15:52	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Client Sample ID: CH-CCR-FD01-12518**

**Lab Sample ID: 550-114629-5**

**Date Collected: 12/05/18 13:49**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

## General Chemistry (Continued)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:52	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 15:52	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:52	1
<b>Total Dissolved Solids</b>	<b>16000</b>	<b>D2</b>	200	mg/L			12/11/18 10:42	1
<b>pH</b>	<b>7.4</b>	<b>H5</b>	1.7	SU			12/10/18 19:35	1
<b>Temperature</b>	<b>18.4</b>	<b>H5</b>	0.1	Degrees C			12/10/18 19:35	1

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: MB 550-164154/2**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/10/18 16:04	1
Fluoride	ND		0.40	mg/L			12/10/18 16:04	1
Sulfate	ND		2.0	mg/L			12/10/18 16:04	1

**Lab Sample ID: LCS 550-164154/5**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.5		mg/L		107	90 - 110
Fluoride	4.00	4.15		mg/L		104	90 - 110
Sulfate	20.0	20.5		mg/L		103	90 - 110

**Lab Sample ID: LCSD 550-164154/6**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.5		mg/L		107	90 - 110	0	20
Fluoride	4.00	4.04		mg/L		101	90 - 110	3	20
Sulfate	20.0	20.5		mg/L		103	90 - 110	0	20

**Lab Sample ID: 550-114628-A-1 MS ^2**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND	D1 D5	8.00	8.64	D1	mg/L		101	80 - 120

**Lab Sample ID: 550-114628-A-1 MS ^50**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	4000	D2	1000	4770	D2	mg/L		81	80 - 120
Sulfate	3300	D2	1000	4190	D2	mg/L		91	80 - 120

**Lab Sample ID: 550-114628-A-1 MSD ^2**  
**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND	D1 D5	8.00	8.69	D1	mg/L		101	80 - 120	1	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-114628-A-1 MSD ^50**

**Matrix: Water**  
**Analysis Batch: 164154**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	4000	D2	1000	4850	D2	mg/L		89	80 - 120	2	20
Sulfate	3300	D2	1000	4270	D2	mg/L		99	80 - 120	2	20

**Lab Sample ID: MB 550-164284/2**

**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/11/18 15:16	1
Fluoride	ND		0.40	mg/L			12/11/18 15:16	1
Sulfate	ND		2.0	mg/L			12/11/18 15:16	1

**Lab Sample ID: LCS 550-164284/5**

**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.3		mg/L		107	90 - 110
Fluoride	4.00	4.10		mg/L		103	90 - 110
Sulfate	20.0	20.4		mg/L		102	90 - 110

**Lab Sample ID: LCSD 550-164284/6**

**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.3		mg/L		107	90 - 110	0	20
Fluoride	4.00	4.11		mg/L		103	90 - 110	0	20
Sulfate	20.0	20.4		mg/L		102	90 - 110	0	20

**Lab Sample ID: 550-114686-A-1 MS**

**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	ND		4.00	4.18		mg/L		102	80 - 120
Sulfate	72		20.0	88.7		mg/L		81	80 - 120

**Lab Sample ID: 550-114686-A-1 MS ^10**

**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	250	D2	200	478	D2	mg/L		113	80 - 120

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-114686-A-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	ND		4.00	4.24		mg/L		104	80 - 120	2	20
Sulfate	72		20.0	88.9		mg/L		82	80 - 120	0	20

**Lab Sample ID: 550-114686-A-1 MSD ^10**  
**Matrix: Water**  
**Analysis Batch: 164284**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	250	D2	200	475	D2	mg/L		111	80 - 120	1	20

**Lab Sample ID: MB 550-164511/2**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/13/18 18:23	1
Fluoride	ND		0.40	mg/L			12/13/18 18:23	1
Sulfate	ND		2.0	mg/L			12/13/18 18:23	1

**Lab Sample ID: LCS 550-164511/5**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.2		mg/L		106	90 - 110
Fluoride	4.00	4.07		mg/L		102	90 - 110
Sulfate	20.0	20.3		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-164511/6**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.2		mg/L		106	90 - 110	0	20
Fluoride	4.00	4.08		mg/L		102	90 - 110	0	20
Sulfate	20.0	20.3		mg/L		101	90 - 110	0	20

**Lab Sample ID: 550-114843-A-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	59		20.0	76.8		mg/L		87	80 - 120
Fluoride	ND		4.00	4.39		mg/L		102	80 - 120
Sulfate	33		20.0	52.7		mg/L		100	80 - 120

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-114843-A-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164511**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	59		20.0	77.1		mg/L		88	80 - 120	0	20
Fluoride	ND		4.00	4.47		mg/L		104	80 - 120	2	20
Sulfate	33		20.0	53.1		mg/L		102	80 - 120	1	20

**Lab Sample ID: MB 550-164796/2**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/14/18 18:31	1
Fluoride	ND		0.40	mg/L			12/14/18 18:31	1
Sulfate	ND		2.0	mg/L			12/14/18 18:31	1

**Lab Sample ID: LCS 550-164796/5**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	21.2		mg/L		106	90 - 110
Fluoride	4.00	4.08		mg/L		102	90 - 110
Sulfate	20.0	20.3		mg/L		101	90 - 110

**Lab Sample ID: LCSD 550-164796/6**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	20.0	21.2		mg/L		106	90 - 110	0	20
Fluoride	4.00	4.09		mg/L		102	90 - 110	0	20
Sulfate	20.0	20.3		mg/L		101	90 - 110	0	20

**Lab Sample ID: 550-114629-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.9	D1 M2	8.00	7.40	D1 M2	mg/L		69	80 - 120

**Lab Sample ID: 550-114629-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7200	D2 M2	4000	11400	D2	mg/L		106	80 - 120
Sulfate	4000	D2 M2	4000	8330	D2	mg/L		107	80 - 120

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

**Lab Sample ID: 550-114629-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.9	D1 M2	8.00	7.51	D1 M2	mg/L		71	80 - 120	1	20

**Lab Sample ID: 550-114629-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	7200	D2 M2	4000	11500	D2	mg/L		107	80 - 120	0	20
Sulfate	4000	D2 M2	4000	8370	D2	mg/L		108	80 - 120	0	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-164126/1-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		12/11/18 07:22	12/12/18 15:18	1
Calcium	ND		2.0	mg/L		12/11/18 07:22	12/12/18 15:18	1
Magnesium	ND		2.0	mg/L		12/11/18 07:22	12/12/18 15:18	1
Potassium	ND		0.50	mg/L		12/11/18 07:22	12/12/18 15:18	1
Sodium	ND		0.50	mg/L		12/11/18 07:22	12/12/18 15:18	1

**Lab Sample ID: LCS 550-164126/2-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	0.950		mg/L		95	85 - 115
Calcium	21.0	20.7		mg/L		99	85 - 115
Magnesium	21.0	21.1		mg/L		100	85 - 115
Potassium	20.0	20.2		mg/L		101	85 - 115
Sodium	20.0	19.7		mg/L		99	85 - 115

**Lab Sample ID: LCSD 550-164126/3-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	1.00	0.933		mg/L		93	85 - 115	2	20
Calcium	21.0	20.5		mg/L		98	85 - 115	1	20
Magnesium	21.0	20.9		mg/L		99	85 - 115	1	20
Potassium	20.0	19.9		mg/L		100	85 - 115	1	20
Sodium	20.0	19.5		mg/L		97	85 - 115	1	20

TestAmerica Phoenix



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-114629-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample	Sample	Spike	MS		Unit	D	%Rec	Limits	%Rec.
	Result	Qualifier		Result	Qualifier					
Boron	43	M3	1.00	41.9	M3	mg/L		-134	70 - 130	
Calcium	760	M3	21.0	722	M3	mg/L		-185	70 - 130	
Magnesium	470	M3	21.0	462	M3	mg/L		-57	70 - 130	
Potassium	91	M3	20.0	88.1	M3	mg/L		-16	70 - 130	

**Lab Sample ID: 550-114629-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164498**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample	Sample	Spike	MS		Unit	D	%Rec	Limits	%Rec.
	Result	Qualifier		Result	Qualifier					
Sodium	4000	D2 M3	20.0	3990	M3	mg/L		-37	70 - 130	

**Lab Sample ID: 550-114629-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample	Sample	Spike	MSD		Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Boron	43	M3	1.00	41.8	M3	mg/L		-137	70 - 130	0	20
Calcium	760	M3	21.0	734	M3	mg/L		-130	70 - 130	2	20
Magnesium	470	M3	21.0	462	M3	mg/L		-60	70 - 130	0	20
Potassium	91	M3	20.0	88.0	M3	mg/L		-17	70 - 130	0	20

**Lab Sample ID: 550-114629-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164498**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample	Sample	Spike	MSD		Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Sodium	4000	D2 M3	20.0	3920	M3	mg/L		-366	70 - 130	2	20

## Method: 245.1 - Mercury (CVAA)

**Lab Sample ID: MB 550-164583/1-A**  
**Matrix: Water**  
**Analysis Batch: 164727**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 164583**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Hg	ND		0.00020	mg/L		12/14/18 16:37	12/17/18 16:09	1

**Lab Sample ID: LCS 550-164583/2-A**  
**Matrix: Water**  
**Analysis Batch: 164727**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164583**

Analyte	Spike	LCS		Unit	D	%Rec	Limits
		Result	Qualifier				
Hg	0.00500	0.00456		mg/L		91	85 - 115

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: 245.1 - Mercury (CVAA) (Continued)

**Lab Sample ID: LCSD 550-164583/3-A**  
**Matrix: Water**  
**Analysis Batch: 164727**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164583**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.00500	0.00466		mg/L		93	85 - 115	2	20

**Lab Sample ID: 550-114629-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164727**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**  
**Prep Batch: 164583**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Hg	ND		0.00500	0.00399		mg/L		80	70 - 130

**Lab Sample ID: 550-114629-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164727**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**  
**Prep Batch: 164583**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.00500	0.00395		mg/L		79	70 - 130	1	20

## Method: SM 2320B - Alkalinity

**Lab Sample ID: MB 550-164215/32**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:00	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:00	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:00	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/11/18 15:00	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/11/18 15:00	1

**Lab Sample ID: LCS 550-164215/31**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Alkalinity as CaCO3	250	246		mg/L		99	90 - 110

**Lab Sample ID: LCSD 550-164215/39**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Alkalinity as CaCO3	250	248		mg/L		99	90 - 110	1	20

**Lab Sample ID: 550-114629-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	100		104		mg/L		2	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Method: SM 2320B - Alkalinity (Continued)

**Lab Sample ID: 550-114629-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164215**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Bicarbonate Alkalinity as CaCO3	100		104		mg/L		2	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20
Hydroxide Alkalinity as CaCO3	ND		ND		mg/L		NC	20

## Method: SM 2540C - Solids, Total Dissolved (TDS)

**Lab Sample ID: MB 550-164156/1**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB	MB	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier						
Total Dissolved Solids	ND		20	mg/L			12/11/18 10:42	1

**Lab Sample ID: LCS 550-164156/2**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Total Dissolved Solids	1000	970		mg/L		97	90 - 110

**Lab Sample ID: LCSD 550-164156/3**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD	LCSD	Unit	D	%Rec	%Rec. Limits	RPD	Limit
		Result	Qualifier						
Total Dissolved Solids	1000	940		mg/L		94	90 - 110	3	10

**Lab Sample ID: 550-114629-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164156**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Total Dissolved Solids	17000	D2	15300	D2	mg/L		8	10

## Method: SM 4500 H+ B - pH

**Lab Sample ID: LCSSRM 550-164118/36**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM	LCSSRM	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
pH	7.00	7.0		SU		100.1	98.5 - 101.5

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
 SDG: Cholla

## Method: SM 4500 H+ B - pH (Continued)

**Lab Sample ID: LCSSRM 550-164118/47**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.1		SU		100.7	98.5 - 101.5

**Lab Sample ID: 550-114629-1 DU**  
**Matrix: Water**  
**Analysis Batch: 164118**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.4	H5	7.4	H5	SU		0.1	5
Temperature	19.2	H5	19.4	H5	Degrees C		1	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## HPLC/IC

### Analysis Batch: 164154

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	300.0	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	300.0	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	300.0	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	300.0	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	300.0	
MB 550-164154/2	Method Blank	Total/NA	Water	300.0	
LCS 550-164154/5	Lab Control Sample	Total/NA	Water	300.0	
LCS 550-164154/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-114628-A-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-114628-A-1 MS ^50	Matrix Spike	Total/NA	Water	300.0	
550-114628-A-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-114628-A-1 MSD ^50	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 164284

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	300.0	
MB 550-164284/2	Method Blank	Total/NA	Water	300.0	
LCS 550-164284/5	Lab Control Sample	Total/NA	Water	300.0	
LCS 550-164284/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-114686-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-114686-A-1 MS ^10	Matrix Spike	Total/NA	Water	300.0	
550-114686-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-114686-A-1 MSD ^10	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 164511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	300.0	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	300.0	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	300.0	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	300.0	
MB 550-164511/2	Method Blank	Total/NA	Water	300.0	
LCS 550-164511/5	Lab Control Sample	Total/NA	Water	300.0	
LCS 550-164511/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-114843-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-114843-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

### Analysis Batch: 164796

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-164796/2	Method Blank	Total/NA	Water	300.0	
LCS 550-164796/5	Lab Control Sample	Total/NA	Water	300.0	
LCS 550-164796/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	300.0	
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	300.0	
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	300.0	
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	300.0	

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Metals

### Prep Batch: 164126

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.7	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	200.7	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.7	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	200.7	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	200.7	
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.7	
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.7	

### Analysis Batch: 164399

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	200.7 Rev 4.4	164126
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164126
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164126
LCSD 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126

### Analysis Batch: 164498

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126

### Prep Batch: 164583

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	245.1	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	245.1	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	245.1	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	245.1	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	245.1	
MB 550-164583/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-164583/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-164583/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	245.1	
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	245.1	

### Analysis Batch: 164727

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	245.1	164583
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	245.1	164583
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	245.1	164583
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	245.1	164583

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Metals (Continued)

### Analysis Batch: 164727 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	245.1	164583
MB 550-164583/1-A	Method Blank	Total/NA	Water	245.1	164583
LCS 550-164583/2-A	Lab Control Sample	Total/NA	Water	245.1	164583
LCSD 550-164583/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	164583
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	245.1	164583
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	245.1	164583

## General Chemistry

### Analysis Batch: 164118

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	SM 4500 H+ B	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	SM 4500 H+ B	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	SM 4500 H+ B	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	SM 4500 H+ B	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-164118/36	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-164118/47	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-114629-1 DU	CH-CCR-W-126-125128	Total/NA	Water	SM 4500 H+ B	

### Analysis Batch: 164156

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	SM 2540C	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	SM 2540C	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	SM 2540C	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	SM 2540C	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	SM 2540C	
MB 550-164156/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-164156/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-164156/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-114629-1 DU	CH-CCR-W-126-125128	Total/NA	Water	SM 2540C	

### Analysis Batch: 164215

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	SM 2320B	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	SM 2320B	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	SM 2320B	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	SM 2320B	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	SM 2320B	
MB 550-164215/32	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-164215/31	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-164215/39	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-114629-1 DU	CH-CCR-W-126-125128	Total/NA	Water	SM 2320B	

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Client Sample ID: CH-CCR-W-126-125128**

**Lab Sample ID: 550-114629-1**

**Date Collected: 12/05/18 13:49**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 03:43	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/13/18 21:09	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 15:56	SRA	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	164498	12/13/18 21:12	ARE	TAL PHX
Total/NA	Prep	245.1			164583	12/14/18 16:37	JTG	TAL PHX
Total/NA	Analysis	245.1		1	164727	12/17/18 16:18	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 15:09	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156		YET	TAL PHX
					(Start)	12/11/18 10:42		
					(End)	12/12/18 11:45		
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-MW65A-2518**

**Lab Sample ID: 550-114629-2**

**Date Collected: 12/05/18 16:42**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 03:06	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/13/18 21:27	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:19	SRA	TAL PHX
Total/NA	Prep	245.1			164583	12/14/18 16:37	JTG	TAL PHX
Total/NA	Analysis	245.1		1	164727	12/17/18 16:19	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 15:26	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156		YET	TAL PHX
					(Start)	12/11/18 10:42		
					(End)	12/12/18 11:45		
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-MW66A-2518**

**Lab Sample ID: 550-114629-3**

**Date Collected: 12/05/18 14:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 02:30	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/13/18 21:46	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:25	SRA	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	164498	12/13/18 22:05	ARE	TAL PHX

TestAmerica Phoenix



# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Client Sample ID: CH-CCR-MW66A-2518**

**Lab Sample ID: 550-114629-3**

**Date Collected: 12/05/18 14:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	245.1			164583	12/14/18 16:37	JTG	TAL PHX
Total/NA	Analysis	245.1		1	164727	12/17/18 16:21	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 15:34	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

**Date Collected: 12/05/18 14:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	164154	12/11/18 01:53	NEL	TAL PHX
Total/NA	Analysis	300.0		2	164511	12/13/18 23:55	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:31	SRA	TAL PHX
Total/NA	Prep	245.1			164583	12/14/18 16:37	JTG	TAL PHX
Total/NA	Analysis	245.1		1	164727	12/17/18 16:22	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 15:43	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

**Client Sample ID: CH-CCR-FD01-12518**

**Lab Sample ID: 550-114629-5**

**Date Collected: 12/05/18 13:49**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 17:36	NEL	TAL PHX
Total/NA	Analysis	300.0		100	164284	12/11/18 18:57	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:36	SRA	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	164498	12/13/18 22:17	ARE	TAL PHX
Total/NA	Prep	245.1			164583	12/14/18 16:37	JTG	TAL PHX
Total/NA	Analysis	245.1		1	164727	12/17/18 16:24	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	164215	12/11/18 15:52	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164156	12/11/18 10:42 12/12/18 11:45	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	164118	12/10/18 19:35	MRR	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

**Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

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# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

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# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-1  
SDG: Cholla

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
245.1	Mercury (CVAA)	EPA	TAL PHX
SM 2320B	Alkalinity	SM	TAL PHX
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PHX
SM 4500 H+ B	pH	SM	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
245.1	Preparation, Mercury	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

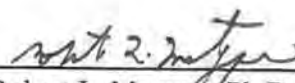
(480) 897-9459  
FAX (480) 892-5446

## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 05, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W-126-125128 (550-114629-1)	< 0.4	< 0.6	< 0.6
Date of Analysis	12/21/2018	12/21/2018	12/21/2018

  
Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
Date  
Laboratory License Number AZ0462

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# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
 Website: www.radsafe.com

(480) 897-9459  
 FAX (480) 892-5446

## Radiochemical Activity in Water (pCi/L)

◊

TestAmerica  
 4625 E. Cotton Center Blvd., Suite #189  
 Phoenix, AZ 85040

Sampling Date: December 05, 2018  
 Sample Received: December 11, 2018  
 Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-MW65A-2518 (550-114629-2)	< 0.4	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018

Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

Date

Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

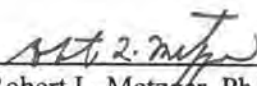
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 05, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-MW66A-2518 (550-114629-3)	< 0.4	< 0.6	< 0.6

Date of Analysis	12/21/2018	12/21/2018	12/21/2018
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Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
Date  
Laboratory License Number AZ0462



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# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

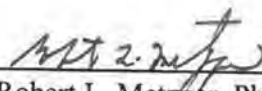
(480) 897-9459  
FAX (480) 892-5446

## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 05, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-MW67A-2518 (550-114629-4)	< 0.4	< 0.6	< 0.6
Date of Analysis	12/14/2018	12/14/2018	12/14/2018

  
 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462





## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

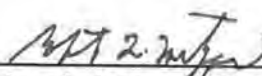
### Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 05, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-FD01-12518 (550-114629-5)	< 0.4	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
------------------	------------	------------	------------

  
Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
Date  
Laboratory License Number AZ0462

**TestAmerica Phoenix**

4825 East Cotton Cir Blvd Suite 189  
Phoenix, AZ 85040  
Phone (602) 437-3340 Fax (602) 454-9303

**Chain of Custody Record**



THE LEADER IN ENVIRONMENTAL TESTING



Client Contact:  
Shipping/Receiving  
Company:  
Radiation Safety Eng., Inc.  
Address:  
3245 North Washington Street,  
City:  
Chandler  
State, Zip:  
AZ, 85225  
Phone:  
Email:  
Project Name:  
APS - Cholla CCR  
Site:  
Arizona Public Service

Lab PM:  
Baker, Ken  
E-Mail:  
ken.baker@testamericainc.com  
Accreditations Required (See note):  
State Program - Arizona

Sampler:  
Phone:  
Carrier Tracking No(s):  
State of Origin:  
Arizona

COC No:  
550-23058.1  
Page:  
Page 1 of 1  
Job #:  
550-114629-1

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (Water, Sewage, Other)	Preservation Code:	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Sub (Radium 226/228) / Radium 226/228	Total Number of Containers	Special Instructions/Note:
CH-CCR-W-126-125128 (550-114629-1)	12/5/18	13:49	Water	Water	X	X		2	Job 3	
CH-CCR-MW65A-2518 (550-114629-2)	12/5/18	16:42	Water	Water	X	X		2	Job 3	
CH-CCR-MW66A-2518 (550-114629-3)	12/5/18	14:58	Water	Water	X	X		2	Job 3	
CH-CCR-MW67A-2518 (550-114629-4)	12/5/18	14:58	Water	Water	X	X		2	Job 3	
CH-CCR-FD01-12518 (550-114629-5)	12/5/18	13:49	Water	Water	X	X		2	Job 3	

Analysis Requested

Preservation Codes:  
 A - HCL  
 B - NaOH  
 C - Zn Acetate  
 D - Nitric Acid  
 E - Nitrous Acid  
 F - MeOH  
 G - Amchlor  
 H - Ascorbic Acid  
 I - Ice  
 J - DI Water  
 K - EDTA  
 L - EDA  
 Other:  
 M - Hexane  
 N - None  
 O - AmNO2  
 P - Na2O4S  
 Q - Na2SO3  
 R - Na2S2O3  
 S - H2SO4  
 T - TSP Dodecahydrate  
 U - Acetone  
 V - MCAA  
 W - pH 4.5  
 Z - other (specify)

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analysis & accreditation compliance upon subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/testing/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other restrictions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

**Possible Hazard Identification**

Unconfirmed

Deliverable Requested: I, II, III, IV, Other (specify)

Primary Deliverable Rank: 2

Empty Kit Returned by:

Relinquished by: *DATAMAN D.C.S.* Date: *12/11/18* Time: *14:15* Company: *P.S.E.*

Relinquished by: *JAMIK WALKER* Date: *12-11-18* Time: *14:15* Company: *P.S.E.*

Relinquished by: *JAMIK WALKER* Date: *12-11-18* Time: *14:15* Company: *P.S.E.*

Custody Seal Intact:  Yes  No

Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Return To Client  Dispose By Lab  Archive For \_\_\_\_\_ Months

Special Instructions/QC Requirements:

Method of Shipment:

Received by: *JAMIK WALKER* Date/Time: *12-11-18 14:15* Company: *P.S.E.*

Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_

Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_

Cooler Temperature(s) °C and Other Remarks:



TestAmerica Phoenix

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114629

Regulatory Program:

CCR

TestAmerica  
THE LEADER IN ENVIRONMENTAL TESTING  
TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarway 928-587-0319  
Analysis Turnaround Time: TAT if different from Below

APS Cholla 4801 Cholla Lake Road Joseph City, Az 86032  
Phone (928) 587-0319 FAX (xxx) xxx-xxxx  
Project Name: CCR  
Site: Cholla  
P O #

Sample Identification	Sample Date	Sample Time	Sample Type (C=Cont, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	SM 2320B (HCO3)	Alkalinity	Carbonate as CaCO3	Bicarbonate as CaCO3
CH-CCR-W-126-12518	12/5/2018	1349 G		W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-MW65A-12518	12/5/2018	1642 G		W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-MW66A-12518	12/5/2018	1458 G		W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-MW67A-12518	12/5/2018	1548 G		W	2	N	X	X	X	X	X	X	X	X	X
CH-CCR-FD01-12518	12/5/2018	1349 G		W	2	N	X	X	X	X	X	X	X	X	X

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:  Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Custody Seals Intact:  Yes  No  
Cooler Temp. (°C): OBS'D  
2.2°C 2.0°C 1.8°C 1.6°C

Relinquished by: Doug Lavarway  
Company: APS  
Date/Time: 12/6/16  
Received by: [Signature]  
Received in Laboratory by: [Signature]

Relinquished by: [Signature]  
Company: [Signature]  
Date/Time: 12-10-16  
Received in Laboratory by: [Signature]





TestAmerica Phoenix  
4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

114629

Client Contact: Doug Lavarway 928-587-0319 Analysis Turnaround Time: Lab Contact: Doug Lavarway 12/9/2018

APS Cholla  
4801 Cholla Lake Road  
Joseph City, Az 86032  
(928) 587-0319 Phone  
(xxx) xxx-xxxx FAX  
Project Name: CCR  
Site: Cholla  
P O #

Carrier: 12/9/2018  
COC No: 1 of 1 COCS  
Sampler:  
For Lab Use Only:  
Walk-in Client:  
Lab Sampling:  
Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )			Perform MS / MSD ( Y / N )		
						EPA 200.7 ( Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 300.0 (F)	EPA 200.7 ( Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 300.0 (F)
CH-CCR-W-126-12518	12/5/2018	1349	G	W	2	N	X	X	X	X	X
CH-CCR-MMW65A-12518	12/5/2018	1642	G	W	2	N	X	X	X	X	X
CH-CCR-MMW66A-12518	12/5/2018	1458	G	W	2	N	X	X	X	X	X
CH-CCR-MMW67A-12518	12/5/2018	1548	G	W	2	N	X	X	X	X	X
CH-CCR-FD01-12518	12/5/2018	1349	G	W	2	N	X	X	X	X	X

Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other  
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:  
 Non-Hazard  
 Flammable  
 Skin Irritant  
 Poison B  
 Unknown  
 Return to Client  
 Disposal by Lab  
 Archive for \_\_\_\_\_ Months

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  
 2-2-e, 2-0-e, 1-8-e, 1-6-e

Custody Seals Intact:  Yes  No  
 Relinquished by: Doug Lavarway  
 Relinquished by: Company: TPS  
 Date/Time: 12/10/16

Relinquished by: Company: TAPHX  
 Date/Time: 12-10-16  
 Received in Laboratory by: TAPHX  
 Date/Time: 11-16



TestAmerica Phoenix  
4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114629

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarnway 928-587-0319  
 Analysis Turnaround Time: TAT if different from Below  
 Lab Contact: Doug Lavarnway  
 Carrier: 12/9/2018  
 COC No.: 1 of 1 COCs  
 Sampler:  
 For Lab Use Only:  
 Walk-in Client:  
 Lab Sampling:  
 Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	932.0 Radium 226 and 228	Sample Specific Notes:
CH-CCR-W-126-12518	12/5/2018	1349	G	W	2	N	X	X	
CH-CCR-MW65A-12518	12/5/2018	1642	G	W	2	N	X	X	
CH-CCR-MW66A-12518	12/5/2018	1458	G	W	2	N	X	X	
CH-CCR-MW67A-12518	12/5/2018	1548	G	W	2	N	X	X	
CH-CCR-FD01-12518	12/5/2018	1349	G	W	2	N	X	X	

Preservation Used: 1=Ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other  
 Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments: Radium shall be sent off to Radiation Safety Engineering for analysis.  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Cooler Temp. (°C): Obs'd: 2-2-c 2-0-c 1-8-c 1-8-c  
 Term ID No.:

Custody Seals Intact:  Yes  No  
 Relinquished by: Doug Lavarnway Company: APS Date/Time: 12/10/18  
 Relinquished by: Company: Date/Time:  
 Relinquished by: Company: Date/Time:  
 Received by: Company: Date/Time:  
 Received in Laboratory by: Company: Date/Time:  
 IA-PHX Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114629-1

SDG Number: Cholla

**Login Number: 114629**

**List Number: 1**

**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-114629-2

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

1/31/2019 3:00:36 PM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

TotalAccess

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
M2	Matrix spike recovery was low, the associated blank spike recovery was acceptable.

