

# ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT FOR 2018 Coal Combustion Residual Rule Groundwater Monitoring System Compliance Four Corners Power Plant Fruitland, New Mexico

**Submitted to:** 

**Arizona Public Service** 

Submitted by:

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# **TABLE OF CONTENTS**

			Page
1.0	INTRO	DUCTION	
	1.1	Site Background	
		1.1.1 Facility and CCR Unit Description	
		1.1.2 Environmental Setting	
	1.2	CCR Groundwater Monitoring System	
		1.2.1 Monitoring System Description	
		1.2.2 Implemented Changes to Monitoring System	
2.0		NDWATER MONITORING PROGRAM	
	2.1	Program Status	
		2.1.1 Summary of Key Actions Completed	
		2.1.2 Problems Encountered and Resolutions to Problems	
		2.1.3 Groundwater Monitoring Program Transitions	
		2.1.4 Alternative Source Demonstrations	
	2.2	Monitoring Data Collected	
		2.2.1 Water Level Monitoring	
		2.2.2 Groundwater Flow Rate Estimation	
		2.2.3 Sample Collection	
		2.2.4 Sample Analysis and Data Validation	
		2.2.5 Sample Results	
	2.3	Statistical Analysis of Monitoring Data	
		2.3.1 Evaluation of Initial Appendix III Constituent Data	
		2.3.2 Evaluation of Initial Appendix IV Constituent Data	
3.0		CTIVE ACTION PROGRAM	
	3.1	Notification of Appendix IV Exceedances	
	3.2	Characterization of Potential Releases from CCR Units	
	3.3	CCR Unit Closure Activities	
4.0		TIVITIES FOR UPCOMING YEAR	
5.0	REFERE	NCES	14
		LIST OF TABLES	
		LIST OF TABLES	
Table 1	-1	Description of Coal Combustion Residuals Units	
Table 1	-2	CCR Groundwater Monitoring System Summary	
Table 2	-1	CCR Groundwater Monitoring Event Summary for 2018	
Table 2	-2	Aquifer Properties and Groundwater Flow Calculations	
Table 2	-3	Summary of Initial Appendix III Constituent Statistical Analyses	
Table 2	-4	Summary of Initial Appendix IV Constituent Statistical Analyses	
		LIST OF FIGURES	
Figure 1	1-1	Site Location Map	
Figure 2		CCR Units and Groundwater Monitoring System Summary	
Figure 2		Potentiometric Surface Map – 1st Quarter 2018 (3/15/2018)	
Figure 2		Potentiometric Surface Map – 2nd Quarter 2018 (5/31/2018)	
Figure 2		Potentiometric Surface Map – 4th Quarter 2018 (11/2/2018)	

# LIST OF APPENDICES

Appendix A	AECOM Letter Report Documenting MW-12R Abandonment and MW-12R1 Installation
Appendix B	AECOM Letter Report Documenting MW-67 Modification
Appendix C	Site CCR Groundwater Monitoring System Notifications
Appendix D	Groundwater Elevation Data and Hydrographs
Appendix E	Analytical Laboratory Reports
Appendix F	2018 Data Validation Report
Appendix G	Wood Technical Memorandum Documenting the Statistical Analysis of Initial Detection
	Monitoring Appendix III Constituent Data
Appendix H	Wood Technical Memoranda Documenting Additional Evaluation of Appendix III
	Constituent Data Collected from the CWTP in April and June 2018
Appendix I	Wood Technical Memorandum Documenting the Statistical Analysis of Initial Assessment
	Monitoring Appendix IV Constituent Data Collected from Multiunit 1
Appendix J	Wood Technical Memorandum Documenting the Statistical Analysis of Initial Assessment
	Monitoring Appendix IV Constituent Data Collected from the URS

#### LIST OF ACRONYMS AND ABBREVIATIONS

§ Section

ACI American Concrete Institute
AECOM AECOM Technical Services, Inc.

Annual Report Annual Groundwater Monitoring and Corrective Action Report

Amec Foster Wheeler, Environment & Infrastructure, Inc.

AMSL above mean sea level APS Arizona Public Service

BTV(s) Background Threshold Value(s)

CCR coal combustion residuals

CCR units CCR landfills and surface impoundments

CFR Code of Federal Regulations
CSM Conceptual Site Model

CWTP Combined Waste Treatment Pond

DFADA Dry Fly Ash Disposal Area

FCPP Four Corners Power Plant

ft foot, feet

GWPS(s) Groundwater Protection Standard(s)

LAI Lined Ash Impoundment LDWP Lined Decant Water Pond

MCL Maximum Contaminant Level

mg/L milligrams per liter

Multiunit 1 CCR multiunit comprised of the LAI and LDWP

SAP Sampling and Analysis Plan SSI(s) statistically significant increase(s) SSL(s) statistically significant level(s)

TestAmerica Laboratories, Inc.

URS Upper Retention Sump

USEPA United States Environmental Protection Agency

Wood Environment & Infrastructure Solutions, Inc.

#### 1.0 INTRODUCTION

This Annual Groundwater Monitoring and Corrective Action Report for 2018 (Annual Report) was prepared on behalf of Arizona Public Service (APS) by Wood Environment & Infrastructure Solutions, Inc. (Wood) for the Four Corners Power Plant (FCPP) located in Fruitland, New Mexico. 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 2018 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 2019.

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. FCPP is an operating power plant owned by APS and four other utilities. The plant burns low sulfur coal in two electrical generating units (Units 4 and 5) and has a net generating capacity of 1,540 megawatts. FCPP formerly had five generating units and a capacity of 2,040 megawatts; Units 1, 2, and 3 were retired in December 2013 and decommissioned between 2014 and 2016. Coal burned at the plant is generally sourced from the nearby Navajo Mine (Navajo Transitional Energy Company, 2016).

Facility Location. The plant and associated infrastructure are located approximately 20 miles southwest of the city of Farmington, in the Colorado Plateau physiographic province of northwestern New Mexico (Figure 1-1). The land on which the plant resides is leased from the Navajo Nation and is primarily located in Section 36, Township 29 North, and Range 16 West.

CCR Unit Description. Plant infrastructure includes three single CCR units and one CCR multiunit (referred to as Multiunit 1) which are located in the main plant area and to the west of the plant within the FCPP lease boundary (also known as the disposal area), respectively (Figure 1-2). 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 AECOM Technical Services, Inc. (AECOM), 2017.

January 31, 2019

Climate. The plant is located in a semi-arid climate on the western flank of the San Juan Basin. The area receives an average of 8.6 inches of precipitation and 12.6 inches of snow per year.

Topography. The main plant area of the FCPP is located at an elevation of approximately 5,340 to 5,360 feet (ft) above mean sea level (AMSL). The topography of the FCPP area is characterized by rolling terrain, steep escarpments, and incised drainages/arroyos. In the vicinity of the plant, the ground surface is relatively flat, sloping to the west at approximately 20 ft per mile; however, surface drainage immediately near Morgan Lake flows towards the lake. About one mile west of the plant, the level ground surface drops rapidly to 5,200 ft AMSL. Chaco Wash (a.k.a. Chaco River) is located west of this abrupt change in elevation and ephemerally flows north to the San Juan River.

Surface Water Hydrology. FCPP is situated on the southern bank of Morgan Lake, an approximately 1,300-acre man-made lake that has a maximum storage capacity of 39,000 acre-ft of water and supplies cooling water to the plant. Morgan Lake was formed by damming a westerly flowing stream (now known as 'No Name Wash') and is replenished by an underground pipeline (i.e., aqueduct) that routes flow from the San Juan River located approximately 3 miles north of the FCPP. The typical water surface elevation of the lake is 5,330 ft AMSL. Morgan Dam discharges to 'No Name Wash' which flows west of the lake to Chaco Wash.

Site Geology. The San Juan Basin is a structural depression that lies at the eastern edge of the Colorado Plateau (Dames & Moore, 1988). The dominant geographic feature in the vicinity of FCPP is the Hogback Monocline located to the west of the plant; this monocline is a steep (38 degree) eastward-dipping flank composed of Cretaceous sedimentary rock (Dames & Moore, 1988).

There are two 'uppermost geologic units' that underlie the FCPP site and immediate vicinity. These units are expected to influence groundwater flow and result in variations in naturally occurring constituent concentrations across the site. The units are as follows:

- Pictured Cliffs Sandstone: The Pictured Cliffs Sandstone is the uppermost geologic unit beneath the plant and the CCR units located in this vicinity (i.e., the Upper Retention Sump [URS] and the Combined Waste Treatment Pond [CWTP] as depicted in Figure 1-2). This unit is a fine- to medium-grained marine sandstone. The lower portions of the Pictured Cliffs Sandstone represent a transitional sequence between this formation and the underlying Lewis Shale as indicated by alternating thin beds of very fine-grained sandstone and silty shale. The Pictured Cliffs Sandstone forms a capstone on an exposed cliff face located between the plant site and the CCR units located to the west (i.e., the Lined Ash Impoundment [LAI], Lined Decant Water Pond [LDWP] and the Dry Fly Ash Disposal Area [DFADA]).
- Lewis Shale: The Lewis Shale is a marine shale that contains evaporite deposits resulting in naturally occurring saline groundwater conditions. The Lewis Shale is the uppermost geologic unit that underlies the LAI, LDWP, and DFADA and spans west of the Pictured Cliffs Sandstone cliff face approximately 1.5 miles westward to the base of the Hogback Monocline. The regional thickness of the Lewis Shale is approximately 500 ft and is underlain by Cliff House Sandstone. The Lewis Shale consists of a weathered shale subunit overlying a hard, unweathered shale subunit. The thickness of the weathered shale varies between 11 and 47 ft with an average thickness of 30 ft within the vicinity of the site (Dames & Moore, 1988). The weathered shale is not as thick when overlain by Pictured Cliffs Sandstone in the vicinity of the plant site. This subunit contains thin sandstone lenses that vary in thickness from 1 to 7 ft; the sandstone is fine to very fine-grained and cemented by calcium carbonate (Dames & Moore, 1988). The unweathered shale is significantly less permeable than the weathered shale. The unweathered shale is very fine-grained to silty, and contains periodic

siltstone and sandstone lenses (Dames & Moore, 1988). The surface of the unweathered shale slopes towards the Chaco Wash at approximately the same slope as land surface (Dames & Moore, 1988) but displays some irregularity resulting in varying levels of saturated thickness in the weathered shale. The Lewis Shale is variably saturated and hydraulically interconnected with alluvial deposits of Chaco Wash. The low-permeability unweathered shale underlying the Pictured Cliffs Sandstone results in a perched saturated zone beneath the plant.

Applicable Hydrostratigraphy. Three general hydrostratigraphic units are conceptualized beneath the FCPP and associated CCR units. These units form the basis for the Conceptual Site Model (CSM) developed by AECOM (2017) for the purpose of designing the site CCR groundwater monitoring system and establish the working basis for statistically evaluating groundwater conditions underlying the site.

The first hydrostratigraphic unit (Pictured Cliffs Sandstone) is dominant only under the plant area, which is located in an elevated area south of Morgan Lake (Figure 1-2). Two CCR units (i.e., the URS and CWTP) reside within this area. The Pictured Cliffs Sandstone is the uppermost water bearing unit for the plant area and extends from ground surface (between approximately 5,340 to 5,360 ft AMSL) to approximately 5,300 ft AMSL in the plant area. Groundwater in this area is strongly influenced by Morgan Lake (at a surface elevation of approximately 5,330 ft AMSL) and generally flows northward towards the lake. However, construction and operations of the plant have resulted in disturbed ground conditions and associated impacts are not well understood.

The second hydrostratigraphic unit (Weathered Lewis Shale/Alluvium) underlies the Pictured Cliffs Sandstone in the plant area and the Multiunit 1/DFADA CCR units in the disposal area, approximately 1 mile west of the plant (Figure 1-2). The Weathered Lewis Shale and the hydraulically connected alluvial deposits along Chaco Wash are designated as the uppermost water bearing unit in the disposal area. Although the Lewis Shale is geologically continuous in this area, it is unsaturated in the vicinity of the DFADA. The water table in the Weathered Lewis Shale can exhibit local seasonal fluctuations that are attributed to interactions between rates of groundwater recharge and discharge (Dames & Moore, 1988) from/to Morgan Lake, historical unlined ponds, and Chaco Wash. Groundwater flow generally follows the surface topography and descends to the west-southwest in the disposal area, mainly in the weathered shale and in local alluvial channels that drain toward the Chaco Wash (APS, 2013).

The third hydrostratigraphic unit (Unweathered Lewis Shale) consists of the Unweathered Lewis Shale and is a regionally extensive confining unit that forms the base of the uppermost aquifers in the plant and disposal areas.

#### 1.2 CCR Groundwater Monitoring System

Multiple monitoring wells are in place at FCPP 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 summary well construction details. Figure 1-2 presents a map with well locations.

Installation of the FCPP CCR groundwater monitoring system is summarized in the CCR Monitoring Well Network Report and Certification and is identified as compliant with 40 CFR §257.91(a) through (e) (AECOM, 2017). 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 water 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 FCPP to assess background water quality are assumed adequate until proven otherwise.

Per the *CCR Monitoring Well Network Report and Certification*, the following monitoring wells are designated as "background monitoring wells" for the respective geologic and hydrostratigraphic conditions underlying the FCPP (AECOM, 2017):

- Background Wells for the Pictured Cliffs Sandstone: Three wells (MW-71, MW-72, and MW-73) were
  installed to assess background groundwater quality for both the URS and the CWTP overlying the
  Pictured Cliffs Sandstone.
- Background Wells for the Weathered Lewis Shale/Alluvium: Seven wells upgradient to sidegradient
  of Multiunit 1 and the DFADA, including MW-12R1 (a replacement well for MW-12R; see Section
  1.2.2), MW-49A, MW-51, MW-50A, MW 43, MW-55R and MW-74, are designated to assess
  background groundwater quality for the Weathered Lewis Shale/Alluvium. Many of these wells are
  routinely either dry or have a limited saturated thickness which precludes sampling; the wells are
  included in the program in case conditions change in the future.

Due to the natural heterogeneity of the geologic and hydrostratigraphic conditions underlying the FCPP, background constituent concentrations are expected to be spatially heterogeneic across the site. The site is also expected to exhibit temporal heterogeneity due to local climatic regimes, potential leakage from Morgan Lake, and potential operational activity at the site. The adequacy of designated background monitoring wells will be assessed on an ongoing basis using groundwater elevation data, boron data, a working understanding of the spatial heterogeneity of geochemistry underlying the FCPP, and the statistical merits of the constituents of concern. Historic groundwater chemistry data may be consulted during this evaluation but data preceding December 2011 will not be considered due to noted "matrix interference issues associated with saline waters" in samples analyzed prior to this date (APS, 2013).

Downgradient Monitoring Well Networks. A total of 23 downgradient wells are in place at the site to monitor the downgradient groundwater conditions of each CCR unit (Table 1-2; Figure 1-2). Thirteen of these monitoring wells are installed in the Pictured Cliffs Sandstone. The remaining ten other wells are completed in the Weathered Lewis Shale/Alluvium. 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 identified by respective CCR unit, as described below:

- URS Downgradient Wells (Pictured Cliffs Sandstone): The groundwater flow direction underlying
  the URS has historically been radially outward from the CCR unit. On this basis, five wells, MW-66,
  MW-67, MW-68, MW-69, and MW-70 were installed around the perimeter of the URS. In 2018, four
  additional wells were installed to evaluate groundwater conditions downgradient of the URS (see
  Section 1.2.2). These wells include MW-83, MW-84, MW-85, and MW-86. URS downgradient wells
  are screened within the Pictured Cliffs Sandstone.
- CWTP Downgradient Wells (Pictured Cliffs Sandstone): Similar to the URS, the groundwater flow direction underlying the CWTP is radially outward from the CCR unit. Four monitoring wells,

including MW-62, MW-63, MW-64, and MW-65, were installed around the perimeter of the CWTP. Each of these wells are screened within the Pictured Cliffs Sandstone.

- Multiunit 1 Downgradient Wells (Weathered Lewis Shale/Alluvium): Six downgradient monitoring wells are in place below the toe of the western to southwestern edge of Multiunit 1: MW-7, MW 8, MW-40R, MW-61, MW-75 and MW-76. Two wells, MW-40R and MW-76, are routinely either dry or have a limited saturated thickness which precludes sampling; the wells are included in the program in case conditions change in the future. A new Multiunit 1 downgradient well (MW-87) was installed in 2018 to evaluate groundwater conditions downgradient of this CCR unit (see Section 1.2.2). The screened interval for each Multiunit 1 downgradient well resides within the Weathered Lewis Shale/Alluvium.
- DFADA Downgradient Wells (Weathered Lewis Shale/Alluvium): Four existing wells are identified downgradient of the DFADA: MW-13, MW-44, MW-10 and MW-48. Each well, except MW 48, is screened within the Weathered Lewis Shale/Alluvium. The screened interval for MW-48 resides within the Unweathered Lewis Shale. The downgradient DFADA wells are known to be dry; this groundwater monitoring system was designed to detect releases since the next underlying aquifer (in the Cliff House Sandstone) is separated from the CCR unit by several hundred ft of Lewis Shale, a regional aquitard.

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. Figure 1-2 identifies these wells. MW-54 is completed within Multiunit 1 and MW-60 is not considered downgradient of Multiunit 1; however, elevations in these wells may be monitored periodically to evaluate the direction of groundwater flow in the disposal area. LS-1 and LS-2 are completed in the Unweathered Lewis Shale.

#### 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 2017 (Table 1-2). During the reporting period, implemented changes to the the monitoring system included:

- Abandonment of MW-12R and replacement of the well with MW-12R1 (a DFADA background well): Appendix A documents the abandonment of MW-12R and replacement of this well with new well MW-12R1 located approximately 600 ft northeast of MW-12R. MW-12R required replacement because of DFADA fill encroachment on the wellhead rendering the well inaccessible. MW-12R was abandoned on April 9, 2018 and MW-12R1 was completed on April 11, 2018. Well completion details are summarized in Table 1-2.
- Modification to the wellhead completion of MW-67 (a URS downgradient well): Appendix B documents modification of the abovegrade completion of this monitoring well to a subsurface completion during activities associated with the demolition of the URS and construction of an associated aboveground replacement tank (Section 3.3). The modification was required because after construction of the tank, MW-67 was in the travel way for trucks entering and exiting the access ramp. Wellhead modifications began on October 29, 2018 and were completed on November 9, 2018.
- Modification of the wellhead completion of MW-49A (a Multiunit 1 background well): The surface
  monument and well casing of MW-49A were extended because nearby berm reinforcement
  activities raised ground level in the vicinity of the well. Modifications were conducted on December

- 3, 2018. Documentation of wellhead modifications was not complete as of the end of the reporting period; however, Table 1-2 includes updated top of casing and ground surface elevations after completion of the modifications.
- Installation of URS downgradient wells MW-83, MW-84, MW-85, and MW-86 and Multiunit 1 downgradient well MW-87: In response to statistical evaluations of data collected from the CCR monitoring well network (Section 2.3.2), five new wells were installed to promote characterization of the nature and extent of flouride concentrations downgradient of the URS and cobalt and molybdenum concentrations downgradient of Multiunit 1. Well installation activities occurred from November 16 through December 6, 2018. Documentation of well installation activities was not complete as of the end of the reporting period; however, Figure 1-2 identifies the locations of the new wells and Table 1-2 includes associated well construction details.

#### 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 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 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 (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.

# 2.1 Program Status

#### 2.1.1 Summary of Key Actions Completed

A summary of key actions conducted at the site through the end of 2018 to address CCR Rule requirements is as follows:

- Completion of Statistical Analyses for Appendix III Constituents 40 CFR §257.90(b)(iv) requires that owners/operators of existing CCR units begin evaluating groundwater monitoring data for SSIs over background levels for Appendix III constituents by October 17, 2017 and complete the analysis no later than 90 days after completing associated sampling and analysis. Section 2.3.1 summarizes the results of APS's initial statistical analysis for site CCR units which concluded that there is enough evidence to declare an SSI over background for one or more Appendix III constituents at both the URS and Multiunit 1. The statistical analysis also recommended that resampling was required to confirm whether there was enough evidence to declare an SSI over background for select Appendix III constituents at the CWTP.
- Documentation of Groundwater Monitoring Activities Conducted in 2017 40 CFR §257.90(e) requires that an Annual Groundwater Monitoring and Corrective Action Report for applicable sites be prepared for existing CCR units no later than January 31, 2018 and annually thereafter. During the reporting period, APS prepared the Annual Groundwater Monitoring and Corrective Action Report for 2017 (Amec Foster Wheeler, 2018), 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).
- Transition to Assessment Monitoring at the URS and Multiunit 1 40 CFR §257.94 requires the transition from detection monitoring to assessment monitoring whenever an SSI over background levels has been detected for one or more of the constituents listed in Appendix III. Section 2.1.3 presents additional detail regarding groundwater monitoring program transitions and Section 2.2 summarizes assessment monitoring data collected on a semiannual basis from the URS and Multiunit 1 during 2018.
- Continuation of the Detection Monitoring Program at the CWTP and DFADA 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 presents the results of detection monitoring data collected on a semiannual basis from the CWTP and DFADA during 2018.
- Statistical Analyses of Collected Appendix IV Constituent Data at the URS and Multiunit 1 40 CFR §257.95(d)(2) requires the establishment of GWPSs for detected Appendix IV constituents after completion of two assessment monitoring rounds with evaluation of whether constituent concentrations at downgradient wells exceed GWPSs at SSLs. During the reporting period, APS updated the *Statistical Data Analysis Work Plan* (Wood, 2018) to incorporate evaluation of assessment monitoring data. Section 2.3.2 summarizes the results of APS's statistical analysis for the URS and Multiunit 1 which establish GWPSs for detected Appendix IV constituents and concluded that there is enough evidence to declare that one or more Appendix IV constituents are present at SSLs above GWPSs at both the URS and Multiunit 1.
- Characterization of the Nature and Extent of Potential Releases Indicated at the URS and Multiunit 1 – 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 3.2 summarizes activities conducted in 2018 to address this requirement including the installation and sampling of wells downgradient of the URS and Multiunit 1.

#### 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

The URS and Multiunit 1 transitioned to assessment monitoring on February 12, 2018. Appendix C presents a notification prepared per 40 CFR §257.94(e)(3) documenting the establishment of an assessment monitoring program for the URS and Multiunit 1. This notification was placed in the facility's operating record and posted to APS's CCR information webpage in accordance with 40 CFR §257.105(h)(5) and 40 CFR §257.106(h)(4).

#### 2.1.4 Alternative Source Demonstrations

There were no alternative source demonstrations performed for site CCR units during the reporting period.

# 2.2 Monitoring Data Collected

APS conducted CCR groundwater monitoring at FCPP in accordance with the site Sampling and Analysis Plan (SAP) presented in the *Annual Groundwater Monitoring and Corrective Action Report for 2017* (Amec Foster Wheeler, 2018). 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.

The following sections summarize groundwater monitoring activities conducted in 2018. 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]).

#### 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 in the Pictured Cliffs Sandstone (i.e., plant area) and Weathered Lewis Shale/Alluvium (i.e., disposal area) are graphed independently based on assessment of the data during initial CSM development; review of the data suggests that the two groundwater systems are likely not in direct communication. As shown in monitoring well hydrographs, groundwater elevations were relatively stable over the period monitored with the following exceptions:

- MW-7 (downgradient well for Multiunit 1): An increasing trend in water level elevations was reversed at this well during the reporting period with a decline of approximately 1.5 ft over the duration of 2018.
- MW-71, MW-72, and MW-73 (background wells for the URS and CWTP): Declining trends in groundwater elevations on the order of 1 ft or less occurred in these wells during 2018.
- MW-66, MW-67, MW-68, MW-69 and MW-70 (the downgradient URS wells): Monitoring of these
  wells in November 2018 indicated decreases in water level elevations ranging from 0.8 to 2.8 ft (at
  MW-67 and MW-69, respectively) from elevations monitored in March and May 2018. Decreases in
  groundwater monitoring elevations are likely associated with the URS closure activities initiated in
  June 2018 (Section 3.3).