### Metals

Qualifier	Qualifier Description
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
M2	Matrix spike recovery was low, the associated blank spike recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike was acceptable.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

**Job ID: 550-114629-2**

**Laboratory: TestAmerica Phoenix**

## Narrative

### Job Narrative 550-114629-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 12/10/2018 11:16 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.6° C, 1.8° C, 2.0° C and 2.2° C.

#### Receipt Exceptions

Several of the sample sites were missing from the pick list.

CH-CCR-W-126-125128 (550-114629-1), CH-CCR-W-126-125128 (550-114629-1[DU]), CH-CCR-W-126-125128 (550-114629-1[MS]), CH-CCR-W-126-125128 (550-114629-1[MSD]), CH-CCR-MW65A-2518 (550-114629-2), CH-CCR-MW66A-2518 (550-114629-3), CH-CCR-MW67A-2518 (550-114629-4) and CH-CCR-FD01-12518 (550-114629-5)

#### HPLC/IC

Method(s) 300.0: The following sample was diluted for Fluoride my method EPA 300.0 due to the nature of the sample matrix: (550-114628-C-1 ^2). The samples contained high concentrations of Chloride and Sulfate which exceeded the instrument's maximum column capacity. Fluoride was not detected in the diluted samples. As such, elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

Method(s) 300.0: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for Fluoride associated with analytical batch 550-164796 were outside control limits. Sample matrix interference was suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recoveries were within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method(s) 200.8 LL: The method blank for preparation batch 440-524048 and analytical batch 440-524210 contained Barium above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

Method(s) 200.8 LL: The matrix spike / matrix spike duplicate (MS/MSD) recoveries of Thallium for preparation batch 440-524048 and 440-524048 and analytical batch 440-524210 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-114629-1	CH-CCR-W-126-125128	Water	12/05/18 13:49	12/10/18 11:16
550-114629-2	CH-CCR-MW65A-2518	Water	12/05/18 16:42	12/10/18 11:16
550-114629-3	CH-CCR-MW66A-2518	Water	12/05/18 14:58	12/10/18 11:16
550-114629-4	CH-CCR-MW67A-2518	Water	12/05/18 14:58	12/10/18 11:16
550-114629-5	CH-CCR-FD01-12518	Water	12/05/18 13:49	12/10/18 11:16

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# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W-126-125128**

**Lab Sample ID: 550-114629-1**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	3.5	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.78		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	470		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	24		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0027		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.021		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0026		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0049		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.00072		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.20		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0015	M1	0.00050	mg/L	1		200.8 LL	Total/NA
Thallium	0.00015		0.00010	mg/L	1		200.8 LL	Total/NA

**Client Sample ID: CH-CCR-MW65A-2518**

**Lab Sample ID: 550-114629-2**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.9	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.54		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	290		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	32		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0025		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.040		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00013		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0035		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0047		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.0010		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.059		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0021		0.00050	mg/L	1		200.8 LL	Total/NA
Thallium	0.00011		0.00010	mg/L	1		200.8 LL	Total/NA

**Client Sample ID: CH-CCR-MW66A-2518**

**Lab Sample ID: 550-114629-3**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.93	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.51		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	280		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO2, Silica	55		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0034		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.095		0.00050	mg/L	1		200.8 LL	Total/NA
Cadmium	0.00029		0.00010	mg/L	1		200.8 LL	Total/NA
Chromium	0.0098		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0026		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.0040		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.016		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.031		0.00050	mg/L	1		200.8 LL	Total/NA
Thallium	0.00015		0.00010	mg/L	1		200.8 LL	Total/NA

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Detection Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## Client Sample ID: CH-CCR-MW67A-2518 (Continued)

## Lab Sample ID: 550-114629-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.0	D1	0.80	mg/L	2		300.0	Total/NA
Magnesium	270		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO <sub>2</sub> , Silica	41		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.018		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.058		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0082		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0058		0.00050	mg/L	1		200.8 LL	Total/NA
Lead	0.0019		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.0061		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0011		0.00050	mg/L	1		200.8 LL	Total/NA

## Client Sample ID: CH-CCR-FD01-12518

## Lab Sample ID: 550-114629-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	3.6	D1	0.80	mg/L	2		300.0	Total/NA
Lithium	0.76		0.20	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	470		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
SiO <sub>2</sub> , Silica	20		0.21	mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0013		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.015		0.00050	mg/L	1		200.8 LL	Total/NA
Chromium	0.0016		0.0010	mg/L	1		200.8 LL	Total/NA
Cobalt	0.0038		0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.17		0.00050	mg/L	1		200.8 LL	Total/NA
Selenium	0.0020		0.00050	mg/L	1		200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W-126-125128**

**Lab Sample ID: 550-114629-1**

Date Collected: 12/05/18 13:49

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	3.5	D1	0.80	mg/L			12/13/18 21:09	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.78		0.20	mg/L		12/11/18 07:22	12/12/18 15:56	1
Magnesium	470		2.0	mg/L		12/11/18 07:22	12/12/18 15:56	1
SiO2, Silica	24		0.21	mg/L		12/11/18 07:22	12/12/18 15:56	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/11/18 07:36	12/20/18 22:11	1
Arsenic	0.0027		0.00050	mg/L		12/11/18 07:36	12/20/18 22:11	1
Barium	0.021		0.00050	mg/L		12/11/18 07:36	12/20/18 22:11	1
Cadmium	ND		0.00010	mg/L		12/11/18 07:36	12/20/18 22:11	1
Chromium	0.0026		0.0010	mg/L		12/11/18 07:36	12/20/18 22:11	1
Cobalt	0.0049		0.00050	mg/L		12/11/18 07:36	12/20/18 22:11	1
Lead	0.00072		0.00050	mg/L		12/11/18 07:36	12/20/18 22:11	1
Molybdenum	0.20		0.00050	mg/L		12/11/18 07:36	12/20/18 22:11	1
Selenium	0.0015	M1	0.00050	mg/L		12/11/18 07:36	12/20/18 22:11	1
Thallium	0.00015		0.00010	mg/L		12/11/18 07:36	01/24/19 23:27	1

**Client Sample ID: CH-CCR-MW65A-2518**

**Lab Sample ID: 550-114629-2**

Date Collected: 12/05/18 16:42

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.9	D1	0.80	mg/L			12/13/18 21:27	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.54		0.20	mg/L		12/11/18 07:22	12/12/18 17:19	1
Magnesium	290		2.0	mg/L		12/11/18 07:22	12/12/18 17:19	1
SiO2, Silica	32		0.21	mg/L		12/11/18 07:22	12/12/18 17:19	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/11/18 07:36	01/24/19 23:34	1
Arsenic	0.0025		0.00050	mg/L		12/11/18 07:36	01/24/19 23:34	1
Barium	0.040		0.00050	mg/L		12/11/18 07:36	01/24/19 23:34	1
Cadmium	0.00013		0.00010	mg/L		12/11/18 07:36	01/24/19 23:34	1
Chromium	0.0035		0.0010	mg/L		12/11/18 07:36	01/24/19 23:34	1
Cobalt	0.0047		0.00050	mg/L		12/11/18 07:36	01/24/19 23:34	1
Lead	0.0010		0.00050	mg/L		12/11/18 07:36	01/24/19 23:34	1
Molybdenum	0.059		0.00050	mg/L		12/11/18 07:36	01/24/19 23:34	1
Selenium	0.0021		0.00050	mg/L		12/11/18 07:36	01/29/19 20:56	1
Thallium	0.00011		0.00010	mg/L		12/11/18 07:36	01/24/19 23:34	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

**Client Sample ID: CH-CCR-MW66A-2518**

**Lab Sample ID: 550-114629-3**

Date Collected: 12/05/18 14:58

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.93	D1	0.80	mg/L			12/13/18 21:46	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.51		0.20	mg/L		12/11/18 07:22	12/12/18 17:25	1
Magnesium	280		2.0	mg/L		12/11/18 07:22	12/12/18 17:25	1
SiO2, Silica	55		0.21	mg/L		12/11/18 07:22	12/12/18 17:25	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/11/18 07:36	01/24/19 23:37	1
Arsenic	0.0034		0.00050	mg/L		12/11/18 07:36	01/24/19 23:37	1
Barium	0.095		0.00050	mg/L		12/11/18 07:36	01/24/19 23:37	1
Cadmium	0.00029		0.00010	mg/L		12/11/18 07:36	01/24/19 23:37	1
Chromium	0.0098		0.0010	mg/L		12/11/18 07:36	01/24/19 23:37	1
Cobalt	0.0026		0.00050	mg/L		12/11/18 07:36	01/24/19 23:37	1
Lead	0.0040		0.00050	mg/L		12/11/18 07:36	01/24/19 23:37	1
Molybdenum	0.016		0.00050	mg/L		12/11/18 07:36	01/24/19 23:37	1
Selenium	0.031		0.00050	mg/L		12/11/18 07:36	01/29/19 20:59	1
Thallium	0.00015		0.00010	mg/L		12/11/18 07:36	01/24/19 23:37	1

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

Date Collected: 12/05/18 14:58

Matrix: Water

Date Received: 12/10/18 11:16

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.0	D1	0.80	mg/L			12/13/18 23:55	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		12/11/18 07:22	12/12/18 17:31	1
Magnesium	270		2.0	mg/L		12/11/18 07:22	12/12/18 17:31	1
SiO2, Silica	41		0.21	mg/L		12/11/18 07:22	12/12/18 17:31	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/11/18 07:36	01/24/19 23:39	1
Arsenic	0.018		0.00050	mg/L		12/11/18 07:36	01/24/19 23:39	1
Barium	0.058		0.00050	mg/L		12/11/18 07:36	01/24/19 23:39	1
Cadmium	ND		0.00010	mg/L		12/11/18 07:36	01/24/19 23:39	1
Chromium	0.0082		0.0010	mg/L		12/11/18 07:36	01/24/19 23:39	1
Cobalt	0.0058		0.00050	mg/L		12/11/18 07:36	01/24/19 23:39	1
Lead	0.0019		0.00050	mg/L		12/11/18 07:36	01/24/19 23:39	1
Molybdenum	0.0061		0.00050	mg/L		12/11/18 07:36	01/24/19 23:39	1
Selenium	0.0011		0.00050	mg/L		12/11/18 07:36	01/29/19 21:01	1
Thallium	ND		0.00010	mg/L		12/11/18 07:36	01/24/19 23:39	1

TestAmerica Phoenix

# Client Sample Results

Client: Arizona Public Service Company  
 Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
 SDG: Cholla

**Client Sample ID: CH-CCR-FD01-12518**

**Lab Sample ID: 550-114629-5**

**Date Collected: 12/05/18 13:49**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

**Method: 300.0 - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	3.6	D1	0.80	mg/L			12/10/18 17:36	2

**Method: 200.7 Rev 4.4 - Metals (ICP)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.76		0.20	mg/L		12/11/18 07:22	12/12/18 17:36	1
Magnesium	470		2.0	mg/L		12/11/18 07:22	12/12/18 17:36	1
SiO <sub>2</sub> , Silica	20		0.21	mg/L		12/11/18 07:22	12/12/18 17:36	1

**Method: 200.8 LL - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/11/18 07:36	01/29/19 21:03	1
Arsenic	0.0013		0.00050	mg/L		12/11/18 07:36	01/29/19 21:03	1
Barium	0.015		0.00050	mg/L		12/11/18 07:36	01/29/19 21:03	1
Cadmium	ND		0.00010	mg/L		12/11/18 07:36	01/29/19 21:03	1
Chromium	0.0016		0.0010	mg/L		12/11/18 07:36	01/29/19 21:03	1
Cobalt	0.0038		0.00050	mg/L		12/11/18 07:36	01/29/19 21:03	1
Lead	ND		0.00050	mg/L		12/11/18 07:36	01/29/19 21:03	1
Molybdenum	0.17		0.00050	mg/L		12/11/18 07:36	01/29/19 21:03	1
Selenium	0.0020		0.00050	mg/L		12/11/18 07:36	01/29/19 21:03	1
Thallium	ND		0.00010	mg/L		12/11/18 07:36	01/29/19 21:03	1



# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography

**Lab Sample ID: 550-114629-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	1.9	D1	8.00	7.40	D1 M2	mg/L		69	80 - 120

**Lab Sample ID: 550-114629-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 164796**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	1.9	D1	8.00	7.51	D1 M2	mg/L		71	80 - 120	1	20

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 550-164126/1-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		12/11/18 07:22	12/12/18 15:18	1
Magnesium	ND		2.0	mg/L		12/11/18 07:22	12/12/18 15:18	1
SiO2, Silica	ND		0.21	mg/L		12/11/18 07:22	12/12/18 15:18	1

**Lab Sample ID: LCS 550-164126/2-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	1.00	1.02		mg/L		102	85 - 115
Magnesium	21.0	21.1		mg/L		100	85 - 115
SiO2, Silica	10.7	9.78		mg/L		91	85 - 115

**Lab Sample ID: LCSD 550-164126/3-A**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lithium	1.00	1.00		mg/L		100	85 - 115	1	20
Magnesium	21.0	20.9		mg/L		99	85 - 115	1	20
SiO2, Silica	10.7	9.63		mg/L		90	85 - 115	2	20

**Lab Sample ID: 550-114629-1 MS**  
**Matrix: Water**  
**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W-126-125128**  
**Prep Type: Total/NA**  
**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.781		1.00	0.788	M2	mg/L		0.6	70 - 130
Magnesium	474		21.0	462	M3	mg/L		-57	70 - 130
SiO2, Silica	24.3		10.7	23.1	M2	mg/L		-11	70 - 130

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: 550-114629-1 MSD**

**Matrix: Water**

**Analysis Batch: 164399**

**Client Sample ID: CH-CCR-W-126-125128**

**Prep Type: Total/NA**

**Prep Batch: 164126**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	0.781		1.00	0.776	M2	mg/L		-0.5	70 - 130	1	20
Magnesium	474		21.0	462	M3	mg/L		-60	70 - 130	0	20
SiO2, Silica	24.3		10.7	23.2	M2	mg/L		-9	70 - 130	1	20

## Method: 200.8 LL - Metals (ICP/MS)

**Lab Sample ID: MB 550-164127/1-A**

**Matrix: Water**

**Analysis Batch: 165102**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 164127**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/11/18 07:36	12/20/18 21:58	1
Arsenic	ND		0.00050	mg/L		12/11/18 07:36	12/20/18 21:58	1
Barium	ND		0.00050	mg/L		12/11/18 07:36	12/20/18 21:58	1
Cadmium	ND		0.00010	mg/L		12/11/18 07:36	12/20/18 21:58	1
Chromium	ND		0.0010	mg/L		12/11/18 07:36	12/20/18 21:58	1
Cobalt	ND		0.00050	mg/L		12/11/18 07:36	12/20/18 21:58	1
Lead	ND		0.00050	mg/L		12/11/18 07:36	12/20/18 21:58	1
Molybdenum	ND		0.00050	mg/L		12/11/18 07:36	12/20/18 21:58	1
Selenium	ND		0.00050	mg/L		12/11/18 07:36	12/20/18 21:58	1

**Lab Sample ID: MB 550-164127/1-A**

**Matrix: Water**

**Analysis Batch: 167570**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 164127**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		12/11/18 07:36	01/24/19 23:20	1
Arsenic	ND		0.00050	mg/L		12/11/18 07:36	01/24/19 23:20	1
Barium	ND		0.00050	mg/L		12/11/18 07:36	01/24/19 23:20	1
Cadmium	ND		0.00010	mg/L		12/11/18 07:36	01/24/19 23:20	1
Chromium	ND		0.0010	mg/L		12/11/18 07:36	01/24/19 23:20	1
Cobalt	ND		0.00050	mg/L		12/11/18 07:36	01/24/19 23:20	1
Lead	ND		0.00050	mg/L		12/11/18 07:36	01/24/19 23:20	1
Molybdenum	ND		0.00050	mg/L		12/11/18 07:36	01/24/19 23:20	1
Thallium	ND		0.00010	mg/L		12/11/18 07:36	01/24/19 23:20	1

**Lab Sample ID: MB 550-164127/1-A**

**Matrix: Water**

**Analysis Batch: 167975**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 164127**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		0.00050	mg/L		12/11/18 07:36	01/29/19 20:44	1

**Lab Sample ID: LCS 550-164127/2-A**

**Matrix: Water**

**Analysis Batch: 165102**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 164127**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.102		mg/L		102	85 - 115

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 550-164127/2-A**  
**Matrix: Water**  
**Analysis Batch: 165102**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164127**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	0.100	0.102		mg/L		102	85 - 115
Barium	0.100	0.107		mg/L		107	85 - 115
Cadmium	0.100	0.103		mg/L		103	85 - 115
Chromium	0.100	0.102		mg/L		102	85 - 115
Cobalt	0.100	0.101		mg/L		101	85 - 115
Lead	0.100	0.103		mg/L		103	85 - 115
Molybdenum	0.100	0.104		mg/L		104	85 - 115
Selenium	0.100	0.107		mg/L		107	85 - 115

**Lab Sample ID: LCS 550-164127/2-A**  
**Matrix: Water**  
**Analysis Batch: 167570**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164127**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.102		mg/L		102	85 - 115
Arsenic	0.100	0.103		mg/L		103	85 - 115
Barium	0.100	0.107		mg/L		107	85 - 115
Cadmium	0.100	0.102		mg/L		102	85 - 115
Chromium	0.100	0.103		mg/L		103	85 - 115
Cobalt	0.100	0.103		mg/L		103	85 - 115
Lead	0.100	0.0989		mg/L		99	85 - 115
Molybdenum	0.100	0.101		mg/L		101	85 - 115
Thallium	0.100	0.101		mg/L		101	85 - 115

**Lab Sample ID: LCS 550-164127/2-A**  
**Matrix: Water**  
**Analysis Batch: 167975**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 164127**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Selenium	0.100	0.0974		mg/L		97	85 - 115

**Lab Sample ID: LCSD 550-164127/3-A**  
**Matrix: Water**  
**Analysis Batch: 165102**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164127**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.104		mg/L		104	85 - 115	1	20
Arsenic	0.100	0.102		mg/L		102	85 - 115	0	20
Barium	0.100	0.111		mg/L		111	85 - 115	4	20
Cadmium	0.100	0.104		mg/L		104	85 - 115	1	20
Chromium	0.100	0.103		mg/L		103	85 - 115	1	20
Cobalt	0.100	0.102		mg/L		102	85 - 115	1	20
Lead	0.100	0.104		mg/L		104	85 - 115	1	20
Molybdenum	0.100	0.106		mg/L		106	85 - 115	1	20
Selenium	0.100	0.107		mg/L		107	85 - 115	0	20

TestAmerica Phoenix

# QC Sample Results

Client: Arizona Public Service Company  
 Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
 SDG: Cholla

## Method: 200.8 LL - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCSD 550-164127/3-A**  
**Matrix: Water**  
**Analysis Batch: 167570**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164127**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD	Limit
Antimony	0.100	0.102		mg/L		102	85 - 115	0		20
Arsenic	0.100	0.104		mg/L		104	85 - 115	1		20
Barium	0.100	0.109		mg/L		109	85 - 115	1		20
Cadmium	0.100	0.102		mg/L		102	85 - 115	0		20
Chromium	0.100	0.103		mg/L		103	85 - 115	0		20
Cobalt	0.100	0.102		mg/L		102	85 - 115	1		20
Lead	0.100	0.0998		mg/L		100	85 - 115	1		20
Molybdenum	0.100	0.101		mg/L		101	85 - 115	1		20
Thallium	0.100	0.102		mg/L		102	85 - 115	1		20

**Lab Sample ID: LCSD 550-164127/3-A**  
**Matrix: Water**  
**Analysis Batch: 167975**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 164127**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD	Limit
Selenium	0.100	0.0994		mg/L		99	85 - 115	2		20

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## HPLC/IC

### Analysis Batch: 164154

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	300.0	

### Analysis Batch: 164511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	300.0	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	300.0	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	300.0	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	300.0	

### Analysis Batch: 164796

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	300.0	
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	300.0	

## Metals

### Prep Batch: 164126

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.7	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	200.7	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.7	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	200.7	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	200.7	
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.7	
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.7	

### Prep Batch: 164127

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.8	
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	200.8	
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.8	
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	200.8	
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	200.8	
MB 550-164127/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-164127/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-164127/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.8	
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.8	

### Analysis Batch: 164399

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	200.7 Rev 4.4	164126
MB 550-164126/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164126

TestAmerica Phoenix

# QC Association Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## Metals (Continued)

### Analysis Batch: 164399 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 550-164126/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164126
LCSD 550-164126/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.7 Rev 4.4	164126

### Analysis Batch: 165102

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.8 LL	164127
MB 550-164127/1-A	Method Blank	Total/NA	Water	200.8 LL	164127
LCS 550-164127/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	164127
LCSD 550-164127/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	164127

### Analysis Batch: 167570

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-1	CH-CCR-W-126-125128	Total/NA	Water	200.8 LL	164127
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	200.8 LL	164127
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.8 LL	164127
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	200.8 LL	164127
MB 550-164127/1-A	Method Blank	Total/NA	Water	200.8 LL	164127
LCS 550-164127/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	164127
LCSD 550-164127/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	164127
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.8 LL	164127
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.8 LL	164127

### Analysis Batch: 167975

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-114629-2	CH-CCR-MW65A-2518	Total/NA	Water	200.8 LL	164127
550-114629-3	CH-CCR-MW66A-2518	Total/NA	Water	200.8 LL	164127
550-114629-4	CH-CCR-MW67A-2518	Total/NA	Water	200.8 LL	164127
550-114629-5	CH-CCR-FD01-12518	Total/NA	Water	200.8 LL	164127
MB 550-164127/1-A	Method Blank	Total/NA	Water	200.8 LL	164127
LCS 550-164127/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	164127
LCSD 550-164127/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	164127
550-114629-1 MS	CH-CCR-W-126-125128	Total/NA	Water	200.8 LL	164127
550-114629-1 MSD	CH-CCR-W-126-125128	Total/NA	Water	200.8 LL	164127

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

**Client Sample ID: CH-CCR-W-126-125128**

**Lab Sample ID: 550-114629-1**

**Date Collected: 12/05/18 13:49**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/13/18 21:09	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 15:56	SRA	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	165102	12/20/18 22:11	ARE	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167570	01/24/19 23:27	ARE	TAL PHX

**Client Sample ID: CH-CCR-MW65A-2518**

**Lab Sample ID: 550-114629-2**

**Date Collected: 12/05/18 16:42**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/13/18 21:27	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:19	SRA	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167570	01/24/19 23:34	ARE	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167975	01/29/19 20:56	ARE	TAL PHX

**Client Sample ID: CH-CCR-MW66A-2518**

**Lab Sample ID: 550-114629-3**

**Date Collected: 12/05/18 14:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/13/18 21:46	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:25	SRA	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167570	01/24/19 23:37	ARE	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167975	01/29/19 20:59	ARE	TAL PHX

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

**Date Collected: 12/05/18 14:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164511	12/13/18 23:55	KJS	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:31	SRA	TAL PHX

TestAmerica Phoenix

# Lab Chronicle

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

**Client Sample ID: CH-CCR-MW67A-2518**

**Lab Sample ID: 550-114629-4**

**Date Collected: 12/05/18 14:58**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167570	01/24/19 23:39	ARE	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167975	01/29/19 21:01	ARE	TAL PHX

**Client Sample ID: CH-CCR-FD01-12518**

**Lab Sample ID: 550-114629-5**

**Date Collected: 12/05/18 13:49**

**Matrix: Water**

**Date Received: 12/10/18 11:16**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	164154	12/10/18 17:36	NEL	TAL PHX
Total/NA	Prep	200.7			164126	12/11/18 07:22	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	164399	12/12/18 17:36	SRA	TAL PHX
Total/NA	Prep	200.8			164127	12/11/18 07:36	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		1	167975	01/29/19 21:03	ARE	TAL PHX

**Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-2  
SDG: Cholla

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
200.7 Rev 4.4	Metals (ICP)	40CFR136A	TAL PHX
200.8 LL	Metals (ICP/MS)	EPA	TAL PHX
200.7	Preparation, Total Metals	EPA	TAL PHX
200.8	Preparation, Total Metals	EPA	TAL PHX

#### Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

#### Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

TestAmerica Phoenix

4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114629

Regulatory Program:

CCR

TestAmerica  
THE LEADER IN ENVIRONMENTAL TESTING  
TestAmerica Laboratories, Inc.