 MW-74 (background well for Multiunit 1 and the DFADA): Groundwater levels at this well located downstream of Morgan Lake varied by more than 3 ft over the duration of 2018. Trends were comparable to those observed in 2017 with elevations higher in early spring and lower in late summer to late fall.

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

Figures 2-1 through 2-3 present quarterly potentiometric surface maps that are representative of conditions at the time of groundwater sampling based on hydrograph data. The estimated direction and gradient of groundwater flow derived from collected groundwater elevation data are noted in these figures. As indicated, groundwater appears to flow towards Morgan Lake in the plant area and towards Chaco Wash in the disposal area. During the first and second quarters of 2018, groundwater appeared to mound under the URS. The extent of mounding was limited during the fourth quarter of 2018.

#### 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). 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 groundwater flow rates. Table 2-2 summarizes the results of these calculations.

For the Pictured Cliffs Sandstone underlying the URS and CWTP, the hydraulic gradient and flow direction were relatively consistent throughout the reporting period. The magnitude of the hydraulic gradient ranged from 0.001 to 0.002 ft per ft and the direction of groundwater flow was northwest towards Morgan Lake (325 to 339 degrees from north). Corresponding groundwater flow rates ranged from 0.02 to 0.04 ft per day.

For the Lewis Shale underlying Multiunit 1, the hydraulic gradient and flow direction were also relatively stable. The magnitude of the hydraulic gradient was 0.03 ft per ft during each calendar quarter and the direction of groundwater flow was southwest towards Chaco Wash (250 to 269 degrees from north). The corresponding groundwater flow rate was 0.0002 ft per day.

#### 2.2.3 Sample Collection

APS collected, labeled, preserved, and shipped groundwater samples in accordance with the SAP. In some instances, the wells were assessed as dry upon monitoring or did not have enough water and could not be sampled (Table 2-1). 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) located in Phoenix, Arizona for analysis. TestAmerica is an Arizona Department of Health Services-licensed laboratory (AZ0728). 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), groundwater monitoring program transition requirements of the CCR Rule, and the need for supplementary information useful in evaluating the nature and extent of potential releases from select units (Section 3.2). 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 *2018 Data Validation Report* which documents these reviews.

#### 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, two different types of statistical analyses were conducted to evaluate whether collected monitoring data indicate site CCR units have adversely impacted underlying groundwater. These analyses were conducted in accordance with the updated site-specific *Statistical Data Analysis Work Plan* (Wood, 2018) and are summarized in the following sections.

#### 2.3.1 Evaluation of Initial Appendix III Constituent Data

Following collection of at least eight independent samples from each CCR unit during initial groundwater monitoring activities, the CCR Rule requires that a statistical assessment of Appendix III constituent data be conducted to assess whether there are SSIs over background in constituent concentrations downgradient of CCR units. Appendix G presents a technical memorandum documenting this initial analysis for the CWTP, Multiunit, and URS. Groundwater was not present in monitoring system wells evaluating the DFADA and thus this unit was not included in the statistical analysis.

As summarized in Table 2-3, APS's initial statistical analysis for site CCR units included the development of background threshold values (BTVs) derived from prediction limits for each Appendix III constituent calculated using data collected from site background wells. Based on a comparison of downgradient well data to the BTVs, the analysis concluded that there is enough evidence to declare an SSI over background for boron at Multiunit 1 as well as boron, chloride, and fluoride at the URS. Although additional Appendix III constituents at Multiunit 1 and the URS indicated intial exceedances with advocated resampling for these constituents to assess these potential SSIs, resampling was not necessary based on the SSI declarations for other constituents noted above.

For the CWTP, the Appendix III constituent statistical analysis documented in Appendix G advocated resampling to confirm initial exceedances for boron, calcium, and pH (Table 2-3). The evaluation also identified an issue with elevated reporting limits for fluoride in samples collected from the Pictured Cliffs Sandstone background wells relative to downgradient wells associated with the CWTP. To address this issue, it was recommended that reporting limits for fluoride be maintained at 0.8 milligrams per liter (mg/L) or less for analysis of CWTP samples going forward.

Appendix H presents two follow up technical memoranda that evaluate the results of CWTP resampling conducted in April 2018 and June 2018. Evaluation of detection monitoring data collected in June 2018 for SSIs at the CWTP is also presented. The resampling analyses did not confirm the initial exceedances for boron, calcium and pH identified in the initial statistical evaluation of Appendix III consitituent data; however, exceedance assessment of detection monitoring data identified initial exceedances for fluoride at all CWTP wells and pH for MW-64 and MW-65. These initial exceedances require confirmation prior to declaring an SSI over background at this CCR unit. Assessment of November 2018 detection monitoring data collected from the CWTP was ongoing as of the end of the reporting period.

#### 2.3.2 Evaluation of Initial Appendix IV Constituent Data

Following collection of two rounds of assessment monitoring data from units where an SSI over background has been declared, the CCR Rule requires establishment of GWPSs and comparison of downgradient well data to the GWPSs to determine if SSLs of Appendix IV constituents are present in groundwater downgradient of the unit. Appendix I and Appendix J present technical memoranda documenting these statistical analyses for Multiunit 1 and the URS, respectively.

Table 2-4 summarizes the results of statistical analyses of Appendix IV constituent data collected from Multiunit 1 and the URS. BTVs derived from upper tolerance limits and GWPSs are identified for each constituent as is the basis for GWPS selection. Where SSLs of constituent concentrations exceeded GWPSs, the location and magnitude of the exceedances are also summarized. As indicated in Table 2-4, the analyses concluded that there is enough evidence to declare that cobalt and molybdenum are present at SSLs above GWPSs in groundwater downgradient of Multiunit 1 and fluoride is present at SSLs above the GWPS in groundwater downgradient of the URS.

#### 3.0 CORRECTIVE ACTION PROGRAM

Based on the declaration that one or more Appendix IV constituents are present at SSLs above GWPSs downgradient of Multiunit 1 and the URS, APS prepared notices of Appendix IV exceedances, progressed characterization of potential releases from these units and initiated closure activities at the URS during the reporting period. Additional information regarding these corrective action program activities is presented in the following sections.

#### 3.1 Notification of Appendix IV Exceedances

On November 14, 2018, APS provided notice that cobalt and molybdenum exceeded GWPSs at Multiunit 1 and fluoride exceeded the GWPS at the URS. Appendix C presents applicable notifications prepared per 40 CFR §257.95(g). These notifications were placed in the facility's operating record and posted to APS's CCR information webpage in accordance with 40 CFR §257.105(h)(8) and 40 CFR §257.106(h)(6).

#### 3.2 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 Multiunit 1 and URS included:

- A review of the existing well groundwater monitoring network at FCPP to assess whether any of
  these supplementary wells could provide useful information regarding the nature and extent of
  cobalt and molybdenum downgradient of Multiunit 1 and fluoride downgradient of the URS.
- Installation of a new CCR well (MW-87) near the property lease boundary in the direction of contaminant migration downgradient of Multiunit 1 (Figure 1-2).
- Installation of a new CCR well (MW-83) near the property lease boundary in the direction of contaminant migration downgradient of the URS (Figure 1-2).
- Installation of three new CCR wells (MW-84, MW-85, and MW-86) downgradient of the URS to define the extent of fluoride impacts downgradient of the URS (Figure 1-2).
- Sampling of new and existing wells occurred from December 15 to 17, 2018 with subsequent analysis of collected samples for Appendix III and IV constituents as well as general water quality parameters. Table 2-1 identifies the wells sampled during release characterization efforts; Figure 1-2 presents associated well locations.

Evaluation of collected data and documentation of these activities was ongoing as of the end of the reporting period.

#### 3.3 CCR Unit Closure Activities

On July 24, 2018, APS published an amended closure plan for the URS that details a plan to close the unit by removal of CCR and replace the unit with a new concrete tank. Activities conducted during the reporting period to prepare for URS closure were as follows:

- A temporary cofferdam was constructed in the southwest corner of the old URS footprint to constrain flows prior to pumping the stored water to the LAI. The cofferdam remained in use until December 10, 2018, at which point, all inflow to the old URS was halted and diverted to the new tank.
- Prior to demolishing the URS, stored liquid in the URS was removed. The wet material or sludge that remained was removed by Riley Industrial Services, Inc. using vacuum trucks. After the wet material was removed, the soil-cement lining of the URS was demolished and removed. In addition, a minimum of two ft of soil beneath the soil-cement lining was over-excavated in accordance with foundation requirements for the replacement concrete tank. After the over-excavated soil was removed, a visual observation was conducted to verify all CCR-impacted material had been removed. The demolished and removed materials were disposed of by placing them in the DFADA. Removal of the existing soil cement layer and the old pump station, along with any remaining CCR sediments began on June 25, 2018 and was completed on December 14, 2018.
- A new concrete tank was erected in the footprint of the closed URS to replace the function of the URS. Construction of the new tank started in August 2018 and was completed on October 19, 2018. The free-standing tank was filled and hydrostatically tested for leaks in accordance with American Concrete Institute (ACI) 350.1, Specifications for Tightness Testing of Environmental Engineering Concrete Containment Structures. Following successful testing, soil was backfilled around the tank for final completion. The tank was completed on November 5, 2018.

A notice of intent to initiate closure of the URS was published December 10, 2018. The new tank was placed into service and CCR disposal to the former URS impoundment ceased on December 10, 2018. The CCR monitoring well network at the URS exhibits fluoride concentrations present at SSLs over the GWPS for this

constituent; therefore, closure by removal will not be complete until constituent concentrations no longer exceed the GWPS.

#### 4.0 KEY ACTIVITIES FOR UPCOMING YEAR

During 2019, 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 2019 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 CWTP and DFADA with Evaluation for SSIs Per 40 CFR §257.94(b), detection monitoring (including analysis of collected samples for Appendix III constituents) must continue on a semiannual basis. On an ongoing basis, APS must 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 Multiunit 1 and the URS While corrective action evaluation progresses, 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).
- Characterization of the Nature and Extent of Potential Releases from Multiunit 1 and the URS Per 40 CFR §257.95(g)(1), characterization of the nature and extent of the release indicated by SSLs over GWPSs must be completed to evaluate whether corrective measures should be initiated or an alternative source demonstration should be conducted for these CCR units. The characterization must be sufficient to support a complete and accurate assessment of corrective measures.
- Evaluation of Corrective Measures for Multiunit 1 and the URS Per 40 CFR §257.95(g)(4), if an Alternative Source Demonstration has not been successfully completed within 90 days of detecting an SSL exceeding a GWPS, an assessment of corrective measures for Multiunit 1 and the URS must be initiated. The Assessment of Corrective Measures must be completed within 90 days of initiating the assessment unless extended up to no more than 60 days with a demonstration that site-specific conditions or circumstances require the extension.

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 2019; this list is not comprehensive.

#### 5.0 REFERENCES

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- Wood Environment & Infrastructure Solutions Inc. (Wood), 2018. *Statistical Data Analysis Work Plan*. Coal Combustion Residual Rule Groundwater Monitoring System Compliance, Four Corners Power Plant, Fruitland, New Mexico. Project No. 1420162024. Report dated October 15, 2018.



**TABLES** 

Table 1-1
Description of Coal Combustion Residual Units

CCR Unit	Location Function		Operation	Size/Construction	History
Upper Retention Sump (URS)  Plant Area  NW1/4 of Sectio 36, T29N, R16V		Single CCR unit. Impoundment. Surge pond for FGD system.	Historically, FGD system discharge was discharged into the URS via 10 plus controlled/monitored lines. Pond contents were recirculated back into the FGD process via a pump chamber located on the south end of the pond. Solids were periodically removed from the sump.	- 1.07 acres in areal extent - Soil-cement liner on bottom and inside slopes	Placed in service around 1983. Pond demolshed in 2018 and replaced with an above-ground concrete tank in the footprint of the former URS.
Combined Waste Treatment Pond (CWTP)			The primary source of water to the CWTP is from hydrobins which separate transport water from bottom ash generated in plant Units 4 and 5. Seven earthen basins in the western edge of the CWTP promote sediment settling prior to the water decanting into the main portion of the CWTP and then overflowing into the cooling water discharge canal at the northeast corner of the pond.	- 13.7 acres in areal extent	Constructed in 1978.
Lined Ash Impoundment (LAI)	Disposal Area E1/2 of Section 34, T29N, R16W	Part of a CCR multiunit with the LDWP that receives fly ash, flue gas desulfurization (FGD) waste and associated residuals as a slurry from the plant. Impoundment.	Waste is discharged into the pond in the northeast portion of the pond. Decanted flow discharges via a vertical drop structure through a toe drain into the LDWP.	<ul> <li>75 acres in areal extent</li> <li>60 mil HDPE liner</li> <li>5,364 acre-ft design capacity</li> <li>5,275.2 ft AMSL maximum working level</li> </ul>	Constructed on top of closed Ash Ponds 4 and 5 and placed in service in 2004.
Lined Decant Water Pond (LDWP)	Disposal Area E1/2 of Section 34, T29N, R16W	Part of a CCR multiunit with the LAI that receives decanted water from the LAI. Impoundment.	Decanted water is discharged into the LAI via gravity; the water is pumped from the LDWP back to the plant for reuse in operations.	<ul> <li>- 45 acres in areal extent</li> <li>- Two 60 mil HDPE liners separated by a leak detection layer</li> <li>- 435 acre-ft design capacity</li> <li>- 5,213.2 ft AMSL maximum working level</li> </ul>	Constructed on top of closed Ash Pond 3 and placed in service in 2003.
Dry Fly Ash Disposal Area (DFADA)	Disposal Area SE1/4 of Section 34, T29N, R16W	Single CCR unit. Landfill. Disposal of dry fly ash, bottom ash, and construction debris. In the future, FGD solids will be mixed with fly ash at the plant and landfilled in the DFADA.	The DFADA is filled in general accordance with a stacking plan. Leachate generated from the DFADA cells is pumped into trucks and used for dust control or can be transferred to the LDWP.	<ul> <li>- 3 conjoined cells (DFADA 1, 2, and 3) with areal extents of 37 acres, 32 acres, and 15 acres, respectively</li> <li>- 3,125 acre-ft design capacity</li> <li>- DFADA 1: compacted clay overlain by 60 mil HDPE liner and drainage layer</li> <li>- DFADA 2 and 3: geosynthetic clay liner overlain by 60 mil HDPE liner and drainage layer</li> <li>- Leachate collection system drains each DFADA cell</li> <li>- DFADA 4 is planned but not yet constructed</li> </ul>	Constructed in 2007 (DFADA 1), 2012 (DFADA 2), and 2014 (DFADA 3).

AMSL - above mean sea level
CCR - Coal combustion residuals
CWTP - Combined Waste Treatment Pond
DFADA - Dry Fly Ash Disposal Area
FGD - flue gas desulfurization
ft - feet

HDPE - high density polyethylene
LAI - Lined Ash Impoundment
LDWP - Lined Decant Water Pond
NPDES - National Pollutant Discharge Elimination System
URS - Upper Retention Sump

January 31, 2019 Page 1 of 1

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]
MW-66	URS	Downgradient	Pictured Cliffs Sandstone	9/27/2015	33	5,344.69	5,344.70	15	25	10	5,329.70	5,319.70	5,311.70
MW-67	URS	Downgradient	Pictured Cliffs Sandstone	9/11/2015	31	5,352.76 <sup>(d)</sup>	5,353.8 <sup>(d)</sup>	19.6	29.6	10	5,334.42	5,324.42	5,323.02
MW-68	URS	Downgradient	Pictured Cliffs Sandstone	9/10/2015	30	5,353.58	5,353.95	19	29	10	5,334.95	5,324.95	5,323.95
MW-69	URS	Downgradient	Pictured Cliffs Sandstone	9/9/2015	35	5,357.66	5,355.26	24.3	34.3	10	5,330.96	5,320.96	5,320.26
MW-70	URS	Downgradient	Pictured Cliffs Sandstone	9/30/2015	53	5,371.12	5,368.62	40	50	10	5,328.62	5,318.62	5,315.62
MW-83	URS	Downgradient	Pictured Cliffs Sandstone	11/29/2018	35	5,343.15	5,341.51	14	29	15	5,327.51	5,312.51	5,306.51
MW-84	URS	Downgradient	Pictured Cliffs Sandstone	11/18/2018	35	5,338.23	5,339.34	10	30	20	5,329.34	5,309.34	5,304.34
MW-85	URS	Downgradient	Pictured Cliffs Sandstone	11/18/2018	35	5,352.78	5,353.69	15	30	15	5,338.69	5,323.69	5,318.69
MW-86	URS	Downgradient	Pictured Cliffs Sandstone	11/17/2018	35	5,338.76	5,338.74	10	30	20	5,328.74	5,308.74	5,303.74
MW-71	URS/CWTP	Background	Pictured Cliffs Sandstone	3/12016	50	5,362.91	5,363.62	22.5	42.5	20	5,341.12	5,321.12	5,313.62
MW-72	URS/CWTP	Background	Pictured Cliffs Sandstone	3/2/2016	61	5,381.62	5,379.09	50.7	60.7	10	5,328.39	5,318.39	5,318.09
MW-73	URS/CWTP	Background	Pictured Cliffs Sandstone	1/18/2017	45	5,353.95	5,351.90	28.9	43.9	15	5,323.00	5,308.00	5,306.90
MW-62	CWTP	Downgradient	Pictured Cliffs Sandstone	9/28/2015	20	5,341.87	5,339.37	10	20	10	5,329.37	5,319.37	5,319.37
MW-63	CWTP	Downgradient	Pictured Cliffs Sandstone	9/25/2015	20	5,337.02	5,337.02	9	19	10	5,328.02	5,318.02	5,317.02
MW-64	CWTP	Downgradient	Pictured Cliffs Sandstone	9/26/2015	25	5,337.66	5,337.66	10	20	10	5,327.66	5,317.66	5,312.66
MW-65	CWTP	Downgradient	Pictured Cliffs Sandstone	9/27/2015	20	5,339.74	5,337.24	8	18	10	5,329.24	5,319.24	5,317.24
MW-7	Multiunit 1	Downgradient	Lewis Shale	3/11/1987 <sup>(a)</sup>	60	5,149.32	5,148.29	14.7	34.7	20	5,133.59	5,113.59	5,088.29
MW-8	Multiunit 1	Downgradient	Lewis Shale	3/11/1987 <sup>(a)</sup>	74	5,122.56	5,120.85	28	48	20	5,093.15	5,073.15	5,046.85
MW-40R	Multiunit 1	Downgradient	Lewis Shale	9/17/2015	25	5,137.43	5,134.83	14.3	24.3	10	5,120.53	5,110.53	5,109.83
MW-43	Multiunit 1	Background	Lewis Shale	3/24/2012	60	5,271.58	5,269.42	16	26	10	5,253.42	5,243.42	5,209.42
MW-49A	Multiunit 1	Background	Lewis Shale	5/18/2013	68	5,288.62 <sup>(d)</sup>	5,285.29 <sup>(d)</sup>	50	65	15	5,231.38	5,216.38	5,213.38
MW-50A	Multiunit 1	Background	Lewis Shale	5/7/2013	63	5,335.97	5,333.20	28	43	15	5,305.20	5,290.20	5,270.20
MW-51	Multiunit 1	Background	Lewis Shale	4/28/2013	80	5,288.14	5,285.14	20	30	10	5,265.14	5,255.14	5,205.14
MW-61	Multiunit 1	Downgradient	Lewis Shale	9/16/2015	35	5,129.19	5,126.59	24.2	34.2	10	5,102.39	5,092.39	5,091.59
MW-74	Multiunit 1	Background	Lewis Shale	1/18/2017	40	5,219.09	5,216.70	8.1	18.1	10	5,208.60	5,198.60	5,176.70
MW-75	Multiunit 1	Downgradient	Lewis Shale	3/15/2017	41	5,126.80	5,124.80	29.0	39.0	10	5,095.80	5,085.80	5,083.80
MW-76	Multiunit 1	Downgradient	Lewis Shale	3/16/2017	33	5,116.23	5,114.30	11.8	26.8	15	5,102.50	5,087.50	5,081.30
MW-87	Multiunit 1	Downgradient	Lewis Shale	11/28/2018	50	5,076.53	5,074.29	15	45	30	5,059.29	5,029.29	5,024.29
MW-10	DFADA	Downgradient	Lewis Shale	3/12/1987	35	5,150.71	5,149.65	13	33	20	5,136.65	5,116.65	5,114.65
MW-12R <sup>(b)</sup>	DFADA	Background	Lewis Shale	3/27/2012	70	5,264.44	5,261.71	13.5	33.5	20	5,248.21	5,228.21	5,191.71
MW12R1 <sup>(c)</sup>	DFADA	Background	Lewis Shale	4/10/2018	40	5,270.12	5,268.23	22	32	10	5,246.20	5,236.20	5,228.20
MW-13	DFADA	Downgradient	Lewis Shale	8/31/1987	60	5,150.75	5,149.52	34.9	54.9	20	5,114.62	5,094.62	5,089.52
MW-44	DFADA	Downgradient	Lewis Shale	3/28/2012	40	5,146.89	5,145.15	13.5	23.5	10	5,131.65	5,121.65	5,105.15
MW-48	DFADA	Downgradient	Lewis Shale	5/14/2013	80	5,165.96	5,163.43	35	60	25	5,128.43	5,103.43	5,083.43
MW-55R	DFADA	Background	Lewis Shale	9/13/2015	95	5,243.96	5,241.36	72.9	92.9	20	5,168.46	5,148.46	5,146.36

Source of presented information presented is AECOM, 2017; AECOM, 2018; and Sakura Engineering & Surveying, 2018 and 2019 Vertical datum is NAVD 88

(a) - Estimated

<sup>(b)</sup> - Abandoned

<sup>(c)</sup> - Replacement well for MW-12R

AMSL - Above mean sea level

bgs - below ground surface btoc - below top of casing

CCR - coal combustion residual(s)
CWTP - Combined Waste Treatment Pond

DFADA - Dry Fly Ash Disposal Area

ft - feet

URS - Upper Retention Sump

January 31, 2019 Page 1 of 1

Table 2-1 **CCR Groundwater Monitoring Event Summary for 2018** 

		Monitoring				Samplin	g Date (Monitoring Pro	ogram)			Number of Field
System Well			Mar 16-17, 2018	Mar 16-17, 2018	Apr 6, 2018		May 31-Jun 3, 2018	· ·	Nov 2-4, 2018	Dec 15-17, 2018	Original Samples
CCR UNIT	Well ID*	Туре	(Detection)	(Assessment)	(Resampling)	(Detection)	(Assessment)	(Detection)	(Assessment)	(Characterization)	Collected in 2018**
	MW-62	CCR			Х	Х		Х			3
CWTP	MW-63	CCR			Χ	Х		Χ			3
	MW-64	CCR				X		Χ			2
	MW-65	CCR				X		X			2
	MW-10	CCR	Dry			Dry		Dry			0
	MW-12R	CCR	Not Accessible			Not Accessible		Not Present			0
55454	MW-12R1	CCR	Not Present			Not Present		Dry			0
DFADA	MW-13	CCR	Dry			Dry		Dry			0
	MW-44	CCR	Dry			Dry		Dry			0
	MW-48	CCR	Dry			Dry		Dry			0
	MW-55R	CCR	Dry			Dry	 V	Dry		 V	0
	MW-7 MW-8	CCR CCR		X NS			X		X	X X	4
	MW-16	Supplementary		<del></del>						X	<u>3</u>
	MW-17R	Supplementary								X	1 1
	MW-38R	Supplementary								X	1
	MW-40R	CCR		NS			NS		NS		0
	MW-43	CCR		NS			Dry		NS		0
	MW-49A	CCR		X			X		X		3
	MW-50A	CCR		NS			Dry		Dry		0
Multiunit 1	MW-51	CCR		Dry			Dry		Dry		0
	MW-56	Supplementary								Х	1
	MW-57	Supplementary								Х	1
	MW-61	CCR		X			Х		Х	Х	4
	MW-74	CCR		X			Х		NS		2
	MW-75	CCR		Х			Х		X	Х	4
	MW-76	CCR		NS			Dry		Dry		0
	DMX-4	Supplementary								X	1
	DMX-6	Supplementary								X	1
	MW-66	CCR		X			X		X		3
	MW-67	CCR		X			X		X		3
	MW-68	CCR		X			X		X		3
	MW-69	CCR		X			X		X		3
	MW-70	CCR		X			X		X		3
URS	MW-71*	CCR		X			X		X		3
	MW-72*	CCR		X			X		X		3
	MW-73*	CCR		X Not Present			X Not Present		X Not Present	 V	<u>3</u>
	MW-83 MW-84	CCR CCR		Not Present Not Present			Not Present Not Present		Not Present Not Present	X	<u> </u>
	MW-85	CCR		Not Present			Not Present		Not Present	X	<u></u>
	MW-86	CCR		Not Present			Not Present		Not Present	X	<u> </u>
Ana	alyzed Consti		No Samples Collected	App IV	Select App III	 Арр III	App III and Detected App IV	App III	App III and App IV	App III, App IV, and	65

X - Well Monitored

NS - Not Enough Water to Sample --- - Well Not Monitored

App - Appendix

CCR - coal combustion residuals CWTP - Combined Waste Treatment Pond DFADA - Dry Fly Ash Disposal Area ID - Indentification URS - Upper Retention Sump

<sup>\*</sup> MW-71, MW-72, and MW-73 serve as background wells for both the CWTP and URS but are only listed with the URS.