Client Contact

4801 Cholla Lake Road  
Joseph City, Az 86032  
(928) 587-0319  
Phone  
(xxx) xxx-xxxx FAX  
Project Name: CCR  
Site: Cholla  
P O #

Doug Lavarway  
928-587-0319

Doug Lavarway  
Lab Contact:

Carrier:

12/9/2018

COC No: 1 of 1 COCs

Analysis Turnaround Time  
TAT if different from Below

Sample Identification

Filtered Sample ( Y / N )  
Perform MS / MSD ( Y / N )  
EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)  
EPA 300.0 (Cl, F, SO4)  
SM 2540C (TDS)  
SM 4500-HB (pH)  
SM 2320B (HCO3)  
Alkalinity  
Carbonate as CaCO3  
Bicarbonate as CaCO3

Sampler:  
For Lab Use Only:  
Walk-in Client:  
Lab Sampling:  
Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Cont, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	SM 2320B (HCO3)	Alkalinity	Carbonate as CaCO3	Bicarbonate as CaCO3	Sample Specific Notes:
CH-CCR-W-126-12518	12/5/2018	1349 G		W	2	N	X	X	X	X	X	X	X	X	X	
CH-CCR-MW65A-12518	12/5/2018	1642 G		W	2	N	X	X	X	X	X	X	X	X	X	
CH-CCR-MW66A-12518	12/5/2018	1458 G		W	2	N	X	X	X	X	X	X	X	X	X	
CH-CCR-MW67A-12518	12/5/2018	1548 G		W	2	N	X	X	X	X	X	X	X	X	X	
CH-CCR-FD01-12518	12/5/2018	1349 G		W	2	N	X	X	X	X	X	X	X	X	X	



Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Special Instructions/QC Requirements & Comments:  
 Non-Hazard  
 Flammable  
 Skin Irritant  
 Poison B  
 Unknown  
 Return to Client  
 Disposal by Lab  
 Archive for \_\_\_\_\_ Months

2-2-C 2.0-C 1.8-C 1.0-C

Custody Seats Intact:  Yes  No  
Cooler Temp. (°C): OBS'D \_\_\_\_\_  
Therm ID No. \_\_\_\_\_

Relinquished by: *Doug Lavarway*  
Company: APS  
Date/Time: 12/10/18  
Received by: \_\_\_\_\_  
Company: \_\_\_\_\_  
Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_  
Company: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Received in Laboratory by: \_\_\_\_\_  
Company: \_\_\_\_\_  
Date/Time: 12-10-18

Relinquished by: \_\_\_\_\_  
Company: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Received in Laboratory by: \_\_\_\_\_  
Company: \_\_\_\_\_  
Date/Time: 12-10-18



TestAmerica Phoenix  
4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114629

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact: Doug Lavarway 928-587-0319  
 Analysis Turnaround Time: TAT if different from Below  
 Lab Contact: Doug Lavarway 12/9/2018  
 Carrier: COC No. 1 of 1 COCS  
 Sampler: For Lab Use Only:  
 Walk-in Client: Lab Sampling:  
 Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )			Perform MS / MSD ( Y / N )			
						EPA 200.7 ( Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 300.0 (F)				
CH-CCR-W-126-12518	12/5/2018	1349	G	W	2	N	X	X	X			
CH-CCR-MW65A-12518	12/5/2018	1642	G	W	2	N	X	X	X			
CH-CCR-MW66A-12518	12/5/2018	1458	G	W	2	N	X	X	X			
CH-CCR-MW67A-12518	12/5/2018	1548	G	W	2	N	X	X	X			
CH-CCR-FD01-12518	12/5/2018	1349	G	W	2	N	X	X	X			

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other  
 Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison 8  Unknown  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months  
 Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Special Instructions/QC Requirements & Comments: 2-2-e, 2-0-e, 1-8-e, 1-6-e

Custody Seals Intact:  Yes  No  
 Relinquished by: Doug Lavarway Company: TPS Date/Time: 12/10/18  
 Relinquished by: Company: Date/Time:  
 Relinquished by: Company: Date/Time:  
 Cooler Temp. (°C): Obs'd: Corrd: Therm ID No.:  
 Received by: Received in Laboratory by: TAPHX TAPHX Company: LAB Date/Time: 12-10-18  
 Date/Time: 11:16



**TestAmerica Phoenix**  
4625 E Colton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114629

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact		Doug Lavarnway		928-587-0319		Analysis Turnaround Time		Doug Lavarnway		Lab Contact:		Carrier:		12/9/2018		COC No:		1 of 1 COCs	
4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone		TAT if different from Below		Doug Lavarnway		Carrier:		12/9/2018		COC No:		1 of 1 COCs	
(xxx) xxx-xxxx		FAX		Project Name: CCR		Site: Cholla		P O #		Doug Lavarnway		Carrier:		12/9/2018		COC No:		1 of 1 COCs	
Sample Identification		Sample Date		Sample Time		Sample Type (C=Comp, G=Grab)		Matrix		# of Cont.		Filtered Sample ( Y / N )		Perform MS / MSD ( Y / N )		932.0 Radium 226 and 228		Sample Specific Notes:	
CH-CCR-W-126-12518		12/5/2018		1349 G		W		W		2		N		X		X			
CH-CCR-MW65A-12518		12/5/2018		1642 G		W		W		2		N		X		X			
CH-CCR-MW66A-12518		12/5/2018		1458 G		W		W		2		N		X		X			
CH-CCR-MW67A-12518		12/5/2018		1548 G		W		W		2		N		X		X			
CH-CCR-FD01-12518		12/5/2018		1349 G		W		W		2		N		X		X			
<p><b>Preservation Used:</b> 1=Ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other</p> <p><b>Possible Hazard Identification:</b> Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.</p> <p><input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown</p> <p><input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months</p> <p><b>Special Instructions/QC Requirements &amp; Comments:</b> Radium shall be sent off to Radiation Safety Engineering for analysis.</p> <p>Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)</p> <p>2-2-e 2-0-c 1-8-e, 1-8-c</p>																			
Custody Seals Intact:		<input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obs'd:		Therm ID No.:		Company:		Company:		Date/Time:		Date/Time:		Date/Time:	
Relinquished by:		Doug Lavarnway		Company: APS		Date/Time: 12/10/18		Received by:		Company:		Date/Time:		Received in Laboratory by:		Company: IAPHX		Date/Time: 12-10-18	
Relinquished by:		Doug Lavarnway		Company:		Date/Time:		Received by:		Company:		Date/Time:		Received in Laboratory by:		Company: IAPHX		Date/Time: 12-10-18	

**Chain of Custody Record**



<b>Client Information (Sub Contract Lab)</b>		Lab PM Baker, Ken	Camera Tracking No(s) 550-23361.1
Client Contact Shipping/Receiving		E-Mail ken.baker@testamericainc.com	Page Page 1 of 1
Company TestAmerica Laboratories, Inc.		State of Origin Arizona	Job # 550-114629-2
Address 17461 Denan Ave. Suite 100, Irvine State, Zip CA, 92614-5817 Phone 949-261-1022(Tel) 949-260-3297(Fax) Email		Accreditations Required (See note) State Program - Arizona	Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other: M - Hexane N - None O - AsNaO2 P - Na2CAS Q - Na2SO3 R - Na2SO4 S - H2SO4 T - TSP Dodecylhydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)
Due Date Requested: 1/22/2019		Analysis Requested	
TAT Requested (days):		Total Number of Containers	
PO #	Field Filtered Sample (Yes or No)	200.8, CWA, LL/200.2, 200.8 Metals	
WO #	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)
Project # 55009651	12/5/18	13:49	Water
SSOW#	12/5/18	13:49	Water
Arizona Public Service	12/5/18	13:49	Water
	12/5/18	16:42	Water
	12/5/18	14:58	Water
	12/5/18	14:58	Water
	12/5/18	13:49	Water
	12/5/18	13:49	Water
Special Instructions/Note: AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible! AZ Sample! Do not dilute if at all possible!			
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.			
<b>Possible Hazard Identification</b>			
Unconfirmed Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank 2			
Empty Kit Relinquished by: _____ Date: _____ Relinquished by: _____ Date/Time: _____ Relinquished by: _____ Date/Time: _____ Relinquished by: _____ Date/Time: _____			
Custody Seal Intact Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>			
Received by: _____ Date/Time: _____ Received by: _____ Date/Time: _____ Received by: _____ Date/Time: 1/16/19 13:00 Cooler Temperature(s) °C and Other Remarks: 2.1 / 2.5 IR-89			



# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114629-2

SDG Number: Cholla

**Login Number: 114629**

**List Number: 1**

**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.





# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-114629-3

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

For:

Arizona Public Service Company

4801 Cholla Lake Rd

Joseph City, Arizona 86032

Attn: Doug Lavarney



Authorized for release by:

1/16/2019 8:01:30 AM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

TotalAccess

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-3  
SDG: Cholla

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-3  
SDG: Cholla

**Job ID: 550-114629-3**

**Laboratory: TestAmerica Phoenix**

## Narrative

**Job Narrative**  
**550-114629-3**

## Comments

No additional comments.

## Receipt

The samples were received on 12/10/2018 11:16 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.6° C, 1.8° C, 2.0° C and 2.2° C.

## Receipt Exceptions

Several of the sample sites were missing from the pick list.

CH-CCR-W-126-125128 (550-114629-1), CH-CCR-W-126-125128 (550-114629-1[DU]), CH-CCR-W-126-125128 (550-114629-1[MS]), CH-CCR-W-126-125128 (550-114629-1[MSD]), CH-CCR-MW65A-2518 (550-114629-2), CH-CCR-MW66A-2518 (550-114629-3), CH-CCR-MW67A-2518 (550-114629-4) and CH-CCR-FD01-12518 (550-114629-5)

## Lab Admin

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

## Subcontract Work

Method Radium 226/228: This method was subcontracted to Radiation Safety. The subcontract laboratory certification is different from that of the facility issuing the final report.

# Sample Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-3  
SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-114629-1	CH-CCR-W-126-125128	Water	12/05/18 13:49	12/10/18 11:16
550-114629-2	CH-CCR-MW65A-2518	Water	12/05/18 16:42	12/10/18 11:16
550-114629-3	CH-CCR-MW66A-2518	Water	12/05/18 14:58	12/10/18 11:16
550-114629-4	CH-CCR-MW67A-2518	Water	12/05/18 14:58	12/10/18 11:16
550-114629-5	CH-CCR-FD01-12518	Water	12/05/18 13:49	12/10/18 11:16

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# Accreditation/Certification Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-3  
SDG: Cholla

## Laboratory: TestAmerica Phoenix

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-19

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# Method Summary

Client: Arizona Public Service Company  
Project/Site: CCR

TestAmerica Job ID: 550-114629-3  
SDG: Cholla

---

Method	Method Description	Protocol	Laboratory
Subcontract	Radium 226/228	None	Radiation

---

**Protocol References:**

None = None

**Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225



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# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
 Website: www.radsafe.com

(480) 897-9459  
 FAX (480) 892-5446

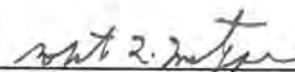
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
 4625 E. Cotton Center Blvd., Suite #189  
 Phoenix, AZ 85040

Sampling Date: December 05, 2018  
 Sample Received: December 11, 2018  
 Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-W-126-125128 (550-114629-1)	< 0.4	< 0.6	< 0.6

Date of Analysis	12/21/2018	12/21/2018	12/21/2018
------------------	------------	------------	------------

  
 \_\_\_\_\_ 12/26/2018  
 Robert L. Metzger, Ph.D., C.H.P. Date  
 Laboratory License Number AZ0462



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

(480) 897-9459  
FAX (480) 892-5446

## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 05, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-MW65A-2518 (550-114629-2)	< 0.4	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
------------------	------------	------------	------------

Robert L. Metzger, Ph.D., C.H.P.

12/26/2018

Date

Laboratory License Number AZ0462



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# Radiation Safety Engineering, Inc.

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 Website: www.radsafe.com

(480) 897-9459  
 FAX (480) 892-5446

## Radiochemical Activity in Water (pCi/L)

TestAmerica  
 4625 E. Cotton Center Blvd., Suite #189  
 Phoenix, AZ 85040

Sampling Date: December 05, 2018  
 Sample Received: December 11, 2018  
 Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-MW66A-2518 (550-114629-3)	< 0.4	< 0.6	< 0.6

Date of Analysis	12/21/2018	12/21/2018	12/21/2018
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*Robert L. Metzger* 12/26/2018  
 Robert L. Metzger, Ph.D., C.H.P. Date  
 Laboratory License Number AZ0462



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
Website: www.radsafe.com

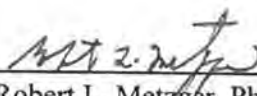
(480) 897-9459  
FAX (480) 892-5446

## Radiochemical Activity in Water (pCi/L)

TestAmerica  
4625 E. Cotton Center Blvd., Suite #189  
Phoenix, AZ 85040

Sampling Date: December 05, 2018  
Sample Received: December 11, 2018  
Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-MW67A-2518 (550-114629-4)	< 0.4	< 0.6	< 0.6
Date of Analysis	12/14/2018	12/14/2018	12/14/2018

  
 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462

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# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121  
 Website: www.radsafe.com

(480) 897-9459  
 FAX (480) 892-5446

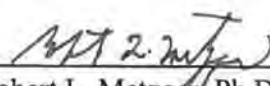
## Radiochemical Activity in Water (pCi/L)

TestAmerica  
 4625 E. Cotton Center Blvd., Suite #189  
 Phoenix, AZ 85040

Sampling Date: December 05, 2018  
 Sample Received: December 11, 2018  
 Analysis Completed: December 26, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
CH-CCR-FD01-12518 (550-114629-5)	< 0.4	0.9 ± 0.3	0.9 ± 0.3

Date of Analysis	12/14/2018	12/14/2018	12/14/2018
------------------	------------	------------	------------

  
 Robert L. Metzger, Ph.D., C.H.P.      12/26/2018  
 Date  
 Laboratory License Number AZ0462





TestAmerica Phoenix


4625 E Cotton Center Blvd  
Suite 189  
Phoenix, AZ 85040  
phone 602.437.3340 fax 602.454.9303

114629

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.  
THE LEADER IN ENVIRONMENTAL TESTING

Client Contact		Doug Lavarnway		928-587-0319		Analysis Turnaround Time		Doug Lavarnway		Lab Contact:		Carrier:		12/9/2018		COC No:		1 of 1 COCs	
APC Cholla		4801 Cholla Lake Road		Joseph City, Az 86032		(928) 587-0319		Phone		FAX		Project Name: CCR		Site: Cholla		P O #		Sampler:	
								TAT if different from Below										For Lab Use Only:	
																		Walk-in Client:	
																		Lab Sampling:	
																		Job / SDG No.:	
																		Sample Specific Notes:	
Sample Identification	Sample Date	Sample Time	Sample Type (C=Cont, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 200.7 Rev 4.4 (B, Ca, Na, K, Mg)	EPA 300.0 (Cl, F, SO4)	SM 2540C (TDS)	SM 4500-HB (pH)	SM 2320B (HCO3)	Alkalinity	Carbonate as CaCO3	Bicarbonate as CaCO3				
CH-CCR-W-126-12518	12/5/2018	1349 G		W	2	N	X	X	X	X	X	X	X	X	X				
CH-CCR-MW65A-12518	12/5/2018	1642 G		W	2	N	X	X	X	X	X	X	X	X	X				
CH-CCR-MW66A-12518	12/5/2018	1458 G		W	2	N	X	X	X	X	X	X	X	X	X				
CH-CCR-MW67A-12518	12/5/2018	1548 G		W	2	N	X	X	X	X	X	X	X	X	X				
CH-CCR-FD01-12518	12/5/2018	1349 G		W	2	N	X	X	X	X	X	X	X	X	X				
<p>Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other</p> <p>Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.</p> <p>Special Instructions/QC Requirements &amp; Comments:</p> <p><input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown</p> <p><input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months</p> <p>Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)</p>																			
<p>550-114629 Chain of Custody</p> 																			
Custody Seals Intact:		<input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:				Cooler Temp. (°C):		Obs'd:		Therm ID No.:							
Relinquished by:		Doug Lavarnway		Company:		APC		Date/Time:		12/10/18		Received by:		TAPPH		Company:		Date/Time:	
Relinquished by:				Company:				Date/Time:				Received in Laboratory by:		TAPPH		Company:		Date/Time:	
Relinquished by:				Company:				Date/Time:				Received in Laboratory by:		TAPPH		Company:		Date/Time:	



# Chain of Custody Record



THE LEADER IN ENVIRONMENTAL TESTING

**TestAmerica Phoenix**  
 4625 E Cotton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

114629

Client Contact: Doug Lavarway 928-587-0319 Analysis Turnaround Time: Lab Contact: Doug Lavarway 12/9/2018

APS Cholla  
 4801 Cholla Lake Road  
 Joseph City, Az 86032  
 (928) 587-0319 Phone  
 (xxx) xxx-xxxx FAX  
 Project Name: CCR  
 Site: Cholla  
 P O #

Carrier: 12/9/2018  
 COC No: 1 of 1 COCS  
 Sampler:  
 For Lab Use Only:  
 Walk-in Client:  
 Lab Sampling:  
 Job / SDG No.:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )			Perform MS / MSD ( Y / N )		
						EPA 200.7 ( Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 300.0 (F)	EPA 200.7 ( Li, Mg, SiO2)	200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)	EPA 300.0 (F)
CH-CCR-W-126-12518	12/5/2018	1349	G	W	2	N	X	X	X	X	X
CH-CCR-MMW65A-12518	12/5/2018	1642	G	W	2	N	X	X	X	X	X
CH-CCR-MMW66A-12518	12/5/2018	1458	G	W	2	N	X	X	X	X	X
CH-CCR-MMW67A-12518	12/5/2018	1548	G	W	2	N	X	X	X	X	X
CH-CCR-FD01-12518	12/5/2018	1349	G	W	2	N	X	X	X	X	X

Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other  
 Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:  
 Non-Hazard  
 Flammable  
 Skin Irritant  
 Poison B  
 Unknown  
 Return to Client  
 Disposal by Lab  
 Archive for \_\_\_\_\_ Months

Custody Seals Intact:  Yes  No  
 Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Corrd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_  
 2-2-e, 2-0-e, 1-8-e, 1-6-e

Relinquished by: Doug Lavarway  
 Company: APS  
 Date/Time: 12/10/16  
 Received by: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_  
 Received in Laboratory by: \_\_\_\_\_  
 Company: TAPPHX  
 Date/Time: 12-10-16  
 Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013



# Chain of Custody Record



THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

**TestAmerica Phoenix**  
 4625 E Colton Center Blvd  
 Suite 189  
 Phoenix, AZ 85040  
 phone 602.437.3340 fax 602.454.9303

114629

Regulatory Program:

CCR

TestAmerica Laboratories, Inc.

Client Contact	Doug Lavarnway	928-587-0319	Analysis Turnaround Time	Lab Contact:	Doug Lavarnway	Carrier:	12/9/2018	COC No:	1 of 1 COCs
4801 Cholla Lake Road	Joseph City, Az 86032	(928) 587-0319	Phone	TAI if different from Below				Sampler:	
		(xxx) xxx-xxxx	FAX					For Lab Use Only:	
Project Name: CCR	Site: Cholla							Walk-in Client:	
P O #								Lab Sampling:	
								Job / SDG No.:	

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample ( Y / N )	Perform MS / MSD ( Y / N )	932.0 Radium 226 and 228	Sample Specific Notes:
CH-CCR-W-126-12518	12/5/2018	1349 G	W	W	2	N	X	X	
CH-CCR-MMW65A-12518	12/5/2018	1642 G	W	W	2	N	X	X	
CH-CCR-MMW66A-12518	12/5/2018	1458 G	W	W	2	N	X	X	
CH-CCR-MW67A-12518	12/5/2018	1548 G	W	W	2	N	X	X	
CH-CCR-FD01-12518	12/5/2018	1349 G	W	W	2	N	X	X	

**Preservation Used:** 1=Ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other \_\_\_\_\_

**Possible Hazard Identification:**  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

**Special Instructions/QC Requirements & Comments:** Radium shall be sent off to Radiation Safety Engineering for analysis.

2-2-e 2-0-c 1-8-e, 1-8-c

Custody Seals Intact:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Custody Seal No.:		Cooler Temp. (°C):	Obs'd: _____	Cor'd:	Therm ID No.:
Relinquished by:	Doug Lavarnway	Company:	APS	Received by:		Company:	
Relinquished by:		Company:		Received in Laboratory by:	JAPHX	Company:	AS
Relinquished by:		Company:		Date/Time:	12-10-18	Date/Time:	11-16

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-114629-3

SDG Number: Cholla

**Login Number: 114629**

**List Number: 1**

**Creator: Gravlin, Andrea**

**List Source: TestAmerica Phoenix**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.





### Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-114628-1	<b>Review Date:</b>	5/24/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

**Sample Summary:**

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-W301-12718	12/07/18 14:19	550-114628-1	
CH-CCR-W302-12718	12/07/18 15:05	550-114628-2	
CH-CCR-W304-12718	12/07/18 15:59	550-114628-3	
CH-CCR-W305-12718	12/07/18 13:06	550-114628-4	
CH-CCR-W306-12718	12/07/18 12:28	550-114628-5	
CH-CCR-W307-12818	12/08/18 13:58	550-114628-6	
CH-CCR-W308-12818	12/08/18 12:42	550-114628-7	
CH-CCR-W309-12818	12/08/18 11:25	550-114628-8	
CH-CCR-M52A-12818	12/08/18 14:54	550-114628-9	
CH-CCR-M53A-12718	12/07/18 11:14	550-114628-10	
CH-CCR-FD02-12718	12/07/18 11:14	550-114628-11	Duplicate of CH-CCR-M53A-12718
CH-CCR-M55A-12818	12/08/18 16:50	550-114628-12	
CH-CCR-W314-12818	12/08/18 15:27	550-114628-13	

**Analytical Methods:**

Analytes	Analyte Group	Method
Boron, Calcium, Magnesium, Potassium, Sodium	Metals	EPA 200.7
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Alkalinity	General Chemistry	SM 2320B
Total Dissolved Solids	General Chemistry	SM 2450C
pH	General Chemistry	SM 4500 H+ B
Radium 226, Radium 228, Total Radium	Radiochemical Analysis	Gamma Ray HPGE

## Cholla CCR Data Review

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

### Sample Receipt Condition:

COC Signed and Complete?

Yes  No

If No, provide details.

Sample Login Matched COC?

Yes  No

If no, provide details.

The sample time listed on the COC for CH-CCR-W309-12818 is 1124, but the laboratory logged in the sample with a time of 1125. Data usability is not adversely affected by the one-minute discrepancy.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes  No

### Cholla CCR Data Review

1. Samples analyzed for metals and radium within 180 days of sampling?  Yes No
2. Samples analyzed for chloride, fluoride, and/or sulfate within 28 days of sampling?  Yes No
3. Samples analyzed for total dissolved solids within 7 days of sampling?  Yes No
4. Samples analyzed for alkalinity within 14 days of sampling?  Yes No
5. Samples analyzed for pH within 15 minutes of sampling? Yes  No N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-W301-12718	pH	3 days, 5 hours, 16 minutes	J-HT
CH-CCR-W302-12718	pH	3 days, 4 hours, 30 minutes	J-HT
CH-CCR-W304-12718	pH	3 days, 3 hours, 36 minutes	J-HT
CH-CCR-W305-12718	pH	3 days, 6 hours, 29 minutes	J-HT
CH-CCR-W306-12718	pH	3 days, 7 hours, 7 minutes	J-HT
CH-CCR-W307-12818	pH	2 days, 5 hours, 37 minutes	J-HT
CH-CCR-W308-12818	pH	2 days, 6 hours, 53 minutes	J-HT
CH-CCR-W309-12818	pH	2 days, 8 hours, 10 minutes	J-HT
CH-CCR-M52A-12818	pH	2 days, 4 hours, 41 minutes	J-HT
CH-CCR-M53A-12718	pH	3 days, 8 hours, 21 minutes	J-HT
CH-CCR-FD02-12718	pH	3 days, 8 hours, 21 minutes	J-HT
CH-CCR-M55A-12818	pH	2 days, 2 hours, 45 minutes	J-HT
CH-CCR-W314-12818	pH	2 days 4 hours, 8 minutes	J-HT

Note:

HT = Hold time exceeded.

**Cholla CCR Data Review**

6. Target analytes detected in the blank?

Yes

No

If Yes:

<b>Detected Analyte</b>	<b>Concentration</b>	<b>Samples with concentrations less than 5 times the blank detection</b>

7. LCS recoveries within laboratory-specified limits?

Yes

No

If No:

<b>Analyte</b>	<b>Recovery</b>	<b>Affected Samples</b>

**Cholla CCR Data Review**

8. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W301-12718	Chloride, Fluoride, Sulfate, Boron, Calcium, Magnesium, Potassium, Sodium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-W301-12718	Calcium	-87%/-102%	70 – 130%	None *
	Magnesium	56%/47%	70 – 130%	None*
	Sodium	-131%/-269%	70 – 130%	None *

Note:

\* = It is not possible to assess data usability for this analyte based on spike recovery because the concentration detected in the unspiked native sample is greater than four times the spike concentration.

**Cholla CCR Data Review**

9. Field duplicate collected?

Yes  No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M53A-12718	CH-CCR-FD02-12718

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?  Yes  No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Chloride	400 mg/L	2,300	2,300	0.0%	
Fluoride	0.80 mg/L	2.3	2.3	0.0%	
Sulfate	400 mg/L	3,000	3,100	3.3%	
Boron	0.050 mg/L	3.4	3.3	3.0%	
Calcium	2.0 mg/L	620	600	3.3%	
Magnesium	2.0 mg/L	220	210	4.7%	
Potassium	0.50 mg/L	13	13	0.0%	
Sodium	0.50 mg/L	1,600	1,500	6.5%	
Alkalinity	6.0 mg/L	92	91	1.1%	
Bicarbonate Alkalinity	6.0 mg/L	92	91	1.1%	
Total Dissolved Solids	100 mg/L	7,600	8,000	5.1%	
pH	1.7 S.U.	7.4	7.4	0.0%	
Radium 228	0.5 pCi/L	1.1	0.9	20%	
Total Radium	0.5 pCi/L	1.1	0.9	20%	

Notes:

mg/L = milligrams per liter

pCi/L = picocuries per liter

S.U. = standard units

### Cholla CCR Data Review

10. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-W301-12718	Alkalinity, Total Dissolved Solids, pH
CH-CCR-W305-12718	Alkalinity
CH-CCR-M55A-12818	pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     N/A

If No:

Sample ID	Analyte	Effect on Data Usability



**Cholla CCR Data Review**

11. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes       No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	S.U.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit

## Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-114628-2	<b>Review Date:</b>	5/24/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-W301-12718	12/07/18 14:19	550-114628-1	
CH-CCR-W302-12718	12/07/18 15:05	550-114628-2	
CH-CCR-W304-12718	12/07/18 15:59	550-114628-3	
CH-CCR-W305-12718	12/07/18 13:06	550-114628-4	
CH-CCR-W306-12718	12/07/18 12:28	550-114628-5	
CH-CCR-W307-12818	12/08/18 13:58	550-114628-6	
CH-CCR-W308-12818	12/08/18 12:42	550-114628-7	
CH-CCR-W309-12818	12/08/18 11:25	550-114628-8	
CH-CCR-M52A-12818	12/08/18 14:54	550-114628-9	
CH-CCR-M53A-12718	12/07/18 11:14	550-114628-10	
CH-CCR-FD02-12718	12/07/18 11:14	550-114628-11	Duplicate of CH-CCR-M53A-12718
CH-CCR-M55A-12818	12/08/18 16:50	550-114628-12	
CH-CCR-W314-12818	12/08/18 15:27	550-114628-13	

### Analytical Methods:

Analytes	Analyte Group	Method
Lithium, Magnesium, Silica	Metals	EPA 200.7
Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Fluoride	Anion	EPA 300.0

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

### Cholla CCR Data Review

**Sample Receipt Condition:**

COC Signed and Complete?  
If No, provide details.

Yes  No

Sample Login Matched COC?

Yes  No

If no, provide details.

The sample time listed on the COC for CH-CCR-W309-12818 is 1124, but the laboratory logged in the sample with a time of 1125. Data usability is not adversely affected by the one-minute discrepancy.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes  No

1. Samples analyzed for metals and within 180 days of sampling?

Yes  No

2. Samples analyzed for fluoride within 28 days of sampling?

Yes  No

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability

**Cholla CCR Data Review**

3. Target analytes detected in the blank?

Yes

No

If Yes:

<b>Detected Analyte</b>	<b>Concentration</b>	<b>Samples with concentrations less than 5 times the blank detection</b>
Blank data missing for fluoride analysis.		

4. LCS recoveries within laboratory-specified limits?

Yes

No

If No:

<b>Analyte</b>	<b>Recovery</b>	<b>Affected Samples</b>
LCS data missing for fluoride analysis.		All samples J/UJ-NQ

Note:

NQ = There were insufficient quality control parameters reported for this analysis.

**Cholla CCR Data Review**

5. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W301-12718	Fluoride, Lithium, Magnesium, Silica, Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium
CH-CCR-MW53A-12718	Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-W301-12718	Magnesium	56%/47%	70 – 130%	None *

Note:

\* = It is not possible to assess data usability for this analyte based on spike recovery because the concentration detected in the unspiked native sample is greater than four times the spike concentration.

**Cholla CCR Data Review**

6. Field duplicate collected?

Yes     No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-M53A-12718	CH-CCR-FD02-12718

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?     Yes     No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Fluoride	0.80 mg/L	2.3	2	0.0%	
Lithium	0.20 mg/L	0.20	0.20 U	NC	± RL
Magnesium	2.0 mg/L	220	210	4.7%	
Silica	0.2 mg/L	9.4	8.9	5.5%	
Barium	0.0020 mg/L	0.0085	0.0087	2.3%	
Cadmium	0.0010 mg/L	0.0014	0.0012	15%	
Cobalt	0.0020 mg/L	0.014	0.013	7.4%	
Molybdenum	0.0020 mg/L	0.042	0.039	7.4%	

Notes:

± RL = The difference between analyte concentrations is less than the reporting limit, indicating acceptable sampling and analytical accuracy.

mg/L = milligrams per liter

NC = not calculable

**Cholla CCR Data Review**

7. Did the laboratory perform duplicate analyses on project-specific samples?

Yes  No

If Yes:

Sample ID	Analysis

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes  No  N/A

If No:

Sample ID	Analyte	Effect on Data Usability



### Cholla CCR Data Review

8. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	S.U.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-FD02-12718	Lithium	0.20 mg/L
CH-CCR-W309-12818	Lithium	0.20 mg/L

## Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-114629-1	<b>Review Date:</b>	5/24/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-W-126-12518	12/5/2018 13:49	550-114629-1	
CH-CCR-MW65A-12518	12/5/2018 16:42	550-114629-2	
CH-CCR-MW66A-12518	12/5/2018 14:58	550-114629-3	
CH-CCR-MW67A-12518	12/5/2018 15:48	550-114629-4	
CH-CCR-FD01-12518	12/5/2018 13:49	550-114629-5	Field duplicate of CH-CCR-W-126-12518

### Analytical Methods:

Analytes	Analyte Group	Method
Boron, Calcium, Magnesium, Potassium, Sodium	Metals	EPA 200.7
Mercury	Metals	EPA 245.1
Chloride, Fluoride, Sulfate	Anions	EPA 300.0
Alkalinity	General Chemistry	SM 2320B
Total Dissolved Solids	General Chemistry	SM 2450C
pH	General Chemistry	SM 4500 H+ B
Radium 226, Radium 228, Total Radium	Radiochemical Analysis	Gamma Ray HPGE

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

## Cholla CCR Data Review

### Sample Receipt Condition:

COC Signed and Complete?

Yes

No

If No, provide details.

Sample Login Matched COC?

Yes

No

If no, provide details.

The laboratory logged in the samples recorded on the COC as CH-CCR-W-126-12518, CH-CCR-MW65A-12518, CH-CCR-MW66A-12518, and CH-CCR-MW67A-12518 as CH-CCR-W-126-125128, CH-CCR-MW65A-2518, CH-CCR-MW66A-2518, and CH-CCR-MW67A-2518. Wood will use the Sample IDs from the COC when referring to these samples.

The laboratory logged in sample CH-CCR-MW67A-12518 with a time of 14:48 instead of the time recorded on the COC (15:48). Wood will use the time recorded on the COC for evaluating hold times for this sample.

Mercury analysis is not specified on the COC, but these samples were analyzed for mercury.

Sample receipt temperature  $\leq 6^{\circ}\text{C}$ ?

Yes

No

### Cholla CCR Data Review

1. Samples analyzed for metals and radium within 180 days of sampling?  

Yes     No
2. Samples analyzed for chloride, fluoride, sulfate, and mercury within 28 days of sampling?  

Yes     No
3. Samples analyzed for total dissolved solids within 7 days of sampling?  

Yes     No
4. Samples analyzed for alkalinity within 14 days of sampling?  

Yes     No
5. Samples analyzed for pH within 15 minutes of sampling?    Yes     No    N/A

If No:

Sample ID	Analysis	Time Between Collection And Analysis	Effect on data usability
CH-CCR-W-126-12518	pH	5 days, 5 hours, 46 minutes	J-HT
CH-CCR-MW65A-12518	pH	5 days, 2 hours, 53 minutes	J-HT
CH-CCR-MW66A-12518	pH	5 days 4 hours, 37 minutes	J-HT
CH-CCR-MW67A-12518	pH	5 days, 3 hours, 47 minutes	J-HT
CH-CCR-FD01-12518	pH	5 days, 5 hours, 46 minutes	J-HT

Note:

HT = Hold time exceeded.

**Cholla CCR Data Review**

6. Target analytes detected in the blank?

Yes

 No

If Yes:

<b>Detected Analyte</b>	<b>Concentration</b>	<b>Samples with concentrations less than 5 times the blank detection</b>

7. LCS recoveries within laboratory-specified limits?

Yes

No

If No:

<b>Analyte</b>	<b>Recovery</b>	<b>Affected Samples</b>

**Cholla CCR Data Review**

8. MS performed on a project-specific sample?

Yes  No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W-126-12518	Chloride, Fluoride, Sulfate, Boron, Calcium, Magnesium, Potassium, Sodium, Mercury

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes   No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-W-126-12518	Fluoride	69%/71%	80 – 120%	J-LM
	Boron	-134%/-137%	70 – 130%	None *
	Calcium	-185%/-130%	70 – 130%	None *
	Magnesium	-57%/-60%	70 – 130%	None *
	Potassium	-16%/-17%	70 – 130%	None *
	Sodium	-37%/-366%	70 – 130%	None *

Notes:

\* = It is not possible to assess data usability for this analyte based on spike recovery because the concentration detected in the unspiked native sample is greater than four times the spike concentration.

LM = Low matrix spike recovery. Potentially low analytical bias.

**Cholla CCR Data Review**

9. Field duplicate collected?

Yes  No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-W-126-12518	CH-CCR-FD01-12518

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit?  Yes  No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Chloride	400 mg/L	7,400	6,900	7.0%	
Fluoride	0.80 mg/L	3.5	3.6	2.8%	
Sulfate	400 mg/L	4,200	4,100	2.4%	
Boron	0.05 mg/L	43	43	0.0%	
Calcium	2.0 mg/L	760	760	0.0%	
Magnesium	2.0 mg/L	470	470	0.0%	
Potassium	0.50 mg/L	91	89	2.2%	
Sodium	1.0 mg/L	4,000	4,000	0.0%	
Alkalinity	6.0 mg/L	100	100	0.0%	
Bicarbonate Alkalinity	6.0 mg/L	100	100	0.0%	
Total Dissolved Solids	200 mg/L	17,000	16,000	6.1%	
pH	1.7 S.U.	7.4	7.4	0.0%	
Radium 228	0.4 pCi/L	0.9	0.9	0.0%	
Total Radium	0.4 pCi/L	0.9	0.9	0.0%	

Notes:

mg/L = milligrams per liter  
 pCi/L = picocuries per liter  
 S.U. = standard units

### Cholla CCR Data Review

10. Did the laboratory perform duplicate analyses on project-specific samples?

Yes     No

If Yes:

Sample ID	Analysis
CH-CCR-W-126-12518	Alkalinity, Total Dissolved Solids, pH

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes     No     N/A

If No:

Sample ID	Analyte	Effect on Data Usability





## Cholla CCR Data Review

<b>Laboratory Name:</b>	TestAmerica Phoenix		
<b>Sample Delivery Group:</b>	550-114629-2	<b>Review Date:</b>	5/24/2019
<b>Validator's Name:</b>	Marie Bevier	<b>Reviewed By:</b>	Caprielle Larsen

### Sample Summary:

Field Sample Identification	Collection Date and Time	Laboratory Sample Identification	Notes
CH-CCR-W-126-12518	12/5/2018 13:49	550-114629-1	
CH-CCR-MW65A-12518	12/5/2018 16:42	550-114629-2	
CH-CCR-MW66A-12518	12/5/2018 14:58	550-114629-3	
CH-CCR-MW67A-12518	12/5/2018 15:48	550-114629-4	
CH-CCR-FD01-12518	12/5/2018 13:49	550-114629-5	Field duplicate of CH-CCR-W-126-12518

### Analytical Methods:

Analytes	Analyte Group	Method
Lithium, Magnesium, Silica	Metals	EPA 200.7
Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals	EPA 200.8
Fluoride	Anion	EPA 300.0

### Qualifier Definitions:

- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- UJ** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.



**Cholla CCR Data Review**

3. Target analytes detected in the blank?

Yes

No

If Yes:

<b>Detected Analyte</b>	<b>Concentration</b>	<b>Samples with concentrations less than 5 times the blank detection</b>
Blank data not present for fluoride		

4. LCS recoveries within laboratory-specified limits?

Yes

No

If No:

<b>Analyte</b>	<b>Recovery</b>	<b>Affected Samples</b>
LCS data not present for fluoride		All Samples J/UJ - NQ

Note:

NQ = There were insufficient quality control parameters reported for this analysis.

**Cholla CCR Data Review**

5. MS performed on a project-specific sample?

Yes     No

If Yes:

Spiked Sample ID	Spiked Analyte(s)
CH-CCR-W-126-12518	Fluoride, Lithium, Magnesium, Silica

a. Are MS recoveries and/or precision within laboratory specified limits?

Yes     No

If No:

Sample ID	Analyte	RPD or Recovery	Accuracy or Recovery Limits	Effect on Data Usability
CH-CCR-W-126-12518	Fluoride	69%/71%	80 – 120%	J-LM
	Lithium	0.6%/-0.5%	70 – 130%	J-LM
	Magnesium	-57%/-60%	70 – 130%	None *
	Silica	-11%/-9%	70 – 130%	J-LM

Notes:

\* = It is not possible to assess data usability for this analyte based on spike recovery because the concentration detected in the unspiked native sample is greater than four times the spike concentration.

LM = Low matrix spike recovery. Result may be biased low.

**Cholla CCR Data Review**

6. Field duplicate collected?

Yes No

If Yes:

Parent Sample	Field Duplicate
CH-CCR-W-126-12518	CH-CCR-FD01-12518

a. Is the RPD between primary and duplicate results  $\leq$  20% or is the difference between analyte concentrations  $\leq$  the reporting limit? Yes No

Analyte	Reporting Limit	Primary Result	Duplicate Result	RPD	Notes
Fluoride	0.80 mg/L	3.5	3.6	2.8%	
Lithium	0.20 mg/L	0.78	0.76	2.6%	
Magnesium	2.0 mg/L	470	470	0.0%	
Silica	0.21 mg/L	24	20	18%	
Arsenic	0.00050 mg/L	0.0027	0.0013	70%	J-FD
Barium	0.00050 mg/L	0.021	0.015	33%	J-FD
Chromium	0.0010 mg/L	0.0026	0.0016	48%	J-FD
Cobalt	0.00050 mg/L	0.0049	0.0038	25%	J-FD
Lead	0.00050 mg/L	0.00072	0.00050 U	NC	$\pm$ RL
Molybdenum	0.00050 mg/L	0.20	0.17	16%	
Selenium	0.00050 mg/L	0.0015	0.0020	29%	J-FD
Thallium	0.00010 mg/L	0.00015	0.00010 U	NC	$\pm$ RL

Notes:

$\pm$  RL = The difference between analyte concentrations is less than the reporting limit, indicating acceptable sampling and analytical accuracy.

FD = Imprecision between primary and field duplicate results. Potential sampling and/or analytical imprecision.

mg/L = milligrams per liter

NC = not calculable

### Cholla CCR Data Review

7. Did the laboratory perform duplicate analyses on project-specific samples?

Yes  No

If Yes:

Sample ID	Analysis

a. Is the RPD between duplicate results within laboratory-specified limits or is the difference between analyte concentrations less than the reporting limit?

Yes  No  N/A

If No:

Sample ID	Analyte	Effect on Data Usability

### Cholla CCR Data Review

8. Are non-detect results sufficiently low to meet EPA primary drinking water criteria?

Yes

No

Analyte	List	MCL	Alternative GWPS	Units
Antimony	Appendix IV	0.006	--	mg/L
Arsenic	Appendix IV	0.010	--	mg/L
Barium	Appendix IV	2	--	mg/L
Beryllium	Appendix IV	0.004	--	mg/L
Boron	Appendix III	--	--	mg/L
Cadmium	Appendix IV	0.005	--	mg/L
Calcium	Appendix III	--	--	mg/L
Chloride	Appendix III	--	--	mg/L
Chromium	Appendix IV	0.1	--	mg/L
Cobalt	Appendix IV	--	0.006	mg/L
Fluoride	Appendix III/IV	4.0	--	mg/L
Lead	Appendix IV	--	0.015	mg/L
Lithium	Appendix IV	--	0.040	mg/L
Mercury	Appendix IV	0.002	--	mg/L
Molybdenum	Appendix IV	--	0.1	mg/L
pH	Appendix III	--	--	S.U.
Radium 226 + Radium 228	Appendix IV	5	--	pCi/L
Selenium	Appendix IV	0.05	--	mg/L
Sulfate	Appendix III	--	--	mg/L
Total Dissolved Solids	Appendix III	--	--	mg/L
Thallium	Appendix IV	0.002	--	mg/L

If No, list affected samples and analytes.

Sample ID	Analyte	Reporting Limit
CH-CCR-MW67A-12518	Lithium	0.20 mg/L

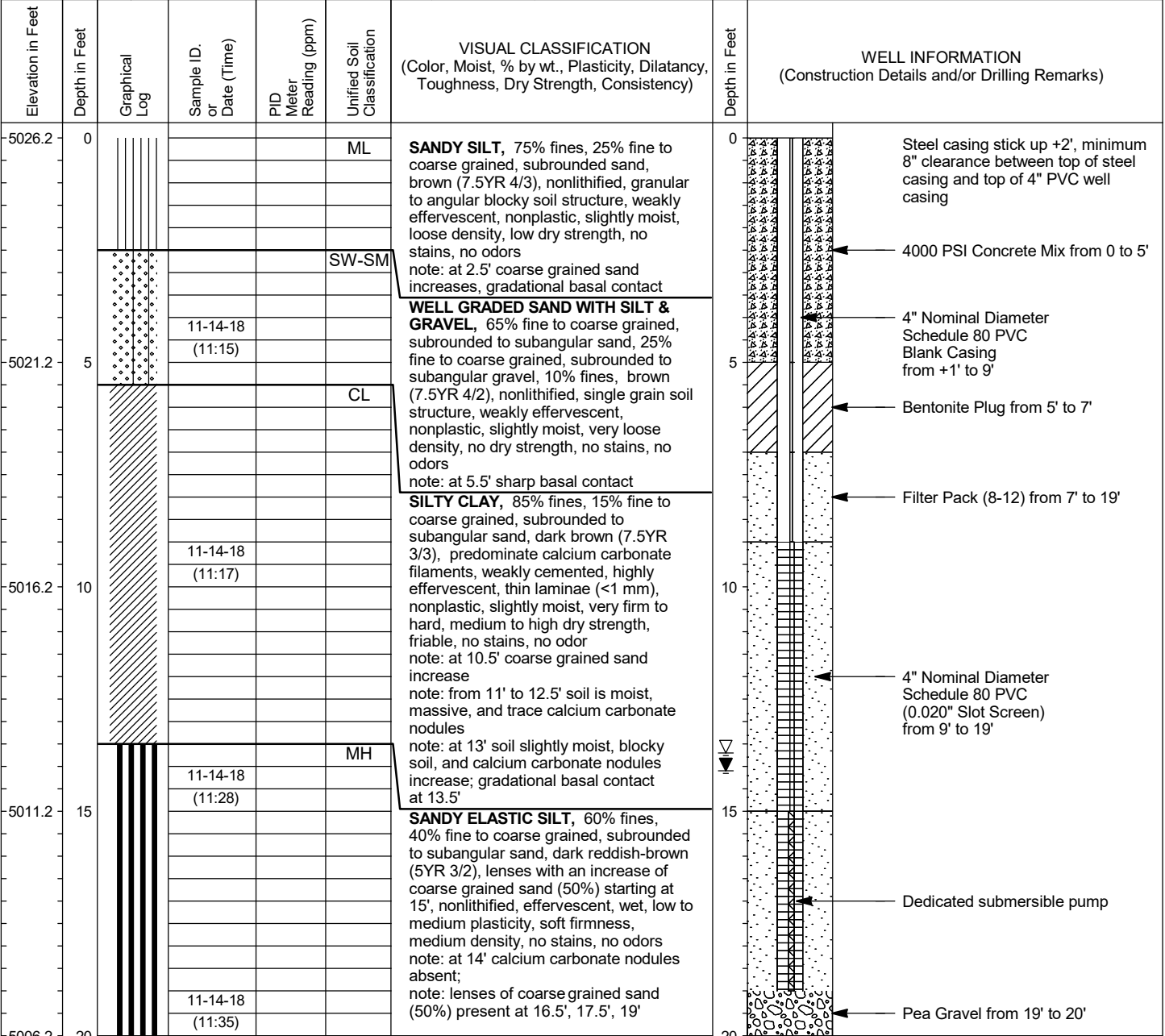


## **APPENDIX B**

### **Boring Logs and Well Construction Diagrams**



<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>LOGGED BY:</b>	Isaac Torres	<b>PROJECT FEATURE:</b>	Fly Ash Pond
<b>DRILLER:</b>	Darius Cervantez	<b>WOOD PROJECT #:</b>	14-2018-2040
<b>DRILLER FIRM:</b>	Boart Longyear	<b>ADWR REG. #:</b>	55-922299
<b>RIG I.D.:</b>	---	<b>COORDINATES:</b>	N1429134.06, E669178.50
<b>RIG TYPE:</b>	Rotosonic	<b>COORDINATE SYS:</b>	Arizona State Plane East Zone 0201, International Feet
<b>BORING TYPE:</b>	---	<b>BORING DIA.:</b>	8"
<b>ORIENTATION:</b>	90°	<b>SURFACE ELEV. (FT):</b>	5026.21'
<b>HAMMER TYPE:</b>	Not Applicable	<b>MEAS. PT. ELEV. (FT):</b>	5027.86'
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>		N/A	<b>COMPLETION DATE:</b> 11-14-2018
<b>START DATE:</b>	11-14-2018	<b>START TIME:</b>	11:15
		<b>COMPLETION TIME:</b>	11:45



**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
13.7	11:55	11/14/18
14.1	10:30	11/17/18

METHOD Not Applicable

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-922299	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
5006.2	20				MH	note: at 20.5' olive brown staining near basal gradational contact <b>SANDY ELASTIC SILT</b> , continued <b>Trmhm - Moqui Member of Moenkopi Formation (mid-unit), mudstone</b> , 60% clay, 30% silt, 10% fine grained sand, dark reddish brown (5YR 3/4) with considerable olive brown staining (2.5Y 4/4), thin laminae (<0.5 mm), effervescent, wet, medium plasticity, medium stiff, ductile, no odors note: from 20.5' to 23' core sample is more compact in diameter note: from 22' to 23' gypsum nodules (<5 mm) present near sharp basal contact	20	(Continued)
			11-14-18 (11:45)			<b>Trmhm - Moqui Member of Moenkopi Formation (mid-unit), silty mudstone</b> , 55% clay, 40% silt, 5% fine grained sand, dark reddish-brown (5YR 4/4), some filaments of gypsum (at about 23'), predominant lenses of gypsum (23.5' to 25'), thin laminae (<1 mm), weakly cemented, slightly moist, low to medium plasticity, hard, medium dry strength, friable, no odors	25	Bentonite Chips from 20' to 25'  Total Depth = 25'
4996.2	30					Total Depth = 25'	30	
4991.2	35						35	
4986.2	40						40	
4981.2	45						45	

**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
13.7	11:55	11/14/18
14.1	10:30	11/17/18

METHOD Not Applicable



Environment & Infrastructure Solutions, Inc.  
4600 East Washington Street, Suite 600  
Phoenix, Arizona 85034

BORING LOG I.D.: MW-66A

Page 1 of 3

<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance		<b>PROJECT LOCATION:</b>	APS Cholla Power Plant	
<b>LOGGED BY:</b>	Isaac Torres		<b>PROJECT FEATURE:</b>	Fly Ash Pond	
<b>DRILLER:</b>	Darius Cervantez		<b>WOOD PROJECT #:</b>	14-2018-2040	
<b>DRILLER FIRM:</b>	Boart Longyear		<b>ADWR REG. #:</b>	55-922300	
<b>RIG I.D.:</b>	---		<b>COORDINATES:</b>	N1429526.69, E668254.52	
<b>RIG TYPE:</b>	Rotasonic		<b>COORDINATE SYS:</b>	Arizona State Plane East Zone 0201, International Feet	
<b>BORING TYPE:</b>	---	<b>BORING DIA.:</b>	8"	<b>SURFACE ELEV. (FT):</b>	5032.46'
<b>ORIENTATION:</b>	90°		<b>MEAS. PT. ELEV. (FT):</b>	5033.35'	
<b>HAMMER TYPE:</b>	Not Applicable		<b>VERTICAL DATUM:</b>	NAVD88	
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>			N/A	<b>COMPLETION DATE:</b>	11-12-2018
<b>START DATE:</b>	11-12-2018	<b>START TIME:</b>	09:35	<b>COMPLETION TIME:</b>	15:40

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
5032.5	0				ML	<b>SANDY SILT</b> , 80% fines, 15% fine to coarse grained, subrounded sand, 5% fine to coarse grained, subrounded to subangular gravel, brown (7.5 YR 4/3), nonlithified, granular to single grain soil structure, weakly effervescent, nonplastic, slightly moist, loose density, low dry strength, no stains, no odors  note: at 2.5' sharp basal contact	0	<p>Steel casing stick up +2', minimum 8" clearance between top of steel casing and top of 4" PVC well casing</p> <p>4000 PSI Concrete Mix from 0 to 5'</p> <p>4" Nominal Diameter Schedule 80 PVC Blank Casing from +1' to 24'</p> <p>Portland Neat Cement from 5' to 20'</p>
					CL			
5027.5	5			11-12-18 (09:35)			5	
5022.5	10					<b>SILTY CLAY</b> , 90% fines, 10% fine to coarse grained, subrounded to subangular sand, dark brown (7.5YR 3/3), predominant calcium carbonate filaments, angular blocky soil structure, weakly cemented, highly effervescent, thin laminae (<1 mm), nonplastic, slightly moist, very firm to hard, low medium dry strength, friable, no stains, no odors  note: at 13' calcium carbonate filaments absent; gradational basal contact	10	
5017.5	15			11-12-18 (09:58)			15	
5012.5	20				CL	<b>CLAY</b> , 90% to 95% fines, 5% to 10% fine to coarse grained, subrounded to subangular sand, dark reddish-brown (5YR 3/4), massive, effervescent, medium plasticity, moist, soft firmness, medium dry strength, ductile, no stains, no odors	20	
				11-12-18 (10:10)				

GROUNDWATER

DEPTH(ft bgs)	HOUR	DATE
31.9	15:50	11/12/18
29.3	08:00	11/13/18
28.9	07:35	11/14/18
28.5	09:30	11/16/18

METHOD Not Applicable

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-922300	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)	
5012.5	20				CL	<b>CLAY</b> , continued  note: at 23' sand decreases; gradational basal contact	20	(Continued) Bentonite Plug from 20' to 22'	
					CL	<b>CLAY</b> , 98% fines, 2% fine to coarse grained, subrounded to subangular sand, dark brown (7.5YR 3/3), effervescent, medium to high plasticity, moist, soft to stiff firmness, medium dry strength, ductile, no stains, no odors note: at 25.5' sand slightly increases; gradational basal contact	25	Filter Pack (8-12) from 22' to 49'	
5007.5	25			11-12-18 (10:35)		CL	<b>CLAY</b> , 95% fines, 5% fine to coarse grained, subrounded to subangular sand, dark reddish-brown (5YR 3/2), trace gypsum nodules (~3 mm) and occ filaments (~1 cm), effervescent, medium to high plasticity, moist, medium stiff to stiff firmness, medium dry strength, ductile, no stains, no odors  note: at 32.5' gypsum filaments increase in length (~2.5 cm)  note: at 33.0' clay decreases while silt increases	30	
5002.5	30			11-12-18 (12:20)				35	
4997.5	35		11-12-18 (12:40)			<b>CLAY</b> , 98% fines, 2% fine to coarse grained, subrounded to subangular sand, dark reddish-brown (5YR 3/3), occasional gypsum nodules, massive, effervescent, high plasticity, moist, soft to medium stiff firmness, medium dry strength, ductile, no stains, no odors note: at about 40' sand decreases; sharp basal contact	40		
4992.5	40		11-12-18 (13:06)		CL	<b>SILTY CLAY</b> , 95% to 98% fines, 2% to 5% fine to coarse grained, subrounded to subangular sand, dark-reddish brown (5YR 3/4), rare gypsum nodules, massive, effervescent, medium to high plasticity wet, soft to medium stiff firmness, medium dry strength, ductile, no stains, no odors note: at about 40' core samples more compact in diameter	45	4" Nominal Diameter Schedule 80 PVC (0.020" Slot Screen) from 24' to 49'	
4987.5	45								

**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
31.9	15:50	11/12/18
29.3	08:00	11/13/18
28.9	07:35	11/14/18
28.5	09:30	11/16/18

METHOD Not Applicable

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-922300	<b>PROJECT FEATURE:</b>	Fly Ash Pond