<sup>\*\*</sup> Totals exclude field duplicate samples.

Table 2-2
Aquifer Properties and Groundwater Flow Calculations

Hydrogeologic Unit (CCR Unit)	Estimated Hydraulic Conductivity [ft/d]	Estimated Effective Porosity [Vol/Vol]	Calendar Quarter	Calculated Hydraulic Gradient [ft/ft]	Calculated Groundwater Flow Direction [degrees from North]	Estimated Groundwater Flow Rate [ft/d]
Pictured Cliffs Sandstone			1st Quarter 2018	0.002	339	0.04
(URS and CWTP)	6.0 <sup>(a)</sup>	0.25 <sup>(b)</sup>	2nd Quarter 2018	0.002	332	0.04
(ONS and GVVII)			4th Quarter 2018	0.001	325	0.02
Louis Chala			1st Quarter 2018	0.03	268	0.0002
Lewis Shale (Multiunit 1)	0.00028 <sup>(b)</sup>	0.05 <sup>(b)</sup>	2nd Quarter 2018	0.03	252	0.0002
(ividitidilit 1)			4th Quarter 2018	0.03	251	0.0002

CCR - Coal Combustion Residuals

**CWTP - Combined Waste Treatment Pond** 

d - day

ft - feet

URS - Upper Retention Sump

Vol/Vol - volume per volume

# References:

<sup>(</sup>a) AECOM, 2017

<sup>(</sup>b) Freeze, R.A. and Cherry, J.A., 1979.

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

СШТР						Multic	ınit 1		URS				
Constituent	BTV	Location of SSI Over Background	Range of Exceeding Sample Values	Conclusion	BTV	Location of SSI Over Background	Range of Exceeding Sample Values	Conclusion	BTV	Location of SSI Over Background	Range of Exceeding Sample Values	Conclusion	
Boron	1.9 mg/L	MW-62 and MW- 63	2 to 2.5 mg/L	Resampling Advocated	3.95 mg/L	MW-7, MW-8, MW-61, and MW-75	7.2 to 41 mg/L	SSI Over Background Declared	1.9 mg/L	MW-66, MW-67, MW-68, MW-69, and MW-70	75 to 160 mg/L	SSI Over Background Declared	
Calcium	540 mg/L	MW-62 and MW- 63	550 to 590 mg/L	Resampling Advocated	454.1 mg/L	MW-7, MW-8, and MW-75	460 to 500 mg/L	Resampling Advocated	540 mg/L	MW-70	550 mg/L	Resampling Advocated	
Chloride	710 mg/L				604.7 mg/L	MW-7 and MW-	740 to 1100 mg/L	Resampling Advocated	710 mg/L	MW-69 and MW- 70	1000 to 1600 mg/L	SSI Over Background Declared	
Fluoride	Detectable Concentrations Exceeding RL per the DQR	Issue with Variable Reporting Limits		Further Evaluation Required	2.1 mg/L	MW-8	5 mg/L	Resampling Advocated		MW-66, MW-67, MW-68, MW-69, and MW-70	0.94 to 26 mg/L	SSI Over Background Declared	
рН	Time Regression LPL and UPL	MW-64 and MW-65	7.61 and 8.27 SU	Resampling Advocated	<6.52 SU and >7.88 SU				Time Regression LPL and UPL	MW-66, MW-70, and MW-68	5.85, 7.88, and 8.27 SU	Resampling Advocated	
Sulfate	13,000 mg/L				22,000 mg/L				13,000 mg/L				
TDS	20,000 mg/L				34,396.6 mg/L				20,000 mg/L				

BTV - Background Threshold Value SU - standard pH units

DQR - Double Quantification Rule SSI - statistically significant increase

LPL - lower prediction limit

mg/L - milligrams per liter

TDS - Total Dissolved Solids

UPL - upper prediction limit

January 31, 2019 Page 1 of 1

Table 2-4
Summary of Initial Appendix IV Constituent Statistical Analyses

	Canimary of Indian Appendix IV Constituent Statistical Analyses										
			Multiunit 1					URS			
Constituent	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	0.01	0.01	BTV	None		0.01	0.01	BTV	None		
Arsenic	0.0086	0.01	US EPA MCL	None		0.013	0.013	BTV	None		
Barium	0.042	2	US EPA MCL	None		0.051	2	US EPA MCL	None		
Beryllium	0.001	0.004	US EPA MCL	None		0.001	0.004	US EPA MCL	None		
Cadmium	0.002	0.005	US EPA MCL	None		0.001	0.005	US EPA MCL	None		
Chromium	0.02	0.1	US EPA MCL	None		0.01	0.1	US EPA MCL	None		
Cobalt	0.01	0.01	BTV	MW-61 and NW-75	0.016 to 0.043	0.016	0.016	BTV	None		
Fluoride	5	5	BTV	None		4	4	BTV/ US EPA MCL	MW-66, MW-67, MW-68, and MW-69	11 to 26	
Lead	0.01	0.015	Alternative Risk- Based GWPS	None		0.005	0.015	Alternative Risk- Based GWPS	None		
Lithium	1.8	1.8	BTV	None		0.8	0.8	BTV	None		
Mercury	0.0002	0.002	US EPA MCL	None		0.0002	0.002	US EPA MCL	None		
Molybdenum	0.12*	0.1	Alternative Risk- Based GWPS	MW-75	0.15	0.011	0.1	Alternative Risk- Based GWPS	None		
Selenium	0.092	0.092	BTV	None		0.45	0.45	BTV	None		
Thallium	0.017	0.017	BTV	None		0.0014	0.002	US EPA MCL	None		
Combined Radium	4.43	5	US EPA MCL	None		5.4	5.4	BTV	None		

BTV - Background Threshold Value mg/L - milligrams per liter
GWPS - Groundwater Protection Standard SSLs - statistically significant levels