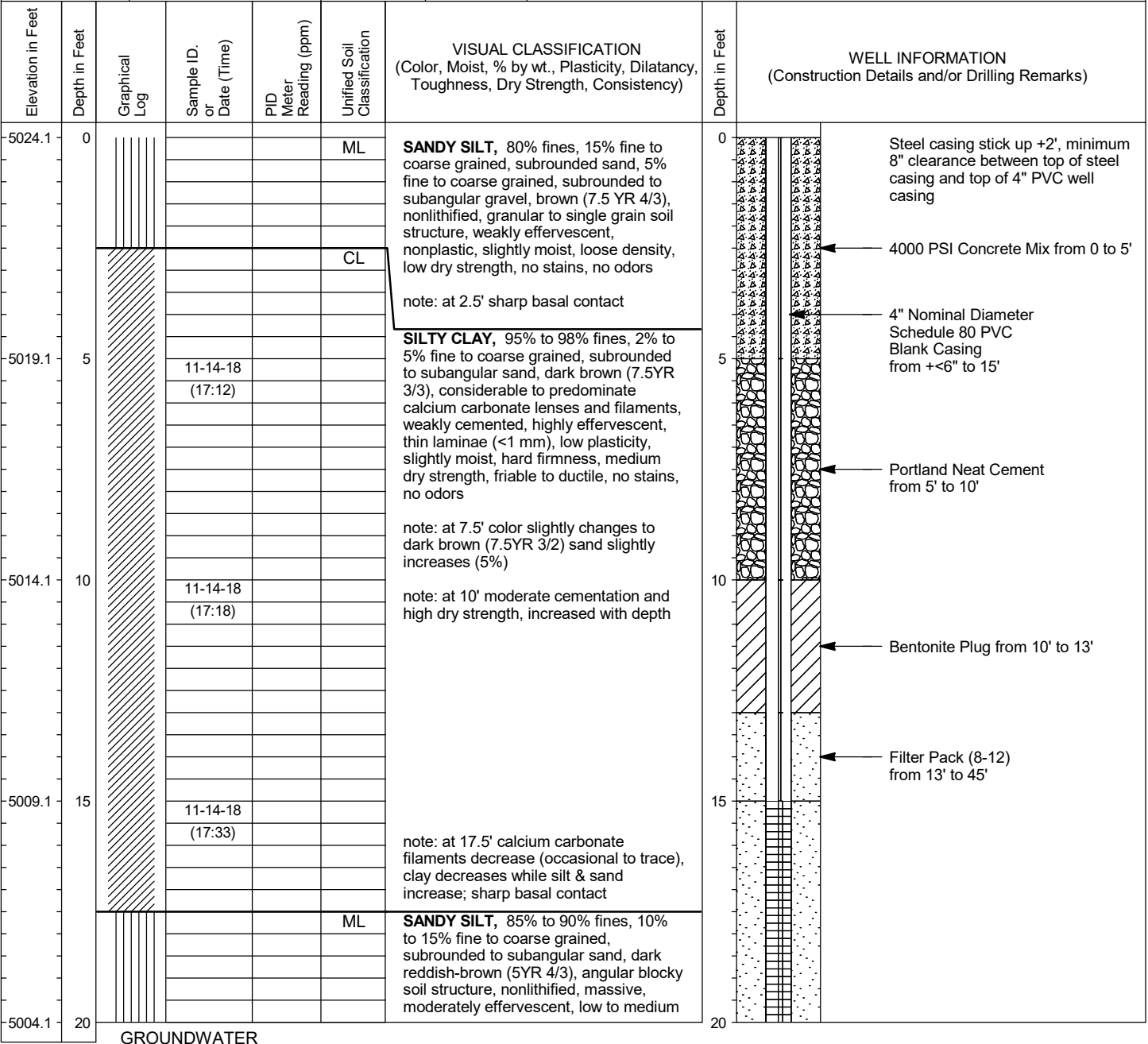
Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
4987.5	45	[Diagonal Hatching]	11-12-18 (13:22)		CL	<b>SILTY CLAY</b> , continued  note: at 47.5' trace gravels (<1 cm), sand increases; gradational basal contact	45	(Continued)  Dedicated submersible pump
						CL	<b>GRAVELLY CLAY</b> , 75% fines, 20% fine to coarse grained, subrounded to subangular gravel, 5% fine to coarse grained, subrounded to subangular sand, dark-reddish brown (5YR 4/3), nonlithified, massive, slightly effervescent, low to medium plasticity, wet, soft firmness, low to medium dry strength, no odors note: at 52.5' core samples expanded back to normal, lenses of olive-brown staining, gradational basal contact	50
4977.5	55	[Horizontal Hatching]				<b>Trmh - Moqui Member of Moenkopi Formation (mid-unit), mudstone</b> , 60% clay, 25% to 30% silt, 10% to 15% fine grained, subrounded to subangular sand, dark brown (7.5YR 3/3) with considerable lenses of olive brown staining (2.5Y 4/4), lithified, thin laminae (<0.5 mm), highly effervescent, slightly moist, medium to high plasticity, medium stiff, ductile, no odors.  note: from 55' to 57' color dark reddish-brown (5YR 4/4), lithified samples in loose soil, trace gypsum nodules (mm), slightly moist, friable  note: at 58' sharp basal contact with silty sandstone	55	Bentonite Chips from 51' to 60'
4972.5	60					Total Depth = 60'	60	Total Depth = 60'
4967.5	65						65	
4962.5	70						70	

**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
31.9	15:50	11/12/18
29.3	08:00	11/13/18
28.9	07:35	11/14/18
28.5	09:30	11/16/18

METHOD Not Applicable

<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance		<b>PROJECT LOCATION:</b>	APS Cholla Power Plant	
<b>LOGGED BY:</b>	Isaac Torres		<b>PROJECT FEATURE:</b>	Fly Ash Pond	
<b>DRILLER:</b>	Darius Cervantez		<b>WOOD PROJECT #:</b>	14-2018-2040	
<b>DRILLER FIRM:</b>	Boart Longyear		<b>ADWR REG. #:</b>	55-922301	
<b>RIG I.D.:</b>	---		<b>COORDINATES:</b>	N1428367.45, E668014.79	
<b>RIG TYPE:</b>	Rotasonic		<b>COORDINATE SYS:</b>	Arizona State Plane East Zone 0201, International Feet	
<b>BORING TYPE:</b>	---	<b>BORING DIA.:</b>	8"	<b>SURFACE ELEV. (FT):</b>	5024.05'
<b>ORIENTATION:</b>	90°		<b>MEAS. PT. ELEV. (FT):</b>	5025.38'	
<b>HAMMER TYPE:</b>	Not Applicable		<b>VERTICAL DATUM:</b>	NAVD88	
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>			N/A	<b>COMPLETION DATE:</b>	11-15-2018
<b>START DATE:</b>			11-14-2018	<b>COMPLETION TIME:</b>	10:20
<b>START TIME:</b>			17:12		



GROUNDWATER

DEPTH(ft bgs)	HOUR	DATE
35.8	09:30	11/15/18
34.4	09:40	11/15/18
33.9	07:15	11/16/18

METHOD Not Applicable

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-922301	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
5004.1	20		11-15-18 (07:50)			plasticity, slightly moist, loose to medium density, medium to hard dry strength, friable, no stains, no odors note: at 22.5' calcium carbonate lenses to filaments absent; gradational basal contact	20	(Continued)
					CL	<b>CLAY</b> , 95% fines, 5% fine grained, subrounded to subangular sand, dark reddish-brown (5YR 3/2), weakly cemented, effervescent, low plasticity, slightly moist, very firm, high to very high dry strength, ductile, no stains, no odors note: at 26' sand & silt decrease while clay increases; gradational basal contact	25	
4999.1	25		11-15-18 (08:20)		CL	<b>CLAY</b> , 99% fines, fine grained, subrounded sand, dark brown (7.5YR 3/3), occasional gypsum nodules (<3 mm), massive, effervescent, medium to high plasticity, moist, stiff to very stiff firmness, medium dry strength, ductile, gray staining, no odors	30	
4994.1	30		11-15-18 (08:34)				35	
4989.1	35		11-15-18 (08:53)			note: at 35.0' gypsum nodules decrease (rare) note: at 36.0' wet sandy elastic silt lense, ~1.5' (see MW-65A log for unit description) note: at 37.5' sharp basal contact	35	4" Nominal Diameter Schedule 80 PVC (0.020" Slot Screen) from 15' to 45'
4984.1	40		11-15-18 (09:11)		CL	<b>SILTY CLAY</b> , 99% fines, 1% fine grained, subrounded sand, dark reddish-brown (5YR 3/4), gypsum nodules absent, massive, effervescent, medium to high plasticity, moist to wet, stiff, medium to high dry strength, ductile, rare gray staining, no odors note: from 40' to 43' core samples more compact in diameter note: at ~43' medium stiffness, sand increases, gravel present (0.5-7.5 cm), core sample diameter expanded, and gradational basal contact	40	
4979.1	45				CL	<b>GRAVELLY CLAY</b> , 70% fines, 20% fine to coarse grained, subrounded to subangular gravel, 10% fine to coarse grained, subrounded to subangular sand, dark reddish-brown (5YR 3/2),	45	

**GROUNDWATER**



DEPTH(ft bgs)	HOUR	DATE
35.8	09:30	11/15/18
34.4	09:40	11/15/18
33.9	07:15	11/16/18

METHOD Not Applicable

(Continued Next Page)



<b>PROJECT:</b>	APS Cholla Power Plant CCR Compliance	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-922301	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
4979.1	45		11-15-18 (09:40)		CL	nonlithified, massive, effervescent, medium to high plasticity, wet, soft to very soft firmness, medium dry strength, no odors. note: at 45' wet sandy elastic silt lense, ~1.5' (see MW-65A log for unit descrip.)  note: at 47' sharp basal contact with siltstone to mudstone	45	(Continued) ← Pea Gravel from 45' to 47.5'
4974.1	50		11-15-18 (10:00)			<b>Trmh - Moqui Member of Moenkopi Formation (mid-unit), SANDY SILT WITH SAND &amp; Interbedded mudstone</b> , 65% fines, 25% fine to coarse grained, subangular sand, dark reddish-brown (7.5YR 3/4) with rare olive brown staining (2.5Y 4/4), granular to rounded blocky soil structure, lithified mudstone samples, mudstone with thin laminae (<0.5mm), effervescent, slightly moist, medium plasticity, low to medium dry strength, friable, no odors	50	← Bentonite Chips from 47.5' to 50' ← Total Depth = 50'
4969.1	55						55	
4964.1	60						60	
4959.1	65						65	
4954.1	70						70	

**GROUNDWATER**



DEPTH(ft bgs)	HOUR	DATE
35.8	09:30	11/15/18
34.4	09:40	11/15/18
33.9	07:15	11/16/18

METHOD Not Applicable

**APPENDIX C**

**Photograph Log**



<p><b>PHOTO 1</b></p> <p><b>Description:</b></p> <p>A view facing south of the staked site for MW-65A.</p>	
<p><b>PHOTO 2</b></p> <p><b>Description:</b></p> <p>Formation samples from 0 to 2.5 feet below ground surface (ft bgs) for MW-65A.</p>	

**PHOTO 3**

**Description:**

Formation samples from 2.5 to 5 ft bgs for MW-65A.



**PHOTO 4**

**Description:**

Formation samples from 5 to 7.5 ft bgs for MW-65A.





**PHOTO 5**

**Description:**

Formation samples from 7.5 to 10 ft bgs for MW-65A.



**PHOTO 6**

**Description:**

Formation samples from 10 to 12.5 ft bgs for MW-65A.



**PHOTO 7**

**Description:**

Formation samples from 12.5 to 15 ft bgs for MW-65A.



**PHOTO 8**

**Description:**

Formation samples from 15 to 17.5 ft bgs for MW-65A.





**Photograph Log**

**PHOTO 9**

**Description:**

Formation samples from 17.5 to 20 ft bgs for MW-65A.



**PHOTO 10**

**Description:**

Formation samples from 20 to 22.5 ft bgs for MW-65A.



**PHOTO 11**

**Description:**

Formation samples  
from 22.5 to 25 ft  
bgs for MW-65A.





**PHOTO 12**

**Description:**

A view facing south of the staked site for MW-66A.



**PHOTO 13**

**Description:**

Formation samples from 0 to 2.5 ft bgs for MW-66A.



**PHOTO 14**

**Description:**

Formation samples from 2.5 to 5 ft bgs for MW-66A.



**PHOTO 15**

**Description:**

Formation samples from 5 to 7.5 ft bgs for MW-66A.





**PHOTO 16**

**Description:**

Formation samples from 7.5 to 10 ft bgs for MW-66A.



**PHOTO 17**

**Description:**

Formation samples from 10 to 12.5 ft bgs for MW-66A.



Photograph Log

**PHOTO 18**

**Description:**

Formation samples from 12.5 to 15 ft bgs for MW-66A.



**PHOTO 19**

**Description:**

Formation samples from 15 to 17.5 ft bgs for MW-66A.





**PHOTO 20**

**Description:**

Formation samples from 17.5 to 20 ft bgs for MW-66A.



**PHOTO 21**

**Description:**

Formation samples from 20 to 22.5 ft bgs for MW-66A.



**PHOTO 22**

**Description:**

Formation samples from 22.5 to 25 ft bgs for MW-66A.



**PHOTO 23**

**Description:**

Formation samples from 25 to 27.5 ft bgs for MW-66A.





**PHOTO 24**

**Description:**

Formation samples from 32.5 to 35 ft bgs for MW-66A.



**PHOTO 25**

**Description:**

Formation samples from 37.5 to 40 ft bgs for MW-66A.



**PHOTO 26**

**Description:**

Formation samples from 42.5 to 45 ft bgs for MW-66A.



**PHOTO 27**

**Description:**

Formation samples from 47.5 to 50 ft bgs for MW-66A.

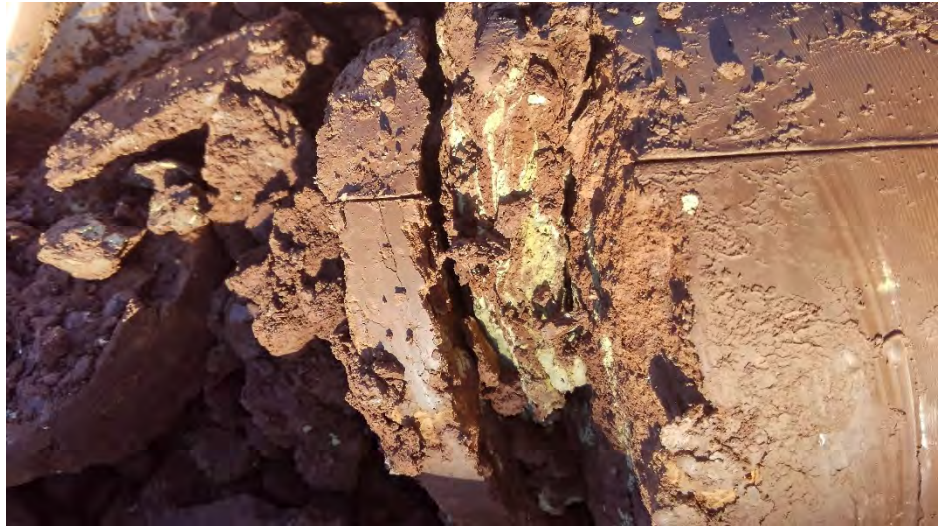




**PHOTO 28**

**Description:**

Formation samples from 52.5 to 55 ft bgs for MW-66A.



**PHOTO 29**

**Description:**

Formation samples from 60 ft bgs for MW-66A.



## Photograph Log

### PHOTO 30

#### Description:

Water sample in Imhoff cone from MW-66A showing turbidity during development.



**PHOTO 31**

**Description:**

A view facing south of the staked site for MW-67A.



**PHOTO 32**

**Description:**

Formation samples from 0 to 2.5 ft bgs for MW-67A.





**PHOTO 33**

**Description:**

Formation samples from 2.5 to 5 ft bgs for MW-67A.



**PHOTO 34**

**Description:**

Formation samples from 5 to 7.5 ft bgs for MW-67A.



**PHOTO 35**

**Description:**

Formation samples from 7.5 to 10 ft bgs for MW-67A. (White specks on core are frost.)



**PHOTO 36**

**Description:**

Formation samples from 10 to 12.5 ft bgs for MW-67A.





**PHOTO 37**

**Description:**

Formation samples from 12.5 to 15 ft bgs for MW-67A.



**PHOTO 38**

**Description:**

Formation samples from 15 to 17.5 ft bgs for MW-67A.



**PHOTO 39**

**Description:**

Formation samples from 17.5 to 20 ft bgs for MW-67A.



**PHOTO 40**

**Description:**

Formation samples from 20 to 22.5 ft bgs for MW-67A.





**PHOTO 41**

**Description:**

Formation samples from 22.5 to 25 ft bgs for MW-67A.



**PHOTO 42**

**Description:**

Formation samples from 25 to 27.5 ft bgs for MW-67A.





**PHOTO 43**

**Description:**

Formation samples from 27.5 to 30 ft bgs for MW-67A.



**PHOTO 44**

**Description:**

Formation samples from 30 to 32.5 ft bgs for MW-67A.



**PHOTO 45**

**Description:**

Formation samples from 32.5 to 35 ft bgs for MW-67A.



**PHOTO 46**

**Description:**

Formation samples from 37.5 to 40 ft bgs for MW-67A.





**PHOTO 47**

**Description:**

Formation samples from 42.5 to 45 ft bgs for MW-67A.



**PHOTO 48**

**Description:**

Formation samples from 45 to 47.5 ft bgs for MW-67A.



**Photograph Log**

**PHOTO 49**

**Description:**

Formation samples  
from 47.5 to 50 ft  
bgs for MW-67A.



**APPENDIX D**

**Soils Laboratory Results**





**PROJECT:** Cholla APP & CCR Compliance Support  
**LOCATION:** Joseph City, AZ  
**MATERIAL:** Native Soil

**JOB NO:** 14-2018-2040.\*\*\*\*.01  
**WORK ORDER NO:** 1  
**DATE ASSIGNED:** 11/19/18

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DENSITY OF ROCK CORE USING VOLUMETRIC CALCULATIONS

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LAB #	BORING	MOISTURE			DIA. (cm)	HGT. (cm)	WET WEIGHT & RINGS (g)	WEIGHT OF RINGS (g)	DRY DENSITY (pcf)	SPECIFIC GRAVITY	POROSITY
		WET WT. (g)	DRY WT. (g)	MOISTURE CONTENT							
18-3840-02	MW 67A (11-11.5')	462.0	372.3	24.1%	4.9	13	602.2	138.5	94.4	2.738	0.45
18-3840-03	MW 67A (16-16.5')	558.0	427.9	30.4%	4.9	15	720.1	162.1	92.0	2.773	0.47
18-3840-04	MW 67A (21-21.5')	452.1	406.7	11.2%	4.9	14	615.5	147.0	99.8	2.741	0.42

**APPENDIX E**

**Well Survey Results**



Wood Environment & Infrastructure Solutions, Inc.  
 4600 E. Washington Street Suite 600  
 Phoenix, AZ 85034

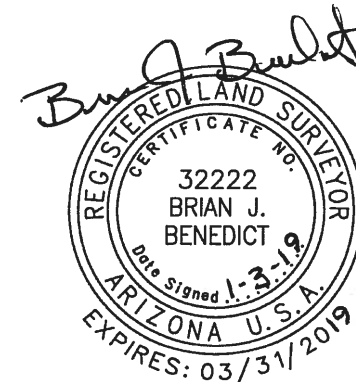


Survey Report  
 Cholla Power Plant APP & CCR Compliance Support  
 Wood E&IS Project No. 1420182040

POINT	NORTHING	EASTING	ELEVATION	LATTITUDE	LONGITUDE	WELL ID	DESCRIPTION
1001	1429134.11	669178.77	5034.53	34d55'41.05672"	-110d16'10.18329"	MW-66A	OUTER PIPE N EDGE
1002	1429134.06	669178.50	5033.35	34d55'41.05621"	-110d16'10.18648"	MW-66A	INNER PIPE N EDGE
1003	1429134.72	669179.25	5032.66	34d55'41.06266"	-110d16'10.17754"	MW-66A	CONCRETE
1004	1429135.91	669180.15	5032.46	34d55'41.07451"	-110d16'10.16672"	MW-66A	GROUND
1005	1429526.74	668254.63	5028.55	34d55'44.93095"	-110d16'21.28771"	MW-65A	OUTER PIPE N EDGE
1006	1429526.69	668254.52	5027.86	34d55'44.93041"	-110d16'21.28902"	MW-65A	INNER PIPE N EDGE
1007	1429527.34	668255.45	5026.59	34d55'44.93688"	-110d16'21.27790"	MW-65A	CONCRETE
1008	1429529.35	668257.16	5026.21	34d55'44.95679"	-110d16'21.25739"	MW-65A	GROUND
1009	1428367.53	668014.91	5026.53	34d55'33.46176"	-110d16'24.15208"	MW-67A	OUTER PIPE N EDGE
1010	1428367.45	668014.79	5025.38	34d55'33.46096"	-110d16'24.15353"	MW-67A	INNER PIPE N EDGE
1011	1428368.27	668015.89	5024.50	34d55'33.46905"	-110d16'24.14032"	MW-67A	CONCRETE
1012	1428370.11	668018.67	5024.05	34d55'33.48737"	-110d16'24.10703"	MW-67A	GROUND

DATUM  
 NAD83 (1982) ARIZONA STATE PLANE COORDINATES  
 EAST ZONE 0201, INTERNATIONAL FEET  
 NAVD88 ELEVATION

This survey was performed under my direct supervision.  
 Field work was completed on December 19, 2018.





**APPENDIX L**  
**SITE CCR GROUNDWATER MONITORING SYSTEM NOTIFICATIONS**





Arizona Public Service Company  
CCR Program  
Environmental Policy & Programs

PO Box 53999  
Mail Station 9303  
Phoenix, AZ 85072-3999

Telephone: 602-250-1000

February 13, 2019

**CCR Program Documentation**

**Groundwater Monitoring Program – Notification of Initiation of Corrective Measures**

**CH\_GW\_CorMInitiate\_002\_20190213**

**CH\_GW\_CorMInitiate\_003\_20190213**

Subject: GW – Notification of Initiation of Corrective Measures; Cholla Power Plant

Pursuant to 40 C.F.R. Secs 257.95(g), APS is providing notice of the initiation of corrective measures at the following CCR units:

- Fly Ash Pond
- Bottom Ash Pond

As such, APS will commence evaluation of corrective measure alternatives.

If you have any questions about this or would like additional information, please consult the CCR information webpage located within [APS.com](http://APS.com) or contact [neal.brown@aps.com](mailto:neal.brown@aps.com).



**Richard Nicosia**  
Plant Manager  
Cholla Power Plant

Tel. 928-288-1176  
Fax 928-288-1399  
e-mail: [Richard.Nicosia@aps.com](mailto:Richard.Nicosia@aps.com)

4801 Cholla Lake Road  
Mail Station 4451  
Joseph City, Arizona 86032

June 24, 2019

Dear [REDACTED],

As you are no doubt aware, real property you own is adjacent to the Cholla Power Plant, in particular the Bottom Ash Pond disposal area used by APS to manage coal combustion residuals (“CCR”) generated by the plant.

The CCR Rule 40 C.F.R. Sec 257.95(g)(2) requires that APS notify the owners of neighboring property where we have identified levels of certain CCR constituents in groundwater that are in excess of federal CCR groundwater protection standards. Based on the results of groundwater quality sampling performed on APS property near certain Cholla CCR disposal areas, we believe that groundwater containing cobalt in excess of federal groundwater protection standards has migrated beneath your property.

At this time, we know of no reason to believe that these conditions pose a threat to human health or the environment. The contamination is limited to groundwater in the alluvial aquifer that is not used for drinking water. Nonetheless, out of an abundance of caution and to comply with federal CCR management regulations, we are in the process of assessing various corrective measures that could be used to remediate groundwater containing CCR constituents resulting from the Cholla Bottom Ash Pond. By July 14, 2019, we intend to publish a written report of this assessment to the APS website, [aps.com](http://aps.com). Then at least 30 days prior to selecting a remedy to address these conditions, we will host a public meeting to discuss this assessment of corrective measures.

We welcome your input as we consider our options for corrective measures. Please do not hesitate to reach out to us if you have any questions or comments about these conditions.

Best regards,

Richard Nicosia  
Plant Manager  
Cholla Power Plant



**Richard Nicosia**  
Plant Manager  
Cholla Power Plant

Tel. 928-288-1176  
Fax 928-288-1399  
e-mail: [Richard.Nicosia@aps.com](mailto:Richard.Nicosia@aps.com)

4801 Cholla Lake Road  
Mail Station 4451  
Joseph City, Arizona 86032

June 24, 2019

Dear [REDACTED]

As you are no doubt aware, real property you own is adjacent to the Cholla Power Plant, in particular the Fly Ash Pond disposal area used by APS to manage coal combustion residuals (“CCR”) generated by the plant.

The CCR Rule 40 C.F.R. Sec 257.95(g)(2) requires that APS notify the owners of neighboring property where we have identified levels of certain CCR constituents in groundwater that are in excess of federal CCR groundwater protection standards. Based on the results of groundwater quality sampling performed on APS property near certain Cholla CCR disposal areas, we believe that groundwater containing fluoride, lithium, and molybdenum in excess of federal groundwater protection standards has migrated beneath your property.

At this time, we know of no reason to believe that these conditions pose a threat to human health or the environment. The contamination is limited to groundwater in the alluvial aquifer that is not used for drinking water. Nonetheless, out of an abundance of caution and to comply with federal CCR management regulations, we are in the process of assessing various corrective measures that could be used to remediate groundwater containing CCR constituents resulting from the Cholla Fly Ash Pond. By July 14, 2019, we intend to publish a written report of this assessment to the APS website, [aps.com](http://aps.com). Then at least 30 days prior to selecting a remedy to address these conditions, we will host a public meeting to discuss this assessment of corrective measures.

We welcome your input as we consider our options for corrective measures. Please do not hesitate to reach out to us if you have any questions or comments about these conditions.

Best regards,

Richard Nicosia  
Plant Manager  
Cholla Power Plant

**APPENDIX M**  
**WOOD REPORT DEMONSTRATING NEED FOR EXTENSION OF CORRECTIVE**  
**MEASURES ASSESSMENT**





Wood Environment & Infrastructure Solutions, Inc.  
4600 E. Washington St, Suite 600  
Phoenix, Arizona 85034  
USA

T: 602-733-6000

[www.woodplc.com](http://www.woodplc.com)

April 15, 2019  
Wood Reference No: 1420182040  
APS WA CHC08903

Arizona Public Service  
400 N. 5th Street  
Phoenix, Arizona 85004

Attn: Michele Robertson, Byron Conrad and Pam Norris

**Re: DEMONSTRATION/CERTIFICATION OF NEED  
FOR CORRECTIVE MEASURES ASSESSMENT EXTENSION  
Cholla Power Plant – Navajo County, Arizona**

Pursuant to 40 Code of Federal Regulations (CFR) Section (§) 257.96(a) of the Coal Combustion Residuals (CCR) Rule, Arizona Public Service Company (APS) is required to initiate an Assessment of Corrective Measures for the Cholla Power Plant Bottom Ash Pond (BAP) and Fly Ash Pond (FAP) within 90 days of finding that an Appendix IV constituent has been detected at a statistically significant level (SSL) exceeding an applicable Groundwater Protection Standard (GWPS). The assessment must be completed within 90 days unless there is a demonstrated need that additional time (up to 60 days) to complete the assessment is necessary. This letter documents this demonstration and includes a certification by a qualified professional engineer that the demonstration is accurate.

## 1. Demonstration

On October 15, 2018, cobalt and lithium were declared to be present at SSLs exceeding the GWPS in groundwater downgradient of the BAP and arsenic, cobalt, fluoride, lithium, and molybdenum were declared to be present at SSLs exceeding GWPSs in groundwater downgradient of the FAP. Although the Assessment of Corrective Measures for both of these units has been initiated, additional time is required to complete the assessment on the basis of the following site-specific conditions and/or circumstances:

- An investigation of the nature and extent of impacts necessitated completion of a monitoring well installation program;
- Iterative sampling rounds of both new and existing wells were needed to complete the investigation and the ability to sample was impacted by unfavorable weather conditions at the site;
- The CCR present in both units is retained by large, earthen zoned dams which are underlain by a complex system of hydrogeologic units; to appropriately assess leakage through the dams, review of a significant amount of construction and operational data is required;
- Existing seepage collection systems have been incorporated into the assessment for the BAP and the FAP which require time to adequately evaluate;
- Construction and use of a complex, multilayer groundwater flow and contaminant transport model is required to evaluate potential remedial measures at both units; and
- Coordination with plant personnel must occur to conceptually design corrective measures in the vicinity of existing infrastructure to ensure that realistic alternatives are considered.



## 2. Schedule

Given the demonstration and timelines presented herein, the schedule for completion of the Corrective Measures Assessment for the BAP and FAP is extended 60 days to June 14, 2019.

## 3. Certification

By means of this certification, I certify in accordance with 40 CFR §257.96(a) that the demonstration presented in this letter is accurate.



Natalie Chrisman Lazarr  
Printed Name of Registered Professional Engineer

31672                      Arizona                      15 April 2019  
Registration No.                      Registration State                      Date



**APPENDIX N**  
**WOOD SEMIANNUAL REPORT DEMONSTRATING PROGRESS OF REMEDY**  
**SELECTION FOR THE FAP AND THE BAP**





Wood Environment & Infrastructure Solutions, Inc.  
4600 E. Washington St, Suite 600  
Phoenix, Arizona 85034  
USA

T: 602-733-6000

[www.woodplc.com](http://www.woodplc.com)

July 15, 2019  
Wood Reference No: 1420182040  
APS WA CHC08903

Arizona Public Service  
400 N. 5th Street  
Phoenix, Arizona 85004

Attn: Michele Robertson, Byron Conrad and Pam Norris

**Re: SEMI-ANNUAL REPORT DOCUMENTING PROGRESS IN REMEDY SELECTION  
FOR THE FLY ASH POND AND BOTTOM ASH POND  
Cholla Power Plant – Navajo County, Arizona**

Pursuant to 40 Code of Federal Regulations (CFR) Section (§) 257.97(a) of the Coal Combustion Residuals (CCR) Rule, Arizona Public Service Company (APS) is required to prepare a semi-annual report describing progress selecting a remedy for CCR units that have been identified as potentially impacting groundwater based on a statistical assessment of groundwater data collected at the Cholla Power Plant located in Navajo County, Arizona (the Site). This letter serves as the first semi-annual report prepared after initiating corrective measures at the Site Fly Ash Pond (FAP) and Bottom Ash Pond (BAP) on January 14, 2019.

## 1. Summary of Activities Completed to Date

Following a demonstration of need for a corrective measures assessment extension, dated April 15, 2019, Wood Environment & Infrastructure Solutions, Inc. (Wood) finalized a report presenting an *Assessment of Corrective Measures for the Fly Ash Pond and the Bottom Ash Pond* on June 14, 2019. The assessment documents the development and evaluation of various corrective measures for the two CCR units including:

- Operation of existing seepage collection systems at the FAP and BAP;
- Future dewatering of the ponds with subsequent closure;
- Installation and operation of various arrays of groundwater intercept systems; and
- Monitored natural attenuation of CCR constituents.

## 2. Future Planned Activities

As identified in the *Assessment of Corrective Measures for the Fly Ash Pond and the Bottom Ash Pond*, additional site characterization is necessary prior to selection and design of the FAP and BAP remedies. Currently planned activities include:

- *Moenkopi Moqui Investigation at the FAP.* At least one new well will be advanced on the south side of I-40 to investigate the presence and quality of groundwater in the Moqui formation downgradient of the FAP.
- *Aquifer Testing Downgradient of the FAP.* Aquifer testing will be conducted at various locations downgradient of the FAP to better understand aquifer properties in this region of the Site.



- *Preparation of Alternative Source Demonstrations (ASDs) for Arsenic and Cobalt at the FAP.* ASDs for these constituents will be prepared to demonstrate whether the source of Groundwater Protection Standard exceedances in groundwater downgradient of the FAP is leakage of arsenic or cobalt mass from the FAP.
- *Stratified Sampling of Water in the BAP.* To assess spatial- and depth-specific variations in cobalt concentrations in BAP water, a water sampling characterization program will be implemented.
- *Leaching Evaluation at the BAP.* Bottom ash as well as distinct geological units found at the BAP (i.e., the alluvium, the Chinle, the Moenkopi Holbrook, and the Moenkopi Moqui) will be sampled and evaluated for CCR Rule constituents and then subject to leach testing in a licensed environmental laboratory to evaluate the potential source of cobalt observed in compliance wells at the BAP.
- *Bottom Ash Pond Dewatering Projection.* A water balance will be developed to project pond dewatering at the BAP.
- *Seepage Intercept System Evaluation, Optimization, and Testing.* Existing systems at both the FAP and BAP will be evaluated and optimization strategies will be investigated. If feasible, testing will be conducted to better understand the influence of these systems in intercepting seepage discharges to the downgradient alluvial aquifer.

The next semi-annual report documenting progress in remedy selection at the Site will be prepared no later than January 15, 2020.

Respectfully submitted,

**Wood Environment & Infrastructure Solutions, Inc.**



Natalie Chrisman Lazarr, PE  
Senior Project Manager  
natalie.chrisman@woodplc.com

Reviewed by:



Emily LoDolce, PE  
Senior Engineer  
emily.lodolce@woodplc.com

**APPENDIX O**  
**WOOD TECHNICAL MEMORANDUM DOCUMENTING THE INSTALLATION AND**  
**ABANDONMENT OF MW-68M**



# Technical Memorandum

---

**To:** Natalie Chrisman Lazarr, PE  
Byron Conrad, PE  
Pamela Norris

**File No:** 14-2018-2040

**From:** Dane Andersen

**Reviewed by:** Emily LoDolce, PE

**Date:** January 31, 2020

**Subject:** **WELL INSTALLATION AND ABANDONMENT OF MW-68M  
DOWNGRAIDENT MOQUI WELL  
Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

---

## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents the installation and abandonment of monitoring well MW-68M, located at the Arizona Public Service (APS) Cholla Power Plant in Navajo County, Arizona. The MW-68M well investigation was conducted downgradient of the Fly Ash Pond (FAP) to evaluate potential groundwater impacts in the Moenkopi Moqui Formation and support compliance with coal combustion residuals (CCR) groundwater monitoring requirements detailed in 40 Code of Federal Regulations (CFR) Sections (§) 257.90 through 257.98 (Federal Register, 2018).

The following sections detail the site background, basis for investigation, description of the investigation activities, conclusions, and recommendations.

### 1.1 Site Background

A description of the site background, CCR groundwater monitoring system, and historical operational information is presented in the *2018 Annual Groundwater Monitoring and Corrective Action Report* (Wood, 2019a). The subject of this investigation is the FAP, a surface impoundment that primarily receives slurried fly ash from the plant. The FAP is constructed primarily on the Moqui member of the Moenkopi Formation, though alluvial sediments are present near the FAP. The uppermost aquifer downgradient of the FAP dam occurs in localized and shallow alluvial sediments. The predominant groundwater flow direction through the alluvial sediments at the toe of the FAP dam is to the west-southwest, until groundwater merges with the Little Colorado River Alluvium, where the predominant groundwater flow direction is to the west.

### 1.2 Basis for Investigation

*The Assessment of Corrective Measures for the Fly Ash Pond and the Bottom Ash Pond* (Wood, 2019b) concluded that near the edges of the dam, groundwater in the Moqui member is in direct hydraulic connection with the FAP. The relatively low permeability of the Moqui member and the dry formation conditions observed during the installation of W-124 (located directly downgradient of the dam) suggest that saturation in the Moqui is localized in the vicinity of the FAP. To verify this conceptual site model (CSM), the MW-68M well was installed adjacent to alluvial monitoring well MW-65A to evaluate the downgradient extent of groundwater in the Moqui member. The well location is shown on Figure 1 – MW-68M Well Location Map.



## **2.0 DESCRIPTION OF INVESTIGATION ACTIVITIES**

### **2.1 Well Installation**

Well drilling and installation was performed by a licensed Arizona driller, Boart Longyear, under direct contract to Wood. The MW-68M boring was drilled to an 8-inch (in) diameter using the RotoSonic drilling method. Drilling occurred on September 16, 2019, to a total depth of approximately 50 feet below ground surface (ft bgs). Continuous formation samples were logged by a Wood field geologist at 5-ft intervals using the Unified Soil Classification System. Alluvium was encountered from 0 ft bgs to 20 ft bgs, and the Moqui member was encountered from 20 ft bgs to 50 ft bgs. The underlying Wupatki member of the Moenkopi Formation was not penetrated during borehole advancement. A complete description of the formation samples is provided in Appendix A – Lithologic Log and Well Construction Diagram, and photos of the formation samples are provided in Appendix B – Photograph Log.

Moisture was first observed in alluvial formation samples at approximately 14 ft bgs. From 17.5 ft bgs to 19.5 ft bgs, free water was observed in poorly graded sand and gravel and silty sand deposits located at the contact with the underlying Moqui member. As the boring advanced past the alluvial-bedrock contact, moisture observed in the Moqui decreased with depth, until all signs of moisture ceased at approximately 26 ft bgs. Upon reaching 35 ft bgs, the drill rig was shut down approximately 1.5 hours for repairs. When drilling resumed, saturated drill cuttings were observed in the 35 ft bgs to 36 ft bgs interval. As the boring advanced past 36 ft bgs, all signs of moisture ceased to the total depth of the borehole. Based on the lack of moisture adjacent to the 35 ft bgs to 36 ft bgs interval, it is inferred that the formation samples were saturated by alluvial groundwater migrating into the borehole from above during the 1.5-hour shutdown and is not indicative of groundwater in the Moqui member.

Well construction occurred on September 17, 2019. Before construction began, the depth to water in the cased borehole was measured at approximately 18 ft bgs, which was inferred at the time to be alluvial groundwater introduced into the borehole during drilling. The well design was based on observations made during the lithologic logging of the borehole and the objective of monitoring potential future groundwater migration through the Moqui. Well materials consisted of 4-in nominal diameter Schedule 80 polyvinyl chloride (PVC) casing and a 4-in nominal diameter Schedule 80 PVC screen with a 0.020-in slot size. The screened interval was placed from approximately 30 ft bgs to 50 ft bgs. Filter pack material consisting of 8-12 silica sand was installed from approximately 50 ft bgs to 29 ft bgs, and 20-40 silica sand was emplaced from approximately 29 ft bgs to 28 ft bgs. A bentonite seal was installed from approximately 28 ft bgs to 26 ft bgs, and neat cement grout was installed from approximately 26 ft bgs to the surface. Depth intervals for the annular materials were verified by the site geologist during well construction by measuring the depth to the top of the annular materials using a weighted tape measure during emplacement (typically after every 1 ft to 2 ft of material emplacement). Details of the well construction are included as Appendix A – Lithologic Log and Well Construction Diagram.

MW-68M was pumped on September 17 and 18, 2019 to remove the alluvial groundwater introduced during drilling and well installation. A table summarizing the pumping activities is included as Table 1 – MW-68M Well Pumping Summary. On September 17 the well was pumped for 1.8 hours at approximately 0.8 gallons per minute (gpm). Pumping resumed on September 18 when the well was pumped for 1.5 hours at approximately 2.4 gpm. Approximately 12 minutes after starting the pump on September 18, the pumping water level reached a relatively stable level of 32 ft bgs. The pumping water level dropped approximately 2 additional feet over the next 78 minutes before the pump was stopped. The stabilization of the pumping water level indicated that the well was in communication with a zone of continuous water production, and not with the limited volume of alluvial groundwater introduced during drilling and well

installation. The total volume of water purged was approximately 303 gallons, and it is unlikely that this amount of alluvial groundwater would be introduced into the Moqui during drilling and well installation. The Moqui member's relatively low permeability limits the volume of alluvial groundwater which could have infiltrated into the formation. Additionally, the borehole remained cased during the time interval between completion of drilling and commencement of well construction, limiting the amount of alluvial groundwater migration through the borehole. Therefore, it is assumed that alluvial groundwater was in communication with the MW-68M well screen during the pumping activities.

## **2.2 Well Abandonment**

The continued migration of alluvial groundwater into the MW-68M well screen necessitated abandonment of the well. Abandonment activities included over drilling the well to a total depth of 50 ft bgs and removing the well casing and annular materials. Once the 8-in abandonment drive casing had reached total depth and the well materials were removed, no water was observed in the cased borehole. It is likely that residual bentonite and grout in the borehole combined with the 8-in drive casing sealed off the alluvial groundwater. Well abandonment was completed by emplacement of neat cement grout in the overdrilled borehole from 50 ft bgs to land surface. The abandoned well location was surveyed by a registered land surveyor (Arizona) on December 2, 2019. The survey data is included in Appendix C – Survey Data, and photographs of the abandonment location are included in Appendix B – Photograph Log.

## **3.0 FINDINGS AND RECOMMENDATIONS**

Key findings from the MW-68M investigation can be summarized as follows:

*Failed Well Seal:* Alluvial groundwater was able to migrate into the MW-68M well screen despite a bentonite and cement seal extending approximately 7 ft below the saturated alluvium and 1.7 ft below any observed moisture in the Moqui. It is unlikely that the volume of water observed during well pumping could have continuously migrated through the cement and bentonite seal. Instead, alluvial groundwater may have migrated through fractures in the formation directly outside the borehole (rather than through the borehole itself). During the investigation, the dry Moqui member formation samples were observed to be very friable when saturated. Alluvial groundwater introduced into the formation during borehole advancement could have caused the surrounding formation to weather in place, creating a conduit between alluvial groundwater and the well screen. Therefore, for future monitoring wells installed in the Moqui member, Wood recommends the use of more robust well designs to successfully seal off alluvial groundwater from the Moqui.

*Moqui Member Groundwater Conditions:* The formation samples collected during the investigation indicate that moisture is present in the weathered upper portion of the Moqui member, from approximately 20 to 26 ft bgs. The upper portion consisted of weathered bedrock in which no obvious signs of groundwater production were observed, suggesting that the Moqui is not likely transmitting groundwater at this location. Observations from this investigation suggest that groundwater migration at this location occurs primarily in the poorly graded sand and gravel and silty sand deposits located at the base of the alluvium.

*Alluvial Groundwater Conditions:* A comparison of the amount of water produced during the pumping of MW-68M to the attempted development of MW-65A suggests that MW-68M was in communication with a more productive zone than MW-65A. MW-65A is an alluvial monitoring well located approximately 60 ft southwest of MW-68M and is screened from 9 to 19 ft bgs, approximately 1.5 ft above the Moqui member. During the MW-65A development activities, approximately 4 gallons were pumped before the well went dry. Water level recovery was too slow to allow further development. As previously stated, observations made during the MW-68M well investigation suggest that the most transmissive zone in this area is located



within the approximately 2 ft thick deposit of poorly graded sand with gravel and silty sand located directly above the Moqui. Because the bottom of the MW-65A well screen is approximately 1.5 ft above the top of the Moqui, it is possible that the MW-65A well screen is not in communication with the most productive zone in this area. Another possibility is that the transmissive zone observed at MW-68M does not extend laterally to the MW-65A location. Finally, the poor production at MW-65A could be due to migration of bentonite into the well screen during well installation.

#### **4.0 REFERENCES**

- Federal Register, 2018. *40 Code of Federal Regulations Part 257 – Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule promulgated April 17, 2015 with Amendments to the National Minimum Criteria (Phase One, Part One) effective August 29, 2018.*
- Wood, 2019a. *Annual Groundwater Monitoring and Corrective Action Report for 2018. Coal Combustion Residuals Rule Groundwater Monitoring System Compliance.* Cholla Power Plant, Navajo County, Arizona. Prepared on behalf of Arizona Public Service. January 31, 2019.
- Wood, 2019b. *Assessment of Corrective Measures for the Fly Ash Pond and the Bottom Ash Pond. Coal Combustion Residuals Rule and Aquifer Protection Permit Compliance.* Arizona Public Service Company. Cholla Power Plant, Navajo County, Arizona. Prepared on behalf of Arizona Public Service. June 14, 2019.

**TABLES**



**Table 1**  
**MW-68M Well Pumping Summary**

Date	Minutes Pumped	Average Pumping Rate (gpm)	Volume Purged (gal)	Depth to Water Before Development (ft bgs)	Depth to Water at End of Development (ft bgs)	Final Measured Temp (°C)	Final Measured pH	Final Measured Electrical Conductivity (µS/cm)	Final Measured Water Turbidity (NTUs)
9/17/2019	109	0.8	87.2	18	19.3	NM	NM	NM	NM
9/18/2019	90	2.4	216	16.8	34	20.7	6.89	>3999 <sup>1</sup>	553

**Notes:**

<sup>1</sup> Measurement out of instrument range

ft bgs – feet below ground surface

gal – gallons

gpm – gallons per minute

min – minute

NM – Not Measured

µS/cm – microsiemens per centimeter

NTUs – Nephelometric Turbidity Unit

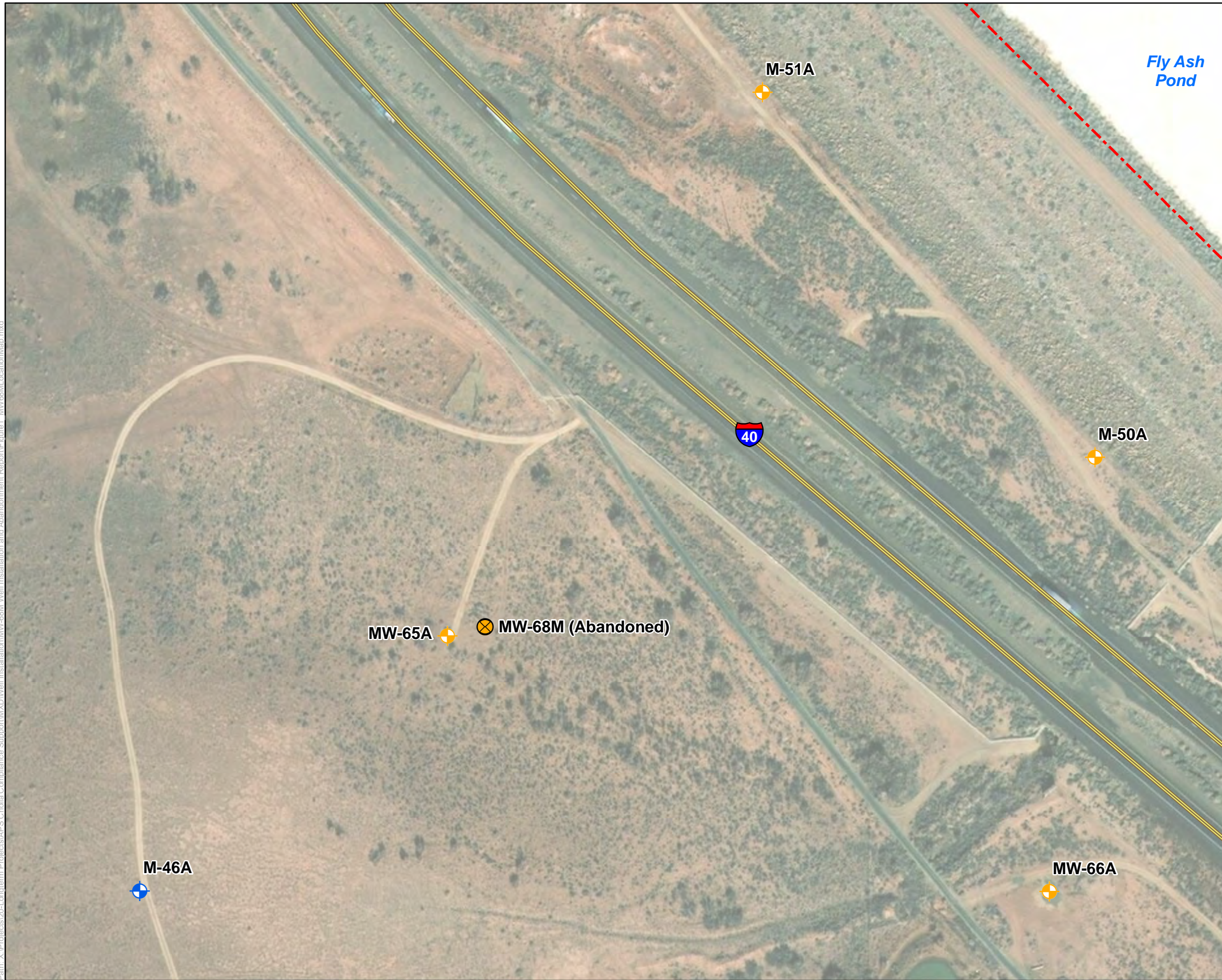
wood.





## FIGURES



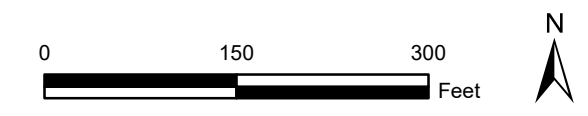



Path: X:\Projects\20-Longterm Projects\APS Cholla Compliance Support\MXD\Well Installation and Abandonment\Report\Figure1\_MW68M LocationMap.mxd



- Legend**
-  CCR Monitoring Well Location
  -  Supplementary Site Monitoring Well Location
  -  Abandoned Well Location
  -  Approximate Extent of CCR Unit

**Notes:**  
MW-65A Well Identification



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE 1</b>	<b>MW-68M Well Location Map</b>
Job No. 1420182040 PM: EHL Date: 1/31/2020 Scale: 1" = 150'	
<small>The map shown here has been created with all due and reasonable care and is strictly for use with Wood Environment &amp; Infrastructure Solutions, Inc. Project Number 1420182040. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Wood Environment &amp; Infrastructure Solutions, Inc. assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.</small>	



**APPENDIX A**

**LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM**

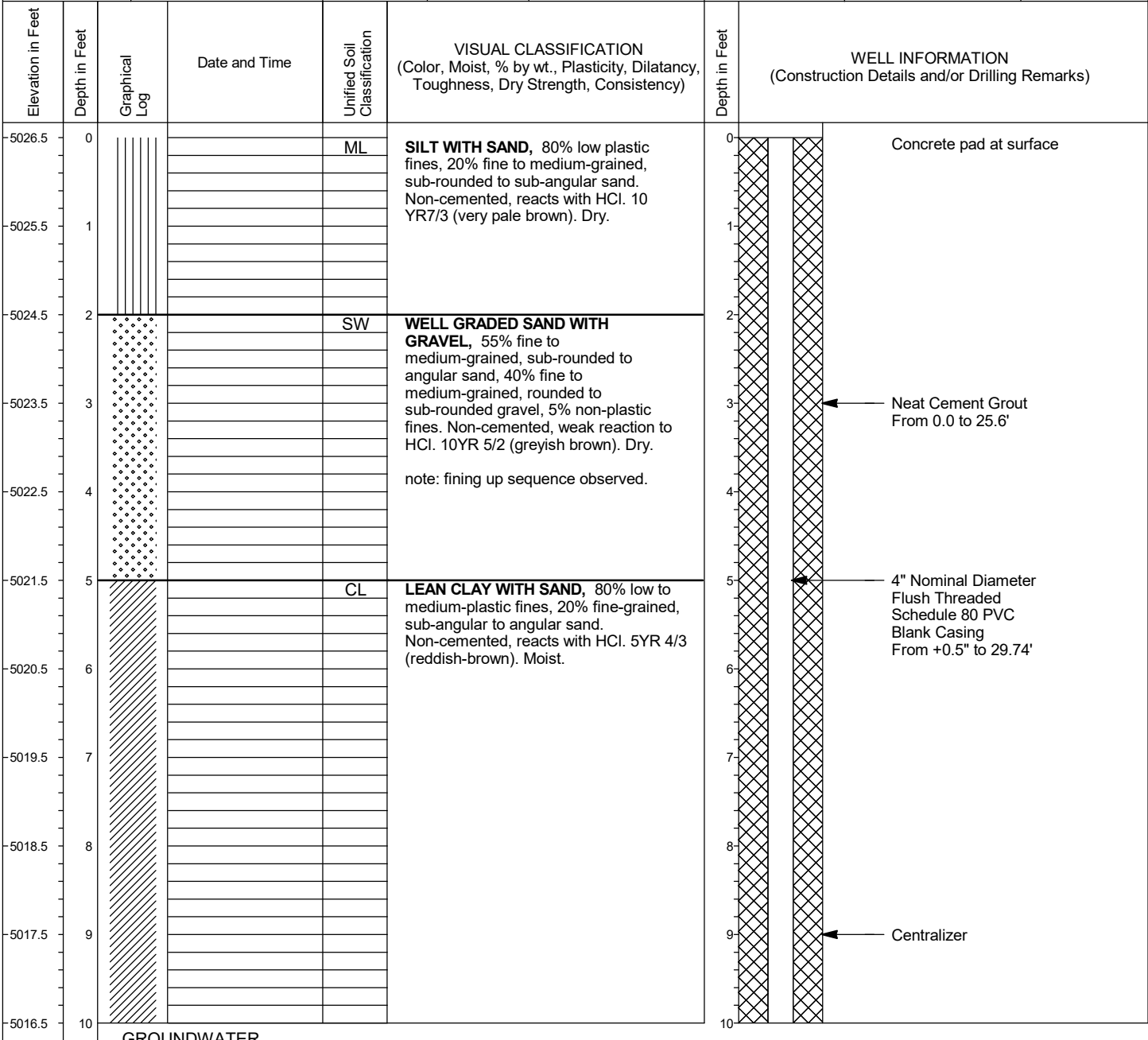




Environment & Infrastructure Solutions, Inc.  
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Phoenix, Arizona 85034

# BORING LOG I.D.: MW-68M (abandoned)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation		<b>PROJECT LOCATION:</b>	APS Cholla Power Plant	
<b>LOGGED BY:</b>	D. Andersen		<b>PROJECT FEATURE:</b>	Fly Ash Pond	
<b>DRILLER:</b>	D. Cervantez		<b>WOOD PROJECT #:</b>	14-2018-2040	
<b>DRILLER FIRM:</b>	Boart Longyear		<b>ADWR REG. #:</b>	55-923346	
<b>RIG I.D.:</b>	LT4634		<b>STATION/OFFSET:</b>	N/A	
<b>RIG TYPE:</b>	Sonic		<b>REFERENCE:</b>	N/A	
<b>BORING TYPE:</b>	N/A	<b>BORING DIA.:</b>	8"	<b>COORDINATES:</b>	N1429535.367, E668309.992
<b>ORIENTATION:</b>	90°		<b>COORDINATE SYS:</b>	NAD83	
<b>HAMMER TYPE:</b>	N/A		<b>SURFACE ELEV. (FT):</b>	5026.45	
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>			N/A	<b>VERTICAL DATUM:</b>	NAVD88
<b>START DATE:</b>	9/16/2019	<b>START TIME:</b>	12:20	<b>COMPLETION DATE:</b>	9/16/2019
				<b>COMPLETION TIME:</b>	17:32