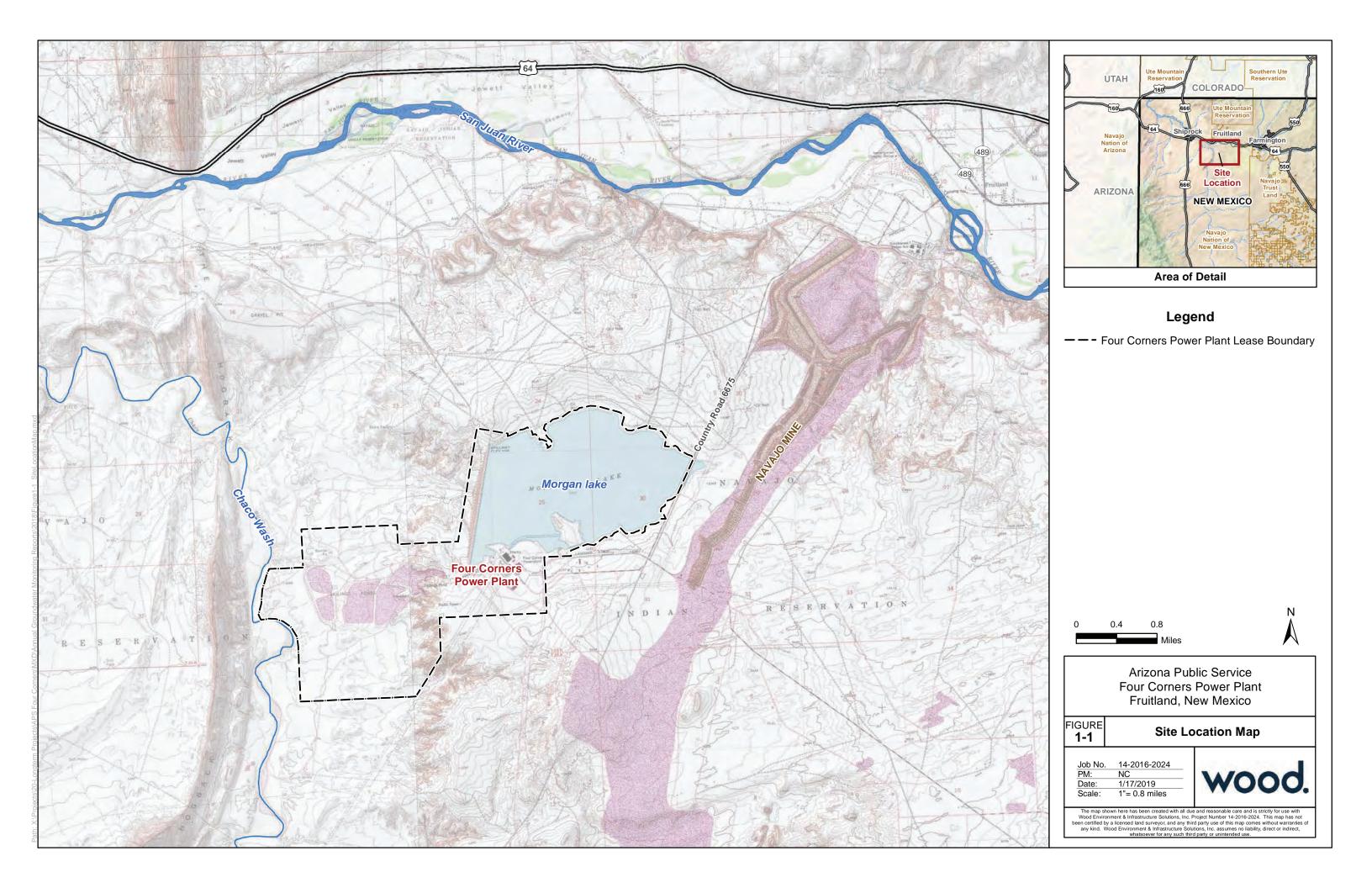
LCL - Lower Confidence Limit

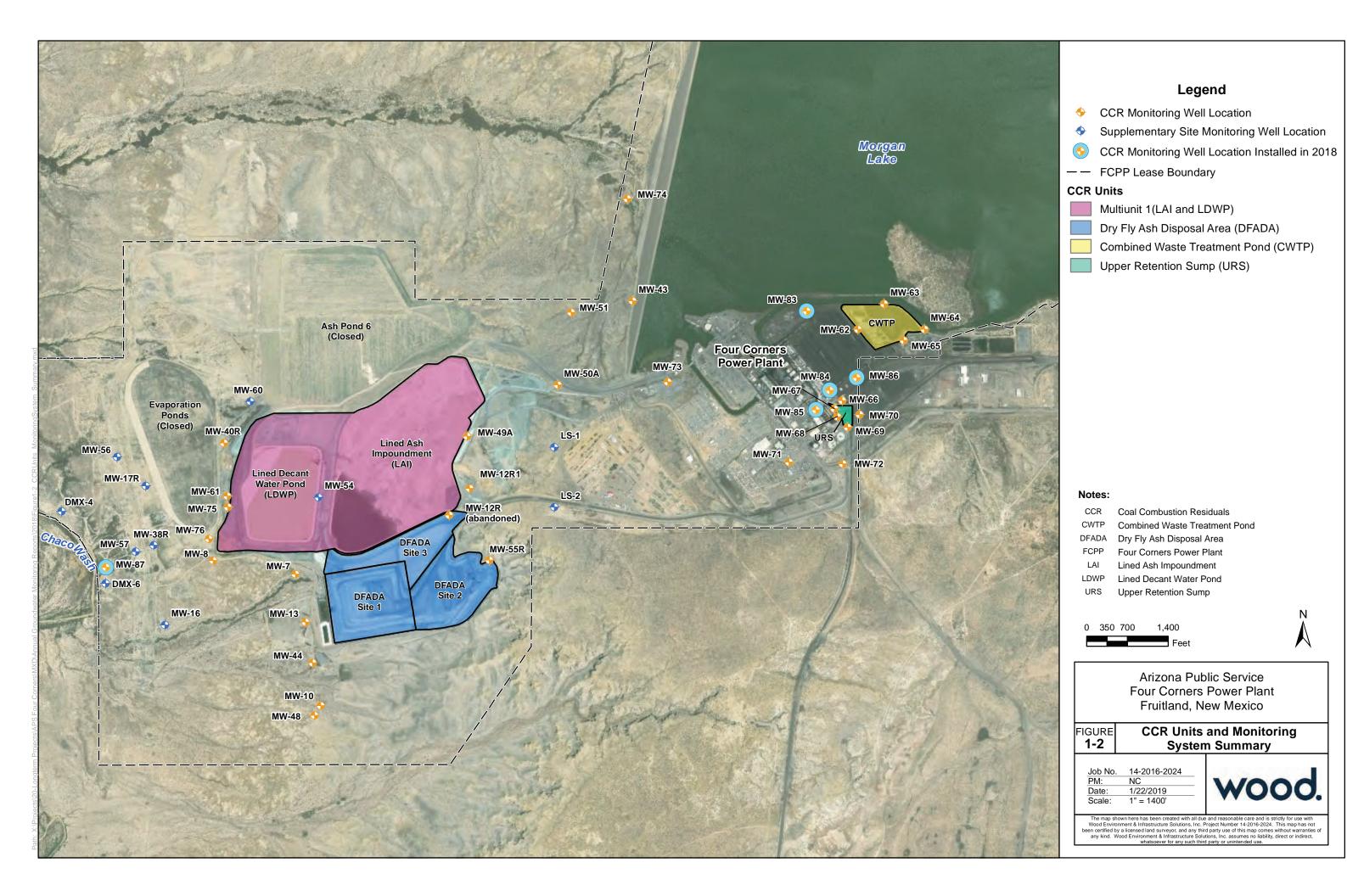
US EPA MCL - United States Environmental Protection Agency Maximum Contaminant Level

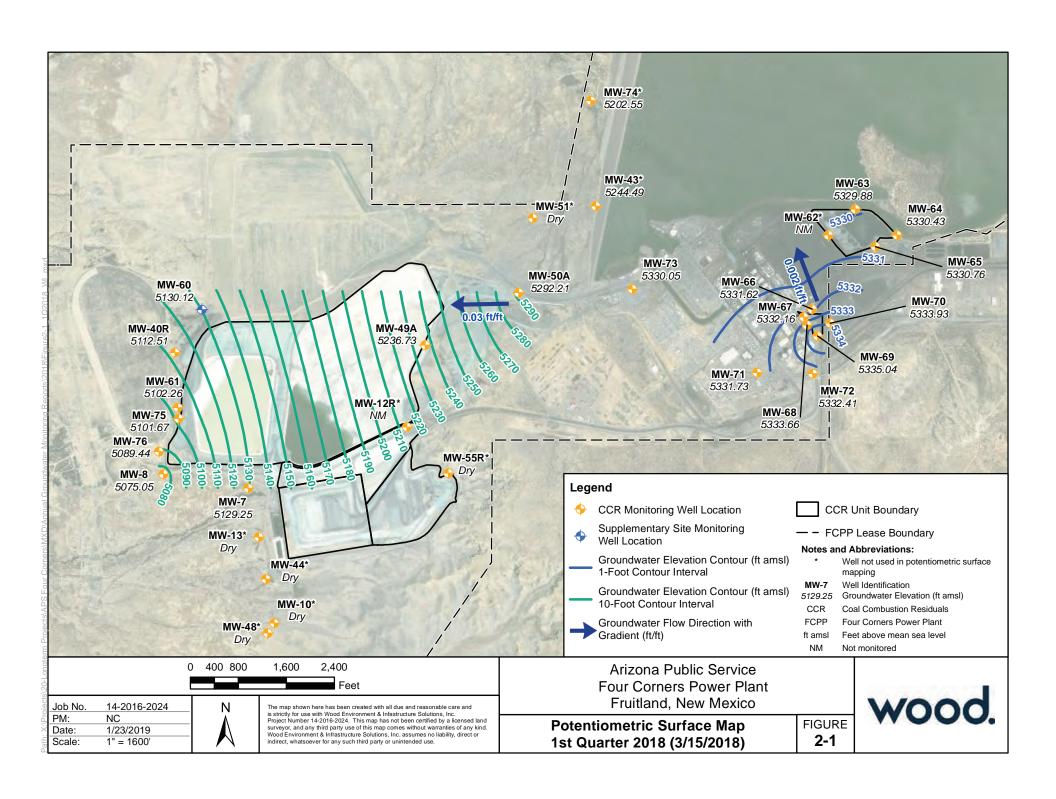
<sup>\*</sup> Inadequate temporal detrending in the background data defaults to using the US EPA MCL or Alternative Risk-Based GWPS, as applicable

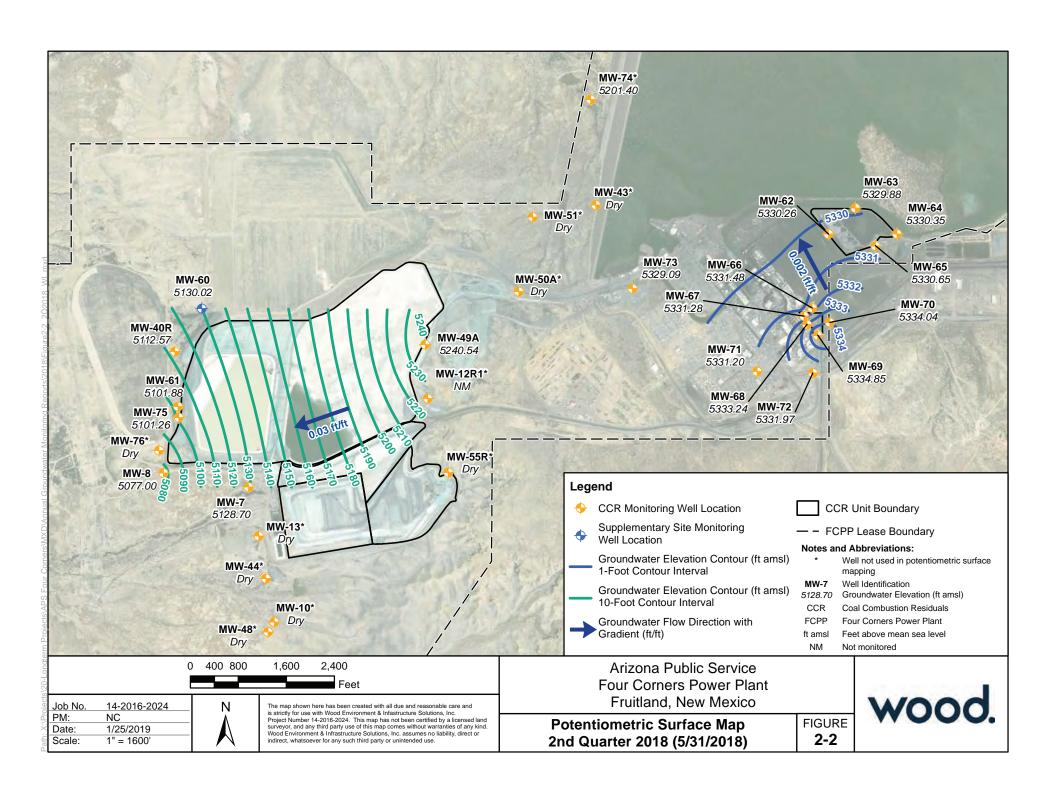


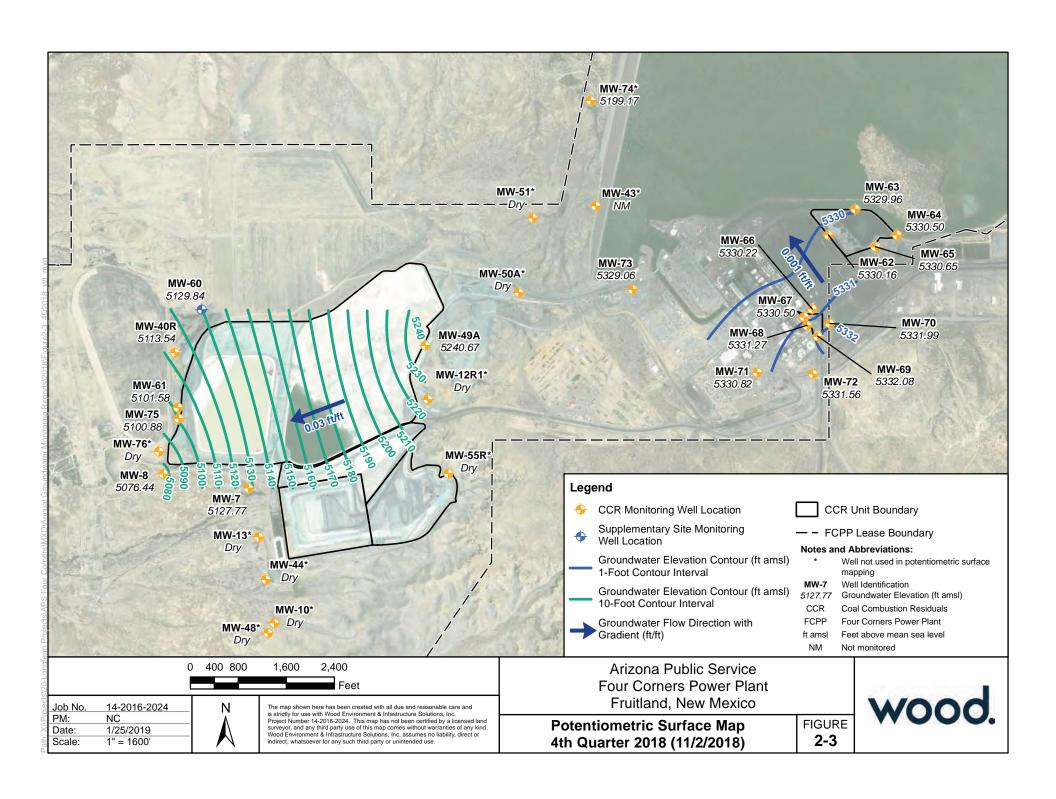
# **FIGURES**













# **APPENDIX A**

AECOM LETTER REPORT DOCUMENTING MW-12R ABANDONMENT AND MW-12R1 INSTALLATION



AECOM 7720 North 16th Street Phoenix, AZ 85020 aecom.com

December 5, 2018

Michele Robertson, RG Principal Environmental Scientist Arizona Public Service P.O. Box 53999 Phoenix, AZ 85072

Subject: Abandonment of Monitoring Well MW-12R and Installation of Monitoring Well MW-12R1

Dear Michele:

This letter provides you with information regarding the abandonment of existing Groundwater Monitoring Well MW-12R and installation of new Groundwater Monitoring Well MW-12R1 at the Four Corners Power Plant

Well MW-12R was installed in March 2012. The well was extended vertically in April 2012 to allow future raising of the ground surface around the well associated with placement of dry ash within the DFADA landfill. In 2018, APS decided to decommission ("abandon") Well MW-12R, rather than extend the casing further, and to install new Well MW-12R1 at a location approximately 600 feet northeast of Well MW-12R.