**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD     N/A    

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<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
-5016.5	10			CL	<b>LENA CLAY WITH SAND</b> , continued	10	(Continued)
-5015.5	11					11	
-5014.5	12					12	
-5013.5	13			CL	<b>SANDY LEAN CLAY WITH GRAVEL</b> , 60% low to medium plastic fines, 20% fine to medium-grained, sub-rounded to sub-angular sand, 20% fine-grained, sub-rounded to rounded gravel. Non-cemented, weak HCl reaction. 5YR 4/3 (reddish-brown). Moist.  note: Lens of wet, medium-grained, sub-rounded to rounded sand from 14' to 14.5'.	13	4" Nominal Diameter Flush Threaded Schedule 80 PVC Blank Casing From +0.5" to 29.74'
-5012.5	14					14	
-5011.5	15				CL	<b>LEAN CLAY</b> , 90% low to medium-plastic fines, 10% medium-grained, sub-angular to angular sand. Non-cemented, weak reaction with HCl. 5YR 4/3 (reddish-brown). Minor calcite throughout. Moist.	
-5010.5	16			SM	<b>SILTY SAND WITH GRAVEL</b> , 50% fine to medium-grained, sub-rounded to well-rounded sand, 30% non-plastic fines, 20% fine-grained, well-rounded gravel. Non-cemented, strong HCL reaction. 10 YR 6/2 (light brownish gray). Dry.	16	Centralizer
-5009.5	17					17	
-5008.5	18				SP	<b>POORLY GRADED SAND WITH GRAVEL</b> , 80% fine to medium-grained, sub-rounded to well-rounded sand, 15% medium-grained, well-rounded gravel, 5% non-plastic fines. Non-cemented, no reaction with HCL. 2.5YR 5/3 (reddish-brown). Wet.	
-5007.5	19			SM	note: free water observed. Fining up sequence observed. <b>SILTY SAND</b> , 60% fine-grained, sub-rounded to well-rounded sand, 40% non-plastic fines. Non-cemented, no HCl reaction. 5YR 4/2 (dark reddish-gray). Wet.	19	Neat Cement Grout From 0.0 to 25.6'
-5006.5	20					20	
-5005.5	21					21	
-5004.5	22				<b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b> , highly-weathered, maroon-red colored mudstone and claystone with 1-2 inch sub-rounded fragments of competent, fine-grained, yellow-green colored siltstone. Mudstone and claystone	22	

**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD N/A

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)	
-5003.5	23				<p>weathered to clay consistency, competent siltstone fragments present in clay matrix. Trace gypsum. No HCl reaction on fresh surfaces. Wet.</p> <p><b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b>, weathered maroon-red colored mudstone and claystone mixed with weathered, fine-grained, yellow-green colored siltstone. Mixture of mudstone, claystone, and siltstone has "swirled" appearance, possibly representing deformation structures or weathering. Reacts w/ HCl on fresh surfaces. Moist, though much less so than previous interval. Decreasing moisture with depth.</p> <p><b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b>, maroon-red colored mudstone and claystone alternating with fine-grained, yellow-green colored siltstone. Decreased weathering. Gypsum stringers throughout. Strong HCl reaction on fresh surfaces. Slightly moist.</p> <p><b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b>, competent, unweathered, maroon-red colored mudstone and claystone alternating with fine-grained, yellow-green colored siltstone. Gypsum stringers throughout. Strong HCl reaction on fresh surfaces. Dry. Hard drilling at 35'.</p> <p>note: rig shutdown for 1.5 hours at 35' interval. Upon resuming drilling, moisture present from 35' to 36' interval and dry underneath. Moisture likely due to introduced alluvial groundwater.</p>	23	(Continued)	
-5002.5	24						24	Neat Cement Grout From 0.0 to 25.6'
-5001.5	25						25	
-5000.5	26						26	Bentonite Hole Plug From 25.6' to 27.7'
-4999.5	27						27	
-4998.5	28						28	Transition Sand 20/40 Silica Sand From 27.7' to 28.5'
-4997.5	29						29	Centralizer
-4996.5	30						30	Filter Pack 8/12 Silica Sand From 28.5' to 50.27'
-4995.5	31						31	4" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 29.74' to 49.84'
-4994.5	32						32	
-4993.5	33						33	
-4992.5	34						34	
-4991.5	35						35	

**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD          N/A

(Continued Next Page)



Environment & Infrastructure Solutions, Inc.  
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# BORING LOG I.D.: MW-68M (abandoned)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
-4991.5	35				<b>MOQUI MEMBER OF THE MOENKOPI FORMATION, continued</b>	35	(Continued)
-4990.5	36		36	4" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 29.74' to 49.84'			
-4989.5	37		37				
-4988.5	38		38	Filter Pack 8/12 Silica Sand From 27.7' to 50.27'			
-4987.5	39		39				
-4986.5	40		40				
-4985.5	41		41				
-4984.5	42		42				
-4983.5	43		43				
-4982.5	44		44				
-4981.5	45		45				
-4980.5	46		46				
-4979.5	47		47				

**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD          N/A         

(Continued Next Page)



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<b>ADWR REG. #:</b>	55-923346	<b>PROJECT FEATURE:</b>	Fly Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Date and Time	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
-4978.5	48				<b>MOQUI MEMBER OF THE MOENKOPI FORMATION, continued</b>	48	(Continued) 4" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 29.74' to 49.84' Filter Pack 8/12 Silica Sand From 27.7' to 50.27' End Cap Total Depth = 50.27'
-4977.5	49					49	
-4976.5	50					50	
					Total Depth = 50.35'		
-4975.5	51					51	
-4974.5	52					52	
-4973.5	53					53	
-4972.5	54					54	
-4971.5	55					55	
-4970.5	56					56	
-4969.5	57					57	
-4968.5	58					58	
-4967.5	59					59	
-4966.5	60					60	

**GROUNDWATER**

	DEPTH(ft bgs)	HOUR	DATE
▽	18.3	09:22	9/17/19
▼	17.8	17:23	9/17/19
▼	16.8	07:37	9/18/19
▼			

METHOD     N/A

**APPENDIX B**  
**PHOTOGRAPH LOG**





Photograph Log

Photograph 1.

0 to 5 foot below ground surface (ft bgs) formation samples from MW-68M.



Photograph 2.

5 to 10 ft bgs formation samples from MW-68M.





## Photograph Log

### Photograph 3.

10 to 15 ft bgs formation samples from MW-68M.



### Photograph 4.

15 to 20 ft bgs formation samples from MW-68M.





## Photograph Log

### Photograph 5.

17.5 to 20 ft bgs formation samples from MW-68M showing alluvial-bedrock interface.



### Photograph 6.

Close up view of sand and gravel near bedrock contact in the 17.5 to 20 ft bgs interval. Free water was observed in this interval.





Photograph Log

Photograph 7.

20 to 22.5 ft bgs formation samples from MW-68M.



Photograph 8.

22.5 ft to 25 ft bgs formation samples from MW-68M.





Photograph Log

Photograph 9.

25 to 27.5 ft bgs formation samples from MW-68M.



Photograph 10.

27.5 to 30 ft bgs formation samples from MW-68M.

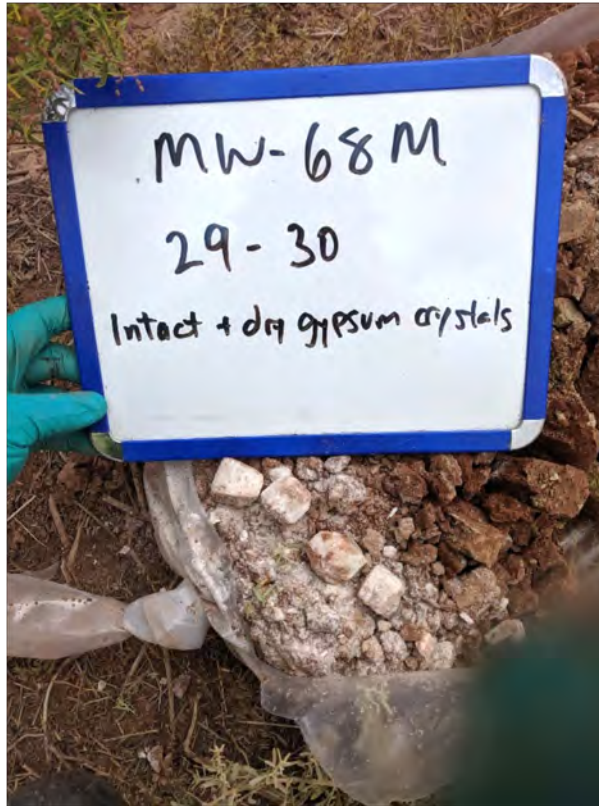




## Photograph Log

**Photograph 11.**

29 to 30 ft bgs formation samples from MW-68M, showing intact and dry gypsum.



**Photograph 12.**

30 to 35 ft bgs formation samples from MW-68M.





## Photograph Log

### Photograph 13.

35 to 37.5 ft bgs formation samples from MW-68M. Moisture from alluvial groundwater introduced during rig shutdown can be seen from 35 to 36 ft bgs.



### Photograph 14.

37.5 to 39 ft bgs formation samples from MW-68M.





Photograph Log

Photograph 15.

39.5 to 41.5 ft  
bgs formation  
samples from  
MW-68M.



Photograph 16.

41.5 to 43.5 ft  
bgs formation  
samples from  
MW-68M.





## Photograph Log

### Photograph 17.

43.5 to 46 ft bgs  
formation  
samples from  
MW-68M.



### Photograph 18.

46 to 48 ft bgs  
formation  
samples from  
MW-68M.





## Photograph Log

### Photograph 19.

48 to 50 ft bgs formation samples from MW-68M.



### Photograph 20.

Abandonment location of MW-68M (denoted by staked position). The bollards surrounding the MW-65A vault can be seen to the right.



**APPENDIX C**  
**SURVEY RESULTS**





**HOLBROOK MONITORING WELLS - JOSEPH CITY, ARIZONA - DECEMBER 2, 2019**

Point ID	Northing	Easting	Elevation	Latitude	Longitude	Well ID	Description
30001	1438922.903	663769.484	5120.488	34d57'17.82529"	-110d17'15.29430"		<b>BORING HOLE 2</b>
30002	1438931.622	663766.322	5121.758	34d57'17.91150"	-110d17'15.33242"		BH 2 GROUND NORTH
30003	1438926.731	663780.020	5121.649	34d57'17.86328"	-110d17'15.16777"		BH 2 GROUND EAST
30006	1438918.405	663757.890	5121.820	34d57'17.78065"	-110d17'15.43354"		BH 2 GROUND WEST
30005	1438915.361	663772.481	5121.888	34d57'17.75072"	-110d17'15.25819"		BH 2 GROUND SOUTH
30014	1438843.380	663545.446	5120.603	34d57'17.03598"	-110d17'17.98485"		<b>BORING HOLE 1</b>
30010	1438853.293	663540.578	5121.342	34d57'17.13398"	-110d17'18.04349"		BH 1 GROUND NORTH
30012	1438823.803	663487.154	5121.439	34d57'16.84163"	-110d17'18.68492"		BH 1 GROUND EAST
30011	1438840.246	663535.904	5121.177	34d57'17.00486"	-110d17'18.09945"		BH 1 GROUND WEST
30013	1438833.040	663548.669	5121.183	34d57'16.93374"	-110d17'17.94599"		BH 1 GOUND SOUTH
30047	1437462.107	663637.500	5050.741	34d57'03.37389"	-110d17'16.85874"	<b>MW-69A</b>	TOP PVC NORTH
30046	1437462.118	663637.629	5051.402	34d57'03.37399"	-110d17'16.85719"	MW-69A	RIM NORTH
30025	1437463.883	663636.587	5049.693	34d57'03.39144"	-110d17'16.86974"	MW-69A	CONCRETE NORTH
30023	1437460.125	663638.394	5049.631	34d57'03.35429"	-110d17'16.84797"	MW-69A	CONCRETE SOUTH
30018	1437464.376	663636.230	5049.253	34d57'03.39632"	-110d17'16.87403"	MW-69A	GROUND NORTH
30016	1437459.412	663639.153	5049.294	34d57'03.34725"	-110d17'16.83884"	MW-69A	GROUND SOUTH
30044	1437468.038	663648.643	5051.119	34d57'03.43269"	-110d17'16.72496"	<b>MW-70M</b>	TOP PVC NORTH
30045	1437468.089	663648.741	5051.701	34d57'03.43319"	-110d17'16.72378"	MW-70M	RIM NORTH
30030	1437469.857	663647.852	5050.161	34d57'03.45068"	-110d17'16.73449"	MW-70M	CONCRETE NORTH
30028	1437466.010	663649.439	5050.092	34d57'03.41264"	-110d17'16.71536"	MW-70M	CONCRETE SOUTH
30032	1437471.026	663647.565	5049.801	34d57'03.46223"	-110d17'16.73795"	MW-70M	GROUND NORTH
30034	1437465.163	663649.474	5049.776	34d57'03.40426"	-110d17'16.71493"	MW-70M	GROUND SOUTH
30039	1429525.854	668305.670	5026.841	34d55'44.92272"	-110d16'20.67470"	<b>MW-68M</b>	ABANDONED WELL
30041	1429535.367	668309.992	5026.445	34d55'45.01687"	-110d16'20.62290"	MW-68M	GROUND NORTH
30040	1429523.222	668312.430	5026.571	34d55'44.89676"	-110d16'20.59347"	MW-68M	GROUND SOUTH

DATUM:  
 NAD83 (1982) ARIZONA STATE PLANE COORDINATES  
 EAST ZONE 0201, INTERNATIONAL FEET  
 NAVD88 ELEVATION

Field work was completed on December 2, 2019.



**APPENDIX P**  
**WOOD TECHNICAL MEMORANDUM DOCUMENTING THE INSTALLATION OF**  
**MW-69A AND MW-70M**



# Technical Memorandum

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**To:** Natalie Chrisman Lazarr, PE  
Byron Conrad, PE  
Pamela Norris

**File No:** 14-2018-2040

**From:** Dane Andersen

**Reviewed by:** Emily LoDolce, PE

**Date:** January 31, 2020

**Subject:** **WELL INSTALLATION OF MW-69A AND MW-70M**  
**Arizona Public Service Cholla Power Plant – Navajo County, Arizona**

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## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents the installation of monitoring wells MW-69A and MW-70M at the Arizona Public Service (APS) Cholla Power Plant (the Site) in Navajo County, Arizona. The MW-69A and MW-70M wells were installed downgradient of the Bottom Ash Pond (BAP) to support a leaching assessment of various geologic formations underlying the BAP and evaluate groundwater quality in the Moqui member of the Moenkopi Formation. Elevated levels of cobalt in groundwater downgradient of the BAP have prompted corrective measures under coal combustion residuals (CCR) groundwater monitoring requirements detailed in 40 Code of Federal Regulations (CFR) Sections (§) 257.90 through 257.98 (Federal Register, 2018). The investigation was proposed in the *Change Order Request for Continuing Corrective Measures Pre-Design Support* (Change Order) (Wood Environment & Infrastructure Solutions, Inc. [Wood], 2019c).

The following sections detail the site background, basis for investigation, description of the investigation activities, conclusions, and recommendations.

## 1.1 Site Background

A description of the site background, CCR groundwater monitoring system, and historical operational information is presented in the *Annual Groundwater Monitoring and Corrective Action Report for 2018* (Wood, 2019a). The subject of this investigation is the BAP, a CCR unit which primarily receives bottom ash slurry from the plant. The BAP impounds bottom ash slurry using a dam system comprised of an eastern and southern dam. The eastern dam is constructed on the Tanner Wash Alluvium and the Moenkopi Holbrook, Moenkopi Moqui, and Chinle geologic units, while the southern dam is constructed on the Tanner Wash Alluvium and Moenkopi Moqui geologic unit. The southern BAP dam clay core extends through alluvium to bedrock where the alluvium was less than 20 feet (ft) thick at the time of construction. In regions where the alluvium was greater than 20 ft thick, a cutoff wall was constructed that generally extended to bedrock. Due to the depths involved, the cutoff wall does not extend to bedrock in the middle of the channel underlying the southern dam. There is an approximately 10 to 20-ft thick layer of alluvium below the base of the cutoff wall (at an elevation of 4,980 ft above mean sea level [amsl]) in this area. Groundwater near the BAP generally flows south-southwest through the Tanner Wash Alluvium to its confluence with the Little Colorado River Alluvium.



## **1.2 Basis for Investigation**

The *Assessment of Corrective Measures for the Fly Ash Pond and the Bottom Ash Pond* (Wood, 2019b) identified a poor understanding of the source of cobalt exceedances in groundwater downgradient of the BAP. Given the absence of cobalt in BAP water, a leaching evaluation was proposed to evaluate the potential mobilization of cobalt from geologic formations underlying the BAP. The installations of wells documented in this Tech Memo were conducted to collect samples for the leaching evaluation and further evaluate water quality in geologic formations downgradient of the BAP.

## **2.0 DESCRIPTION OF INVESTIGATION ACTIVITIES**

### **2.1 Initial Moqui Well Borehole Advancement**

Well drilling and installation was performed by a licensed Arizona driller, Boart Longyear, under direct contract to Wood. The initial Moqui well borehole was drilled to a 9-inch (in) diameter using the Sonic drilling method on November 18, 2019. The borehole was advanced to a total depth of approximately 52 ft below ground surface (bgs). Continuous formation samples were logged by a Wood field geologist at 2.5-ft intervals using the Unified Soil Classification System.

Based on the boring log of CCR compliance well M-52A, which was drilled using the direct-rotary drilling method and is located approximately 26 ft northwest of the initial Moqui well borehole location, the depth to the Moqui member was expected to occur at approximately 79 ft bgs. However, formation samples collected during the initial borehole advancement indicated that the Moqui occurs at approximately 33 ft bgs in this area. The Moqui was observed to be highly weathered and saturated during borehole advancement, making the contact between alluvium and bedrock difficult to identify. The contact between the alluvium and Moqui was identified by observing the downhole transition from sand and gravel typical of alluvial deposition to grayish-green colored siltstone fragments and gypsum (two lithologic features characteristic of the Moqui member).

Moisture was first observed in the alluvial formation samples at approximately 17 ft bgs. The Moqui member was observed to be saturated from the contact with the alluvium (33 ft bgs) to 52 ft bgs. The underlying Wupatki member of the Moenkopi Formation was not penetrated during borehole advancement. A complete description of the formation samples is provided in Appendix A – Lithologic Log and Well Construction Diagram, and photos of the formation samples are provided in Appendix B – Photograph Log.

After positively identifying the top of the alluvial-bedrock contact at 33 ft bgs, it was determined that M-52A (which is screened from 20 to 70 ft bgs) is likely in communication with both the alluvium and the Moqui member. Therefore, to properly monitor both the alluvium and the Moqui, a decision was made to complete the initial Moqui well borehole as an alluvial monitoring well (MW-69A) and install an additional well approximately 15 ft away in the Moqui member (MW-70M).

### **2.2 MW-69A Well Installation**

On November 18, 2019, the initial borehole was backfilled with bentonite chips from approximately 52 to 27 ft bgs. The bentonite was then hydrated and allowed to set until well construction occurred on November 20, 2019. The MW-69A and MW-70M wells were designed similar to existing monitoring wells at Cholla, though a smaller well diameter was selected to accommodate a “telescoped” annular seal, which is discussed in Section 2.3. Well materials consisted of a 3-in nominal diameter Schedule 80 polyvinyl chloride (PVC) casing and a 3-in nominal diameter Schedule 80 PVC screen with 0.020-in slot size. The screen interval

was installed from 26.6 to 16.6 ft bgs. Filter pack material consisting of 12-20 silica sand was installed from 27 to 15.9 ft bgs, and 20-40 silica sand was emplaced from 15.9 to 14.9 ft bgs. A bentonite seal was installed from 14.9 to 12.3 ft bgs, and neat cement grout was installed from 12.3 ft bgs to the ground surface. Depth intervals for the annular materials were verified by a Wood field geologist during well construction by measuring the depth to the top of the annular materials using a weighted tape measure during emplacement (typically after every 1 to 2 ft of material emplacement). Details of the well construction are presented in Appendix A – Lithologic Logs and Well Construction Diagrams.

Well development was attempted on November 22, 2019. The depth to water in MW-69A before development activities began was measured at 16.81 ft bgs (or 10.19 ft of water in the well). At approximately 12:15 PM on November 22, MW-69A was bailed dry. After allowing the well to recover for approximately two hours, the water level was measured at 25 ft bgs (or 2 ft of water in the well), equating to only 2 ft of recovery over the two-hour interval. The remaining water was bailed, and further development was halted due to poor water production at MW-69A.

### **2.3 MW-70M Well Installation**

The MW-70M boring was drilled to a 9-in diameter to 42.5 ft bgs using the Sonic drilling method on November 20, 2019. Upon reaching 42.5 ft bgs, the borehole was backfilled with bentonite to approximately 27 ft bgs. The bentonite was hydrated and allowed to set overnight. On November 21, 2019, an 8-in diameter borehole was advanced through the bentonite and underlying Moenkopi from 27 to 77.5 ft bgs. The purpose of this drilling method (commonly referred to as “telescoped” design) was to seal off alluvial groundwater by placing a 1-in thick bentonite seal on the borehole wall across the contact between the alluvium and Moenkopi Moqui, thereby preventing the migration of alluvial groundwater into the underlying formation. Photographs of the 8-in drill cores advanced through the bentonite seal are presented in Appendix B – Photograph Log.

Continuous formation samples were logged by a Wood field geologist at 2.5-ft intervals using the Unified Soil Classification System. Alluvium was encountered from 0 to approximately 33 ft bgs, and the Moqui member was encountered from 33 to 77.5 ft bgs. The underlying Wupatki member of the Moenkopi Formation was not penetrated during borehole advancement. A complete description of the formation samples is provided in Appendix A – Lithologic Logs and Well Construction Diagrams and photographs of the formation samples are presented in Appendix B – Photograph Log.

Moisture was first observed in the alluvial formation samples at approximately 17 ft bgs. The Moqui member was observed to be saturated from the contact with the alluvium (33 ft bgs) to 73 ft bgs. A significant amount of water was produced during drilling as the borehole was advanced between 67.5 and 73 ft bgs, suggesting a relatively transmissive zone lies within this interval. Several coarse and rounded gravels were observed at approximately 67 ft bgs. Below 73 ft bgs, the Moqui was observed to be dry and competent to the total depth of the borehole.

Well construction occurred on November 22, 2019. Well materials consisted of a 3-in nominal diameter Schedule 80 PVC casing and a 3-in nominal diameter Schedule 80 PVC screen with 0.020-in slot size. The screen interval was placed from 45.6 to 75.6 ft bgs. Filter pack material consisting of 12-20 silica sand was installed from 76 to 44 ft bgs, and 20-40 silica sand was emplaced from 44 to 43 ft bgs. A bentonite seal was installed from 43 to 20.5 ft bgs, and neat cement grout was installed from 20.5 ft bgs to the ground surface. Depth intervals for the annular materials were verified by a Wood field geologist during well construction by measuring the depth to the top of the annular materials using a weighted tape measure



during emplacement (typically after every 1 to 2 ft of material emplacement). Details of the well construction are presented in Appendix A – Lithologic Logs and Well Construction Diagrams.

Well development occurred on November 22, 2019. Initial development activities consisted of surging and bailing the well until the sediment produced by each cycle was reduced to trace amounts. Development pumping was then performed using a 2-in nominal diameter Proactive Mega-Monsoon pump. The pump intake was set at approximately 74 ft bgs. The well was pumped for 198 minutes at flow rates ranging between 1.3 and 1.8 gallons per minute for a total of approximately 280 gallons of groundwater removed. Near the end of development pumping, field parameters including temperature, pH, and electrical conductivity stabilized to less than 10 percent relative difference and turbidity measurements were recorded at less than 5 Nephelometric Turbidity Units. Details of the well development are presented as Table 1 – MW-70M Development Summary.

## **2.4 Investigation Derived Waste**

Drill cuttings from the boreholes were spread on the ground. Water produced during drilling and development was discharged to the ground adjacent to the well from which it was pumped and allowed to infiltrate to the subsurface.

## **2.5 Well Survey**

The location, surface elevation, and top of casing elevation of the completed wells were surveyed on December 2, 2019 by a registered land surveyor (Arizona). The survey report is provided in Appendix C and Figure 1 presents the surveyed location of the wells.

## **3.0 FINDINGS AND RECOMMENDATIONS**

Key findings from the MW-69A and MW-70M well installation can be summarized as follows:

*Well Seal Design:* The telescoped bentonite well seal installed at MW-70M proved to be an effective method for sealing off alluvial groundwater from the underlying Moqui member, and future Moqui well designs should consider employing this method.

*Moqui Member Identification:* The Moqui member was observed to be highly weathered and saturated during the investigation, making identification of the alluvial-bedrock contact difficult. The contact was identified by recognizing distinguishing lithologies from each unit – sand and gravel in the alluvium and grayish-green colored siltstone and gypsum in the Moqui. These formation characteristics should be used as indicators to identify the Moqui member during future well investigations. Because field determination of the contact between alluvium and Moqui can be difficult depending on the degree to which the Moqui is weathered and the drilling method employed, Wood recommends assessing existing boring logs from wells across the Site to ensure the alluvial-bedrock contact has been correctly identified. Additionally, the continuous formation samples produced by the Sonic drilling method proved to be essential in recognizing the transition from alluvium to bedrock and highlights the benefits of this drilling method.

*Well M-52A:* The depth at which the Moqui was identified during this investigation indicates that the elevation of the Moqui is approximately 5016.8 ft amsl at this location (approximately 46 ft higher than previously identified). As previously stated, nearby CCR compliance well M-52A (which is screened from 5,027.08 to 4,977.08 ft amsl) is likely in communication with groundwater in the alluvium and the Moenkopi Moqui. To assess the suitability of M-52A as a CCR compliance well and determine the groundwater

conditions in both the alluvium and the Moqui, Wood recommends collecting groundwater samples from MW-69A and MW-70M for comparison to existing analytical data from M-52A.

*Moqui Member Groundwater Conditions:* Water produced during the drilling and well development of MW-70M was notably greater than MW-69A, suggesting that groundwater migration occurs predominately in the Moqui at this location. Observations made during the MW-70M borehole advancement and well development indicate that the most productive zone within the Moqui likely occurs within the 67.5 to 73 ft bgs interval (4,982.3 ft amsl to 4,976.8 ft amsl). This finding will likely necessitate updates to the BAP Conceptual Site Model. To assess the hydraulic properties of the alluvium and Moqui member downgradient of the BAP, Wood recommends performing rising-head and falling-head tests (i.e. slug tests) at MW-69A and MW-70M.

#### **4.0 REFERENCES**

- Federal Register, 2018. *40 Code of Federal Regulations Part 257 – Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule promulgated April 17, 2015 with Amendments to the National Minimum Criteria (Phase One, Part One) effective August 29, 2018.*
- Wood, 2019a. *Annual Groundwater Monitoring and Corrective Action Report for 2018. Coal Combustion Residuals Rule and Aquifer Protection Permit Compliance.* Arizona Public Service Company. Cholla Power Plant, Navajo County, Arizona. Prepared on behalf of Arizona Public Service. January 31, 2019.
- Wood, 2019b. *Assessment of Corrective Measures for the Fly Ash Pond and the Bottom Ash Pond. Coal Combustion Residuals Rule and Aquifer Protection Permit Compliance.* Arizona Public Service Company. Cholla Power Plant, Navajo County, Arizona. Prepared on behalf of Arizona Public Service. June 14, 2019.
- Wood, 2019c. *Change Order Request for Continuing Corrective Measures Pre-Design Support.* Arizona Public Service Company. Cholla Power Plant, Navajo County, Arizona. November 12, 2019.

**TABLES**



**Table 1**  
**MW-70M Development Summary**

<b>Date</b>	<b>Minutes Pumped</b>	<b>Average Pumping Rate (gpm)</b>	<b>Volume Purged (gal)</b>	<b>Depth to Water Before Development (ft bgs)</b>	<b>Depth to Water at End of Development (ft bgs)</b>	<b>Final Measured Temp (°C)</b>	<b>Final Measured pH (SU)</b>	<b>Final Measured Electrical Conductivity (µS/cm)</b>	<b>Final Measured Water Turbidity (NTUs)</b>
11/22/2019	198	1.3 – 1.8	~280	19.1	72.8	17.04	7.12	9994	1.60

**Notes:**

ft bgs – feet below ground surface  
 gal – gallons  
 gpm – gallons per minute  
 µS/cm – microsiemens per centimeter  
 NTUs – Nephelometric Turbidity Unit  
 SU – Standard Unit




wood.

## FIGURES








- Legend**
-  CCR Monitoring Well Location
  -  Supplementary Site Monitoring Well Location
  -  Approximate Extent of CCR Unit

**Notes:**

MW-69A Well Identification



Arizona Public Service Cholla Power Plant Navajo County, Arizona	
<b>FIGURE 1</b>	<b>MW-69A and MW-70M Well Location Map</b>
Job No. 1420182040 PM: EHL Date: 1/31/2020 Scale: 1" = 75'	
<small>The map shown here has been created with all due and reasonable care and is strictly for use with Wood Environment &amp; Infrastructure Solutions, Inc. Project Number 1420182040. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Wood Environment &amp; Infrastructure Solutions, Inc. assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.</small>	

Path: X:\Projects\201-Longterm Projects\APS Cholla Compliance Support\MXD\Well Installation\2019\Figure1\_MW69and70Locations.mxd

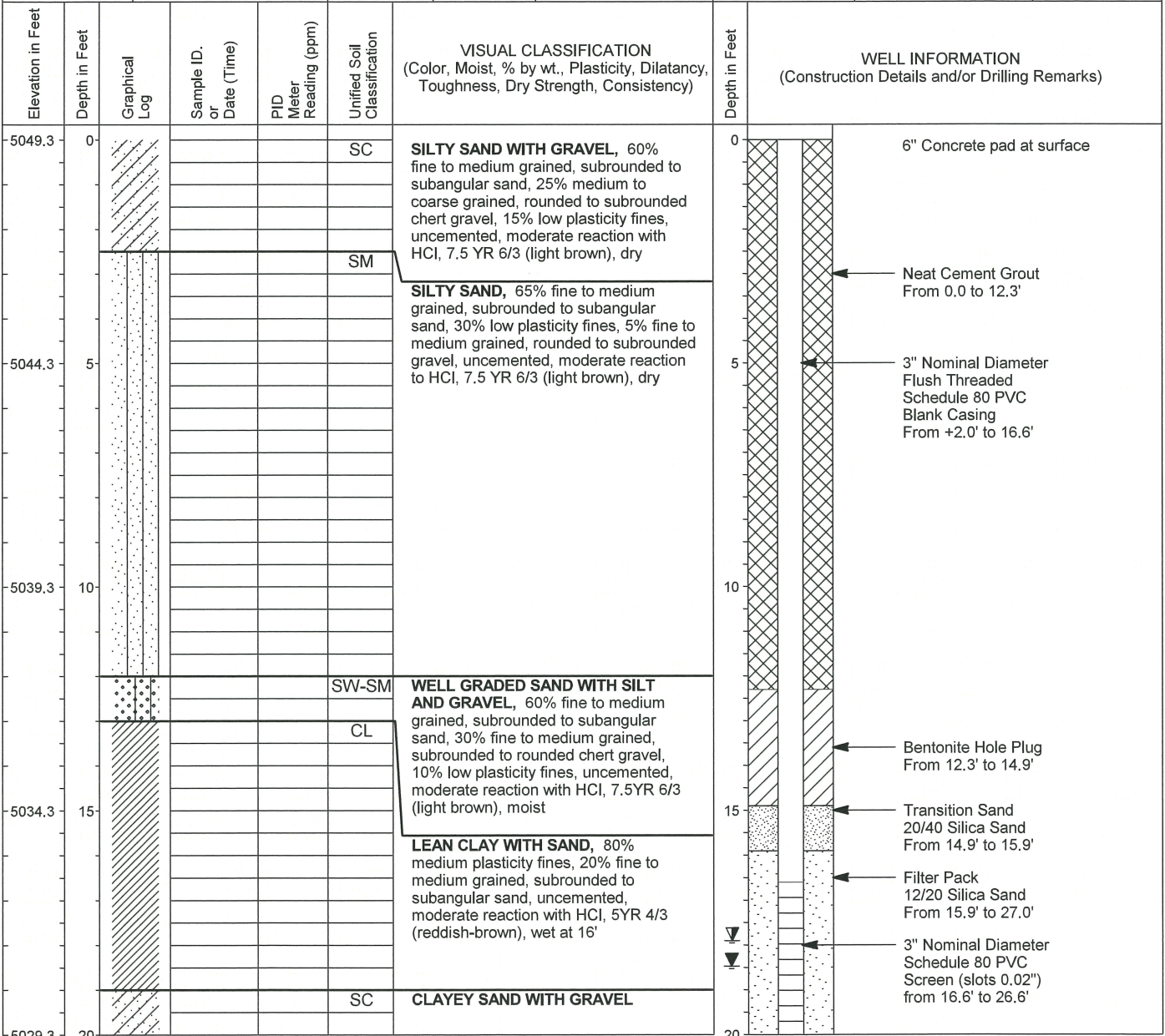


**APPENDIX A**

**LITHOLOGIC LOGS AND WELL CONSTRUCTION DIAGRAMS**



<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation			<b>PROJECT LOCATION:</b>	APS Cholla Power Plant	
<b>LOGGED BY:</b>	D. Andersen			<b>PROJECT FEATURE:</b>	Bottom Ash Pond	
<b>DRILLER:</b>	C. Patterson			<b>WOOD PROJECT #:</b>	14-2018-2040	
<b>DRILLER FIRM:</b>	Boart Longyear			<b>ADWR REG. #:</b>	55-923618	
<b>RIG I.D.:</b>	SR-112			<b>STATION/OFFSET:</b>	N/A	
<b>RIG TYPE:</b>	Sonic			<b>REFERENCE:</b>	N/A	
<b>BORING TYPE:</b>	N/A	<b>BORING DIA.:</b>	9"	<b>COORDINATES:</b>	N1437462.107, E663637.500	
<b>ORIENTATION:</b>	90°			<b>COORDINATE SYS:</b>	NAD83	
<b>HAMMER TYPE:</b>	N/A			<b>SURFACE ELEV. (FT):</b>	5049.25	
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>				N/A	<b>VERTICAL DATUM:</b>	NAVD88
<b>START DATE:</b>	11/18/2019	<b>START TIME:</b>	10:58	<b>COMPLETION DATE:</b>	11/18/2019	
				<b>COMPLETION TIME:</b>	12:17	



**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
21.5	---	11/20/19
18.5	---	11/21/19
17.9	---	11/23/19

METHOD N/A

(Continued Next Page)

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923618	<b>PROJECT FEATURE:</b>	Bottom Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
5029.3	20				SC	<b>CLAYEY SAND WITH GRAVEL</b> , 45% fine and medium grained, subrounded to subangular sand, 35% fine and medium grained, subrounded to rounded chert gravel, 20% medium plasticity fines, uncemented, moderate reaction with HCl, 5YR 4/3 (reddish-brown), wet, fining up sequence with chert gravel layer at 25'	20	(Continued)
5024.3	25				CL	<b>LEAN CLAY WITH SAND</b> , 70% medium plasticity fines, 25% fine and medium grained, subrounded to subangular sand, 5% fine grained, rounded chert gravel, uncemented, no HCL reaction, 5 YR 4/3 (reddish-brown), wet	25	Filter Pack 12/20 Silica Sand From 15.9' to 27.0'
								3" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 16.6' to 26.6'
								End Cap
5019.3	30				SC CL	<b>CLAYEY SAND WITH GRAVEL</b> , 50% fine and medium grained, subrounded to subangular sand, 35% fine and coarse grained, rounded chert gravel, 15% medium plasticity fines, uncemented, moderate reaction with HCl, 5YR 4/3 (reddish-brown), wet, fining up sequence	30	
						<b>LEAN CLAY WITH SAND</b> , 60% medium plasticity fines, 35% fine and medium grained, subrounded to subangular sand, 5% fine grained, rounded chert gravel, uncemented, no HCL reaction, 5 YR 4/3 (reddish-brown), wet		
5014.3	35					<b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b> , highly weathered, brownish-red colored mudstone and claystone with sand-sized fragments of subangular and fine grained grayish-green colored siltstone, mudstone and claystone weathered to clay consistency, siltstone fragments present in clayey matrix, angular fragments of gypsum, weak reaction to HCl, wet	35	Bentonite Hole Plug From 27.0' to 52.0'
5009.3	40						40	
5004.3	45						45	

**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
21.5	---	11/20/19
18.5	---	11/21/19
17.9	---	11/23/19

METHOD     N/A    

(Continued Next Page)







Environment & Infrastructure Solutions, Inc.  
4600 East Washington Street, Suite 600  
Phoenix, Arizona 85034

**BORING LOG I.D.:** MW-70M

Page 1 of 4

<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>LOGGED BY:</b>	D. Andersen	<b>PROJECT FEATURE:</b>	Bottom Ash Pond
<b>DRILLER:</b>	C. Patterson	<b>WOOD PROJECT #:</b>	14-2018-2040
<b>DRILLER FIRM:</b>	Boart Longyear	<b>ADWR REG. #:</b>	55-923582
<b>RIG I.D.:</b>	SR-112	<b>STATION/OFFSET:</b>	N/A
<b>RIG TYPE:</b>	Sonic	<b>REFERENCE:</b>	N/A
<b>BORING TYPE:</b>	N/A	<b>BORING DIA.:</b>	9" to 7"
<b>ORIENTATION:</b>	90°	<b>COORDINATES:</b>	N1437468.038, E663648.643
<b>HAMMER TYPE:</b>	N/A	<b>COORDINATE SYS:</b>	NAD83
<b>HAMMER CALIBRATION-ENERGY TRANSFER RATIO:</b>	N/A	<b>SURFACE ELEV. (FT):</b>	5049.80
<b>START DATE:</b>	11/20/2019	<b>START TIME:</b>	12:10
<b>COMPLETION DATE:</b>	11/21/2019	<b>COMPLETION TIME:</b>	10:42

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
5049.8	0				SC	<b>SILTY SAND WITH GRAVEL</b> , 60% fine to medium grained, subrounded to subangular sand, 25% medium to coarse grained, rounded to subrounded chert gravel, 15% low plasticity fines, uncemented, moderate reaction with HCl, 7.5 YR 6/3 (light brown), dry	0	6" Concrete pad at surface
					SM	<b>SILTY SAND</b> , 65% fine to medium grained, subrounded to subangular sand, 30% low plasticity fines, 5% fine to medium grained, rounded to subrounded gravel, uncemented, moderate reaction to HCl, 7.5 YR 6/3 (light brown), dry		Neat Cement Grout <sup>®</sup> From 0.0 to 20.5'
5044.8	5						5	3" Nominal Diameter Flush Threaded Schedule 80 PVC Blank Casing From +2.0' to 45.6'
					SW-SM	<b>WELL GRADED SAND WITH SILT AND GRAVEL</b> , 60% fine to medium grained, subrounded to subangular sand, 30% fine to medium grained, subrounded to rounded chert gravel, 10% low plasticity fines, uncemented, moderate reaction with HCl, 7.5YR 6/3 (light brown), moist		9" Diameter Borehole From 0.0 to 26.5'
5039.8	10				CL	<b>LEAN CLAY WITH SAND</b> , 80% medium plasticity fines, 20% fine to medium grained, subrounded to subangular sand, uncemented, moderate reaction w/ith HCl. 5YR 4/3 (reddish-brown), wet at 16'	10	
					SC	<b>CLAYEY SAND WITH GRAVEL</b>	15	
5034.8	15							
5029.8	20						20	

GROUNDWATER

DEPTH(ft bgs)	HOUR	DATE
19.7	---	11/21/19
19.1	---	11/22/19

METHOD N/A

(Continued Next Page)



<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923582	<b>PROJECT FEATURE:</b>	Bottom Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
5029.8	20				SC	<b>CLAYEY SAND WITH GRAVEL</b> , 45% fine and medium grained, subrounded to subangular sand, 35% fine and medium grained, subrounded to rounded chert gravel, 20% medium plasticity fines, uncemented, moderate reaction with HCl, 5YR 4/3 (reddish-brown), wet, fining up sequence with chert gravel layer at 25'	20	(Continued)
5024.8	25				CL	<b>LEAN CLAY WITH SAND</b> , 70% medium plasticity fines, 25% fine and medium grained, subrounded to subangular sand, 5% fine grained, rounded chert gravel, uncemented, no HCL reaction, 5 YR 4/3 (reddish-brown), wet	25	← 7" Diameter Borehole From 26.5' to 77.5'
5019.8	30				SC	<b>CLAYEY SAND WITH GRAVEL</b> , 50% fine and medium grained, subrounded to subangular sand, 35% fine and coarse grained, rounded chert gravel, 15% medium plasticity fines, uncemented, moderate reaction with HCl, 5YR 4/3 (reddish-brown), wet, fining up sequence	30	← Bentonite Hole Plug From 20.5' to 43.0'
5014.8	35				CL	<b>LEAN CLAY WITH SAND</b> , 60% medium plasticity fines, 35% fine and medium grained, subrounded to subangular sand, 5% finegrained, rounded chert gravel, uncemented, no HCL reaction, 5 YR 4/3 (reddish-brown), wet	35	
5009.8	40					<b>MOQUI MEMBER OF THE MOENKOPI FORMATION</b> , highly weathered, brownish-red colored mudstone and claystone with sand-sized fragments of subangular and fine grained, grayish-green colored siltstone, mudstone and claystone weathered to clay consistency, siltstone fragments present in clayey matrix, angular fragments of gypsum, weak reaction to HCl, wet with high water production at approximately 67', coarse grained, rounded gravels present at 67', gypsum stringer at ~72'	40	
5004.8	45						45	← Transition Sand 20/40 Silica Sand From 43.0' to 44.0' ← Filter Pack 12/20 Silica Sand From 44.0' to 76.0'

**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
19.7	---	11/21/19
19.1	---	11/22/19

METHOD     N/A    

(Continued Next Page)





<b>PROJECT:</b>	APS Cholla Plant Hydrogeologic Investigation	<b>PROJECT LOCATION:</b>	APS Cholla Power Plant
<b>ADWR REG. #:</b>	55-923582	<b>PROJECT FEATURE:</b>	Bottom Ash Pond

Elevation in Feet	Depth in Feet	Graphical Log	Sample ID. or Date (Time)	PID Meter Reading (ppm)	Unified Soil Classification	VISUAL CLASSIFICATION (Color, Moist, % by wt., Plasticity, Dilatancy, Toughness, Dry Strength, Consistency)	Depth in Feet	WELL INFORMATION (Construction Details and/or Drilling Remarks)
4979.8	70	[Dashed pattern]				<b>MOQUI MEMBER OF THE MOENKOPI FORMATION, continued</b>	70	(Continued)  3" Nominal Diameter Schedule 80 PVC Screen (slots 0.02") from 45.6' to 75.6'  Filter Pack 12/20 Silica Sand From 44.0' to 76.0'  End Cap Slough From 76.0' to 77.5' Total Depth = 77.5'
4974.8	75					<b>MOQUI MEMBER OF THE MOENKOPI FORMATION, competent, unweathered, brownish-red colored mudstone and claystone interbedded with grayish-green colored siltstone, weak reaction to HCl, dry</b>	75	
						Total Depth = 77.5'		
4969.8	80						80	
4964.8	85						85	
4959.8	90						90	
4954.8	95						95	

**GROUNDWATER**

DEPTH(ft bgs)	HOUR	DATE
19.7	---	11/21/19
19.1	---	11/22/19

METHOD     N/A

**APPENDIX B**  
**PHOTOGRAPH LOG**





## Photograph Log

### Photograph 1.

0 to 2.5 feet below ground surface (ft bgs) formation samples from MW-69A. The samples were field labeled as MW-69M before decision was made to install an additional alluvial well.



### Photograph 2.

2.5 to 5 ft bgs formation samples from MW-69A.





## Photograph Log

### Photograph 3.

5 to 7.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 4.

7.5 to 10 ft bgs  
formation  
samples from  
MW-69A.





## Photograph Log

### Photograph 5.

10 to 12.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 6.

12.5 to 15 ft bgs  
formation  
samples from  
MW-69A.





## Photograph Log

### Photograph 7.

15 to 17.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 8.

17.5 to 20 ft bgs  
formation  
samples from  
MW-68A.





## Photograph Log

### Photograph 9.

20 to 22.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 10.

22.5 to 25 ft bgs  
formation  
samples from  
MW-69A.





## Photograph Log

**Photograph 11.**

25 to 27.5 ft bgs  
formation  
samples from  
MW-69A.



**Photograph 12.**

27.5 to 30 ft bgs  
formation  
samples from  
MW-69A.





## Photograph Log

**Photograph 13.**

30 to 32.5 ft bgs  
formation  
samples from  
MW-69A.



**Photograph 14.**

32.5 to 35 ft bgs  
formation  
samples from  
MW-69A.





## Photograph Log

### Photograph 15.

35 to 37.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 16.

37.5 to 40 ft bgs  
formation  
samples from  
MW-69A.





## Photograph Log

### Photograph 17.

40 to 42.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 18.

42.5 to 45 ft bgs  
formation  
samples from  
MW-69A.

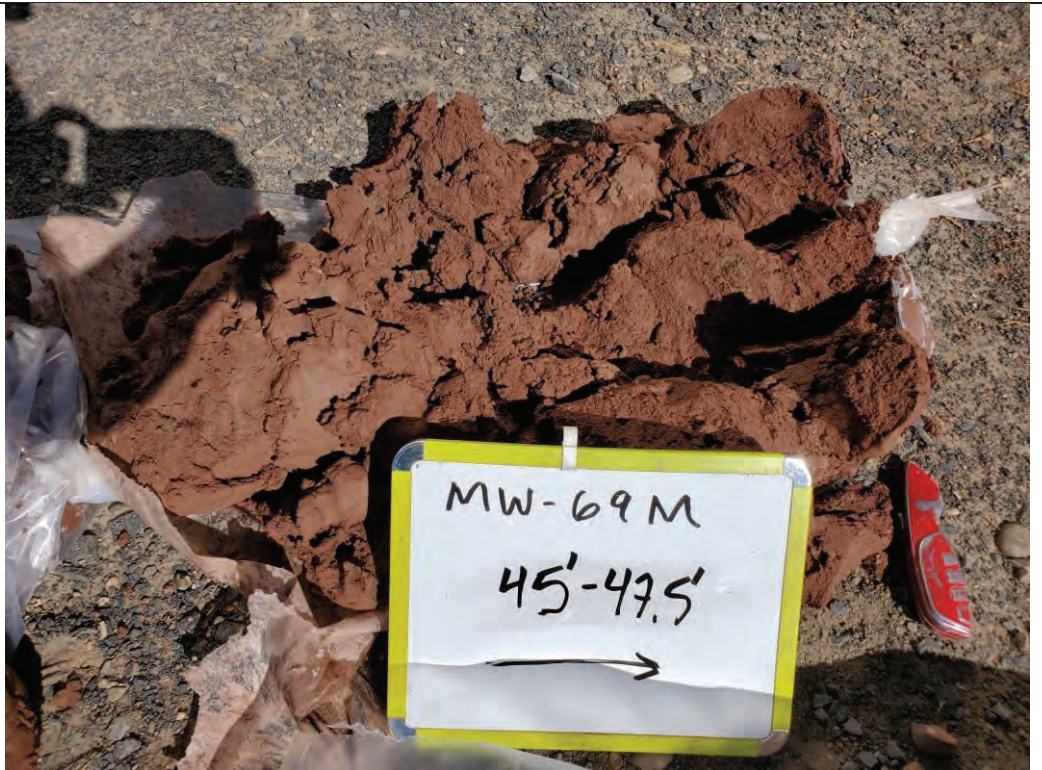




## Photograph Log

### Photograph 19.

45 to 47.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 20.

47.5 to 50 ft bgs  
formation  
samples from  
MW-69A.





## Photograph Log

### Photograph 21.

50 to 52.5 ft bgs  
formation  
samples from  
MW-69A.



### Photograph 22.

52 to 55 ft bgs  
formation  
samples from  
MW-70M.





## Photograph Log

### Photograph 23.

55-57.5 ft bgs  
formation  
samples from  
MW-70M.



### Photograph 24.

57.5 to 60 ft bgs  
formation  
samples from  
MW-70M.





## Photograph Log

### Photograph 25.

60 to 62.5 ft bgs  
formation  
samples from  
MW-70M.



### Photograph 26.

62.5 to 65 ft bgs  
formation  
samples from  
MW-70M.





## Photograph Log

### Photograph 27.

65 to 67.5 ft bgs formation samples from MW-70M.



### Photograph 28.

Rounded gravels at ~67 ft bgs from MW-70M. Significant water production was observed after drilling through this interval.





## Photograph Log

**Photograph 29.**

67.5 to 70ft bgs  
formation  
samples from  
MW-70M.



**Photograph 30.**

70 to 72.5 ft bgs  
formation  
samples from  
MW-70M.





## Photograph Log

### Photograph 31.

72.5 to 75 ft bgs  
formation  
samples from  
MW-70M.



### Photograph 32.

75 to 77.5 ft bgs  
formation  
samples from  
MW-70M. The  
apparent  
moisture in the  
samples is from  
precipitation.  
The formation  
was observed to  
be dry in this  
interval.





Photograph Log

**Photograph 33.**

Green siltstone fragments characteristic of the Moenkopi Moqui.



**APPENDIX C**  
**SURVEY RESULTS**



**HOLBROOK MONITORING WELLS - JOSEPH CITY, ARIZONA - DECEMBER 2, 2019**

Point ID	Northing	Easting	Elevation	Latitude	Longitude	Well ID	Description
30001	1438922.903	663769.484	5120.488	34d57'17.82529"	-110d17'15.29430"		<b>BORING HOLE 2</b>
30002	1438931.622	663766.322	5121.758	34d57'17.91150"	-110d17'15.33242"		BH 2 GROUND NORTH
30003	1438926.731	663780.020	5121.649	34d57'17.86328"	-110d17'15.16777"		BH 2 GROUND EAST
30006	1438918.405	663757.890	5121.820	34d57'17.78065"	-110d17'15.43354"		BH 2 GROUND WEST
30005	1438915.361	663772.481	5121.888	34d57'17.75072"	-110d17'15.25819"		BH 2 GROUND SOUTH
30014	1438843.380	663545.446	5120.603	34d57'17.03598"	-110d17'17.98485"		<b>BORING HOLE 1</b>
30010	1438853.293	663540.578	5121.342	34d57'17.13398"	-110d17'18.04349"		BH 1 GROUND NORTH
30012	1438823.803	663487.154	5121.439	34d57'16.84163"	-110d17'18.68492"		BH 1 GROUND EAST
30011	1438840.246	663535.904	5121.177	34d57'17.00486"	-110d17'18.09945"		BH 1 GROUND WEST
30013	1438833.040	663548.669	5121.183	34d57'16.93374"	-110d17'17.94599"		BH 1 GOUND SOUTH
30047	1437462.107	663637.500	5050.741	34d57'03.37389"	-110d17'16.85874"	<b>MW-69A</b>	TOP PVC NORTH
30046	1437462.118	663637.629	5051.402	34d57'03.37399"	-110d17'16.85719"	MW-69A	RIM NORTH
30025	1437463.883	663636.587	5049.693	34d57'03.39144"	-110d17'16.86974"	MW-69A	CONCRETE NORTH
30023	1437460.125	663638.394	5049.631	34d57'03.35429"	-110d17'16.84797"	MW-69A	CONCRETE SOUTH
30018	1437464.376	663636.230	5049.253	34d57'03.39632"	-110d17'16.87403"	MW-69A	GROUND NORTH
30016	1437459.412	663639.153	5049.294	34d57'03.34725"	-110d17'16.83884"	MW-69A	GROUND SOUTH
30044	1437468.038	663648.643	5051.119	34d57'03.43269"	-110d17'16.72496"	<b>MW-70M</b>	TOP PVC NORTH
30045	1437468.089	663648.741	5051.701	34d57'03.43319"	-110d17'16.72378"	MW-70M	RIM NORTH
30030	1437469.857	663647.852	5050.161	34d57'03.45068"	-110d17'16.73449"	MW-70M	CONCRETE NORTH
30028	1437466.010	663649.439	5050.092	34d57'03.41264"	-110d17'16.71536"	MW-70M	CONCRETE SOUTH
30032	1437471.026	663647.565	5049.801	34d57'03.46223"	-110d17'16.73795"	MW-70M	GROUND NORTH
30034	1437465.163	663649.474	5049.776	34d57'03.40426"	-110d17'16.71493"	MW-70M	GROUND SOUTH
30039	1429525.854	668305.670	5026.841	34d55'44.92272"	-110d16'20.67470"	<b>MW-68M</b>	ABANDONED WELL
30041	1429535.367	668309.992	5026.445	34d55'45.01687"	-110d16'20.62290"	MW-68M	GROUND NORTH
30040	1429523.222	668312.430	5026.571	34d55'44.89676"	-110d16'20.59347"	MW-68M	GROUND SOUTH

DATUM:  
 NAD83 (1982) ARIZONA STATE PLANE COORDINATES  
 EAST ZONE 0201, INTERNATIONAL FEET  
 NAVD88 ELEVATION

Field work was completed on December 2, 2019.