#### Abandonment of Well MW-12R

Well MW-12R was abandoned on April 9, 2018 in accordance with the procedures described in the Arizona Department of Water Resources (ADWR) Well Abandonment Handbook (September 2008). After a utility clearance was completed, Cascade Drilling Services over-drilled the well to a depth of 44 feet below ground surface (bgs). The well was then filled with a cement-bentonite grout mixture, in accordance with Table 1 of the ADWR Well Abandonment Handbook, to a depth of 2 feet bgs and the remaining depth was filled by native soil. The surface and PVC casings were disposed in a roll-off dumpster identified by APS.

#### Installation of Well MW-12R1

Installation of groundwater monitoring well MW-12R1 started on April 10, 2018 and was completed on April 11, 2018. The borehole was drilled to refusal at 40 feet bgs (5228.2 feet above sea level (ASL)) in unweathered shale using a rotosonic drilling rig. The well was set at 32 feet bgs (5236.2 feet ASL) with a 0.010 inch slotted screen from 22 to 32 feet bgs. The well was screened in the weathered shale in coordination with the APS geologist who was on-site for the drilling.

The annular material used to backfill the well was native soil from 35 to 40 feet bgs, bentonite chips from 33 to 35 feet bgs, 20-40 Colorado Silica Sand filter pack from 20 to 33 feet bgs, bentonite chips from 18 to 20 feet bgs, and cement-bentonite grout mixture from 0 to 18 feet bgs. Initial water level measurements on April 11, 2018 showed the well was dry. A well log for MW-12R1 is attached.

A concrete pad was installed around MW-12R1. The ground surface and well casing elevations have been documented in a Monitoring Well Survey Report by Sakura Engineering and Surveying dated May 18, 2018: the top of concrete pad elevation is at 5268.23 feet ASL; the top of the PVC casing is at elevation 5270.12 feet ASL, and the top of the steel well casing is set at elevation 5271.12 feet ASL. The survey report is attached.



#### Certification

I, Alexander W. Gourlay, being a Registered Professional Engineer in good standing in the State of New Mexico, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification is prepared in accordance with the accepted practice of engineering. I certify that the abandonment of Well MW-12R and the installation of Well MW-12R1 meet the requirements of 40 CFR § 257,91(e).

If you have any questions or require additional information, please do not hesitate to contact me at (602) 861-7439.

Paressional

Sincerely,

AECOM Technical Services, Inc.

Alekander W. Gourlay, PE Principal Engineer

Enclosures: MW-12R Well Log (Abandoned)

MW-12R1 Well Log

Certified Monitoring Well Survey Report dated 05-18-2018

cc: Byron Conrad, PE (APS)

Nicole Park, RG (AECOM)



7720 N. 16th St., Suite 100 Phoenix, AZ 85020 Telephone: (602) 371-1100 Fax: (602) 371-1615

# Borehole: MW-12R (Abandoned)

SHEET 1 of 2

**PROJECT:** Four Corners Power Plant

**CLIENT:** APS

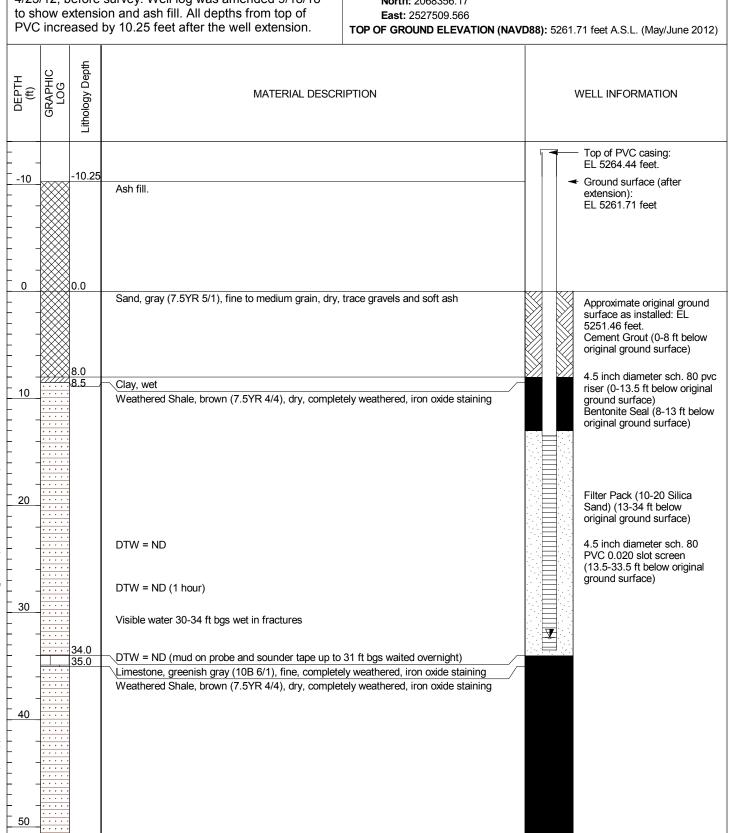
REPORTAPS-FCPP-REVZ (MW-12R) | PROJECTB:\GINT\BINVRES GINT\PROJECTS\APS-FCPP\APS-FCPP\GPJ | LIBRARY APS FCPP-2012.GLB | PRINTED 12/3/18

LOCATION: Fruitland, NM **URS PROJECT #**: 23446275 **DRILLING METHOD:** Rotosonic **LOGGED BY:** Derrick Maurer

**START DATE/TIME:** 3/26/2012 2:53:00 PM FINISH DATE/TIME: 3/27/2012 1:20:00 PM

**ABANDONED**: 4/9/2018

COMMENTS: PVC was extended 10.25 feet on 4/23/12, before survey. Well log was amended 9/18/18 **COORDINATES (NAD83):** North: 2068356.17





7720 N. 16th St., Suite 100 Phoenix, AZ 85020 Telephone: (602) 371-1100 Fax: (602) 371-1615 Borehole: MW-12R (Abandoned)

**PROJECT:** Four Corners Power Plant

**CLIENT: APS** 

**LOCATION:** Fruitland, NM **URS PROJECT #:** 23446275

**DRILLING METHOD:** Rotosonic **LOGGED BY:** Derrick Maurer

**START DATE/TIME:** 3/26/2012 2:53:00 PM **FINISH DATE/TIME:** 3/27/2012 1:20:00 PM

**ABANDONED**: 4/9/2018

DEPTH (ft)	GRAPHIC LOG	Lithology Depth	MATERIAL DESCRIPTION	WELL INFORMATION
60		63.0	Weathered Shale, brown (7.5YR 4/4), dry, completely weathered, iron oxide staining (continued)  Transition from weathered shale to unweathered shale	Bentonite Chips (34-70 ft below original ground surface)
  70		70.0	Unweathered Shale, blueish gray (10B 6/1), dry, hard, fine, unweathered	
			Total Donth of barobala = 70.0 fact bas	·

Total Depth of borehole = 70.0 feet bgs

This well was abandoned on April 9, 2018 in accordance with the procedures described in the Arizona Department of Water Resources (ADWR) Well Abandonment Handbook (September 2008).

A	СОМ	AECOM 7720 N. 16th S Phoenix, AZ 8 Telephone: 60	it. 5020 12-371	I <b>-</b> 1100	0	V	ELL NUM		<b>IW-12R1</b> PAGE 1 OF 1
CLIEN	NT APS					PROJECT NAME APS Four Co	orners		
1		BER _60525856						t	
DATE	STARTE	<b>D</b> 4/10/18		СОМР	PLETED 4/10/18	GROUND ELEVATION 5268.2	3 ft HOLE S	IZE 9 inch	es
B DRILL	ING CON	TRACTOR Casca	ade Dr	rilling		GROUND WATER LEVELS: Gro	oundwater not end	ountered	
E DRILL	ING MET	HOD Rotosonic/C	Continu	uous C	Core (LS-600)	$ abla$ at time of drilling $\_$	Dry		
LOGG	SED BY _1	N. Park	(	CHEC	KED BY F. Ackerman	TAT END OF DRILLING	Dry		
NOTE	S NAD83,	NAVD88: N 2068819.8	84, E 25	27852.0	04; Top of PVC Casing: 5270.12 ft	▼ AFTER DRILLING			
DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG	M	ATERIAL DESCRIPTION			. DIAGRAM
AL/4		HAND AUGER			0.0 (SM) BOTTOM AS	<u>H</u>	5268.2		and well vault
Control   Cont		WELL BUILT USING 5-INCH SCHEDULE 80 PVC WITH 0.010-INCH SLOT SCREEN	SM		Gray, slightly mois				2 feet above grade.  Hydrated Portland Cement - Bentonite grout 0 to 18 feet.
20			CL- ML		Brown, slightly moi yellowish brown moist, slightly pl	st, clayey with silt.			Bentonite chips 18 to 20 feet.
¥ -									Colorado
			<u> </u>		28.0(ML) <u>SANDY SILT</u>		5240.2		Silica Sand filter pack.
30 - 30 - 30 - 30 - 30 - 30 - 30 - 30 -									Screened 22 to 32 feet.
20			ML		Dark brown, dry, tra	ace clay, trace gypsum.			IO OL ICCI.
			L		32.0		5236.2		Flush-threaded
Single 35					(CL) <u>UNWEATHER</u> Gray, dry.	<u>IEU SHALE</u>			end cap.  3/8-inch Bentonite
C			CL						chips 33 to 35 feet.  Backfilled with
-									native soil 35
40					40.0	hala at 40.05 d	5228.2		to 40 feet.
GENER					Bottom of bore	hole at 40.0 feet.			



NEW MEXICO WEST STATE PLANE COORDINATE SYSTEM NAD83 NAVD 88 CONTROL POINT- HV53 N2070581.505, E 2529275.542, ELEV 5331.214

MW 12R1) N 2068819.84 E 2527852.04 ELEV 5268.23 NORTH SIDE OF CONCRETE

5270.12 NORTH SIDE OF PVC 5271.12 NORTH SIDE OF STEEL CASING



125 West Main Suite "A" Farmington New Mexico 87401



## **APPENDIX B**

**AECOM LETTER REPORT DOCUMENTING MW-67 MODIFICATION** 



AECOM 7720 North 16th Street, Suite 100 Phoenix, AZ 85020 aecom.com

December 14, 2018

Michele Robertson, RG APS Principal Environmental Scientist P.O. Box 53999 Phoenix, AZ 85072

**Subject: CCR Monitoring Well MW-67 Modification** 

Dear Michele

This letter provides you with updated information regarding the recent modification to groundwater monitoring well MW-67 at the Four Corners Power Plant. A modified borehole log for MW-67 is enclosed that documents the details of the well modification.

During construction of the Upper Retention Sump Tank, MW-67 was modified from an above-ground to a below-grade completion. MW-67 is located in the travel way for trucks entering and exiting the Upper Retention Sump Tank access ramp. As such, leaving MW-67 as an above-ground completion would have put it at high risk of being damaged or destroyed by work trucks.

Installation of the well modification for MW-67 started on October 29, 2018 and was completed on November 9, 2018. The casing and concrete collar were in their final, modified configuration at the time APS measured and sampled the well on November 2 and 3, 2018.

The well modification included complete removal of all bollards, removal of most of the concrete collar surrounding the well riser, cutting of the outer 8-inch steel protective casing, and cutting of the 5-1/2-inch PVC well casing to allow for a below-grade installation. The steel and PVC casings were both cut to the same level.

The below-grade installation included installation of an H-20 traffic rated limited access monitoring well manhole (PEMCO model 100LA12X12 or equal) to protect the well casing (see Figure 1). The monitoring well manhole consists of a cast-iron lid and a 13 inch-deep steel skirt. The manhole is encased in 5,000 psi concrete that is reinforced with #5 rebar. The new concrete collar around the well manhole is 31 inches in diameter with a depth of 21 inches.

The top of the manhole is set flush with the adjacent regraded ground surface at an elevation of 5353.80 feet above sea level (ASL) based on the North American Vertical Datum 1988 (NAVD88). The top of the well casing is set at an elevation of 5352.76 feet ASL with respect to NAVD88. The ground surface and well casing elevations have been documented in a Monitoring Well Survey Report by Sakura Engineering and Surveying dated November 21, 2018.

I, David E. Mickanen, being a Registered Professional Engineer in good standing in the State of New Mexico, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification is prepared in accordance with the accepted practice of engineering. I certify that the modified surface completion of Monitoring Well MW-67 meets the requirements of 40 CFR § 257.91(e).



If you require additional information, please do not hesitate to contact me at (602) 648-2310. Sincerely,

AECOM Technical Services, Inc.



David E. Mickanen, PE, REM Principal Civil Engineer AECOM

Enclosures: MW-67 Well Log

Figure 1 - CCR Monitoring Well MW-67 Modification Certified Monitoring Well Survey Report dated 11-21-2018

cc: Byron Conrad

Brendan Lemieux Sandy Gourlay

SHEET 1 of 1 Borehole: MW-67 **PROJECT:** FCCP Monitoring Well Install **DRILLING METHOD:** RotoSonic **CLIENT: APS** LOGGED BY: Rick Smith **LOCATION: FCCP New Mexico START DATE/TIME:** 9/11/2015 7:40:00 AM **URS PROJECT #**: 60437300 FINISH DATE/TIME: 9/11/2015 10:20:00 AM Water Level at Drilling Completion (ft bgs): 19.8 Screened Interval (ft bgs): 19.64-29.64 **COORDINATES (NAD83):** North: 2070194.39 **COMMENTS:** Well was modified to a flush mount East: 2534124.22 with traffic rated cover on 11/9/18. Original ground TOP OF GROUND ELEVATION (NAVD88): 5353.80 feet A.S.L. surface was 5354.02 feet A.S.L. Lithology Depth GRAPHIC LOG MATERIAL DESCRIPTION WELL INFORMATION Flush Mount Traffic Rated 0 0-7.5' Airknifed -Concrete (0-2 ft below original ground surface) Borehole Diameter is 9-3/8 inches 7.5 Silty Sand (SM), fine sand, brownish yellow (10 YR 6/6), moist, loose, no HCL -Cement Bentonite Grout (2-15 ft below original ground surface) reaction, some weakly cemented fragments; driller notes competent sandstone 10 Sch 80 5 1/2 inch PVC Riser (0-19.64 ft below original ground surface) Bentonite Seal (15-18 ft below original ground surface) 17.5 Sandy Silt (ML), fine sand, light yellowish brown (2.5 YR 6/4), moist, loose sample, 10-20 Silica Sand (18-31 ft no HCL reaction 20 below original ground surface) 22.0 23.0 Sandy Silt (ML) as above, some thin layers (2-4mm) of dark brown silt with opaque crystals, no HCL reaction, yellowish orange mottling Sch 80 5-1/2 inch PVC, Slot Sandy Silt (ML), fine sand, light yellowish brown (2.5 YR 6/4), moist, loose sample, 26.0 0.020 (19.64-29.64 ft below no HCL reaction, yellowish orange mottling original ground surface) Silty with Sand (ML), brown (10 YR 5/3) and brown (10 YR 5/8), fine sand, some clay, moist, loose sample, slightly platy, weakly cemented, no HCL reaction 30 30.0 Stainless Steel End Cap (29.64-30.30 ft below original 30.5 31.0 Lean Clay with Sand (CL), brown (10 YR 5/3), fine sand, very moist, medium stiff, low plasticity ground surface) (Sandstone) Silty Sand (SM), light grey (10 YR 7/2) to very pale brown (10 YR 7/4), fine sand, with black subrounded grains, dense, moderately cemented, thinly bedded 1-2mm), moderate HCL reaction Total Depth of borehole = 31.0 feet

REPORT APS-FOPP-REV1 | PROJECTB\GINT@WRES GINT\PROJECTS\APS-FCPP\2015 WELLS.GPJ | LIBRARY APS FCPP-2012.GLB | PRINTED 11\2/15

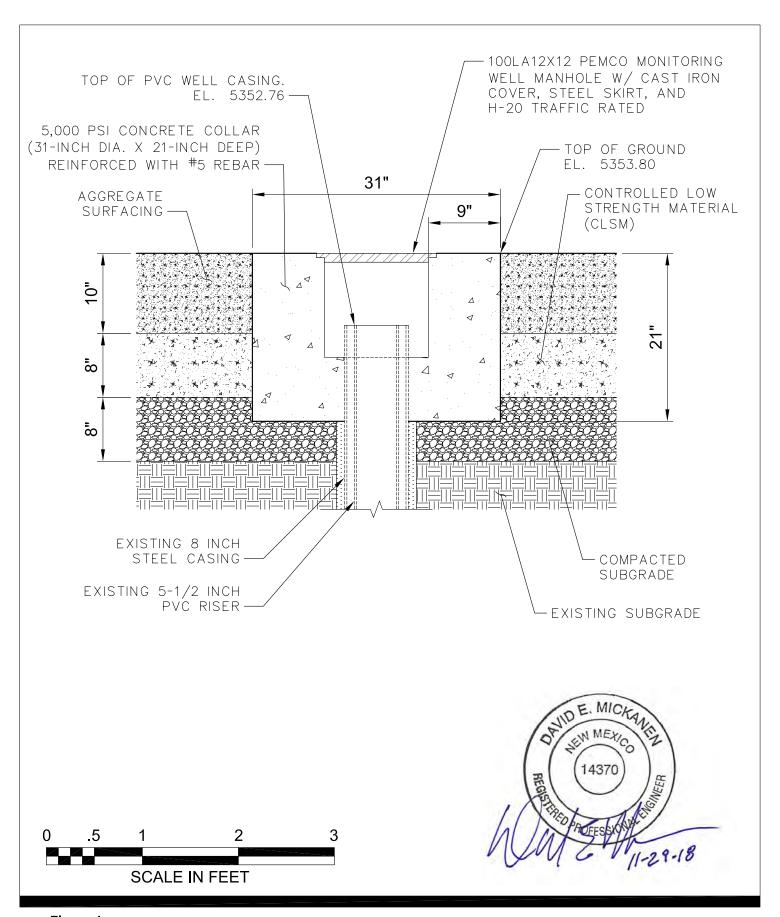


Figure 1
CCR Monitoring Well MW-67 Modification
Arizona Public Service
Four Corners Power Plant



FOUR CORNERS POWER PLANT GRID SYSTEM NAVD 88 CONTROL POINT M6 N-716.400, E 1207.185, ELEV 5340.045

MW 67) N -1071.706 E 1212.664 ELEV 5353.800 NORTH SIDE OF CONCRETE 5352.764 "X"NORTH SIDE OF PVC

I, Scott A Martin, a New Mexico Professional Surveyor No. 21663, do hereby certify this Monitor Well Survey Report was prepared by me or under my supervision based on an actual survey on the ground that I am responsible for this survey; and that the survey and report meets the minimum standards for surveying in New Mexico.

PROPERTY OF THE PROPERTY OF TH

125 West Main Suite "A" Farmington New Mexico 87401



## **APPENDIX C**

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 12, 2018

## CCR Program Documentation Groundwater Monitoring Program – Notification of Change to Monitoring Schedule FC GW AMonTrigNotif 021 20180212

Subject: GW – Notification of Triggering Assessment Monitoring Program

Pursuant to 40 C.F.R. Secs 257.94(e)(3) and 257.106(h)(4), APS is providing notice that an assessment monitoring program has been established for the LAI and North Toe Buttress/ Lined Decant Water Pond (Multi-Unit) and the Upper Retention Pond at Four Corners Power Plant. As such, APS is commencing a groundwater monitoring program in accordance with 40 C.F.R. Sec 257.95, which includes sampling and analysis of those constituents identified at 40 C.F.R. Part 257, Appendix IV. If you have any questions about this or would like additional information, please consult the CCR information webpage located within APS.com or contact neal.brown@aps.com.

Per the September 8, 2015 letter to the Navajo Nation, this assessment monitoring notification should not be construed as a waiver of the covenant not to regulate contained in the site lease for the Four Corners Power Plant.



Arizona Public Service Company CCR Program Environmental Policy & Programs PO Box 53999 Mail Station 9303 Phoenix, AZ 85072-3999 Telephone: 602-250-1000

November 14, 2018

CCR Program Documentation

Groundwater Monitoring Program – Notification of Appendix IV Exceedances

FC\_GW\_AppIVExc\_008\_20181114

FC\_GW\_AppIVExc\_011\_20181114

Subject: GW – Notification of Appendix IV Exceedances; Four Corners Power Plant

Pursuant to 40 C.F.R. Secs 257.95(g), APS is providing notice that one or more constituents in Appendix IV are detected at statistically significant levels above the groundwater protection standard for the following units:

- LAI and North Toe Buttress/ Lined Decant Water Pond (Multi-Unit)
  - o Cobalt; Molybdenum
- Upper Retention Pond
  - o Fluoride

As such, APS will characterize the nature and extent of the release and any relevant site conditions that may affect the remedy ultimately selected.

If you have any questions about this or would like additional information, please consult the CCR information webpage located within APS.com or contact neal.brown@aps.com.

Per the September 8, 2015 letter to the Navajo Nation, this assessment monitoring notification should not be construed as a waiver of the covenant not to regulate contained in the site lease for the Four Corners Power Plant.



Arizona Public Service Company CCR Program Environmental Policy & Programs PO Box 53999 Mail Station 9303 Phoenix, AZ 85072-3999 Telephone: 602-250-1000

December 10, 2018

CCR Program Documentation
Closure – Notification of Intent to Close
FC\_ClosNOI\_011\_20181210

Subject: Closure – Notification of Intent to Close; Upper Retention Pond - Four Corners Power Plant

Pursuant to 40 C.F.R. §§ 257.101(a)(1), 257.101(a)(2), 257.101(b)(1), and 257.101(b)(3), APS is providing notice of its intent to close the Upper Retention Pond.

In accordance with 40 CFR 257.102(g), the unit will be closed in accordance with its Closure Plan and the provisions of 40 CFR 257.102(c).

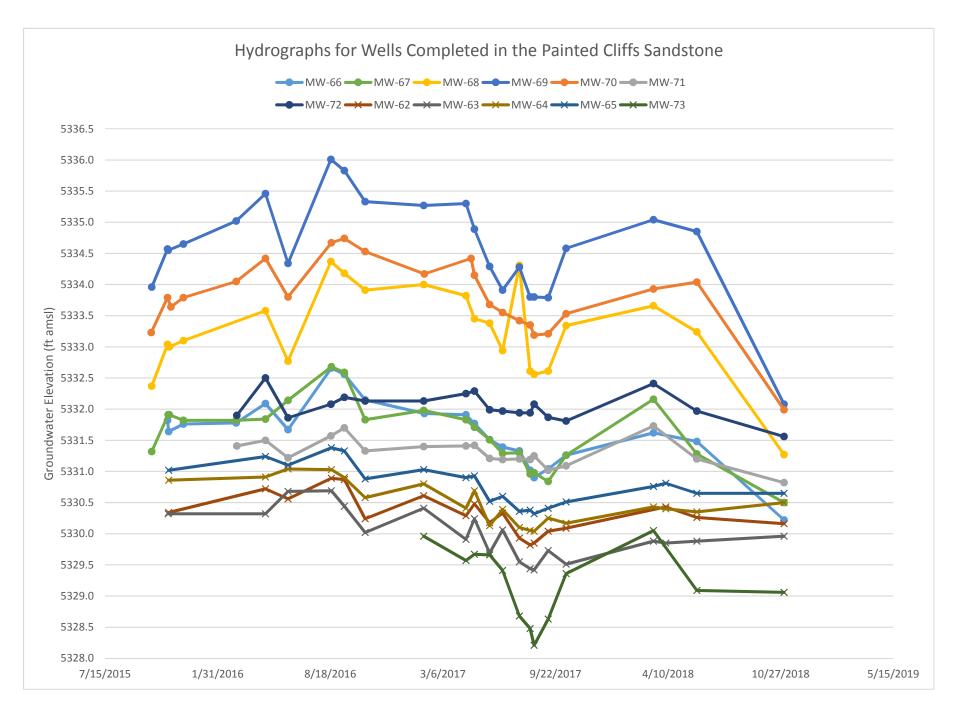
If you have any questions about this or would like additional information, please consult the CCR information webpage located within APS.com or contact neal.brown@aps.com.

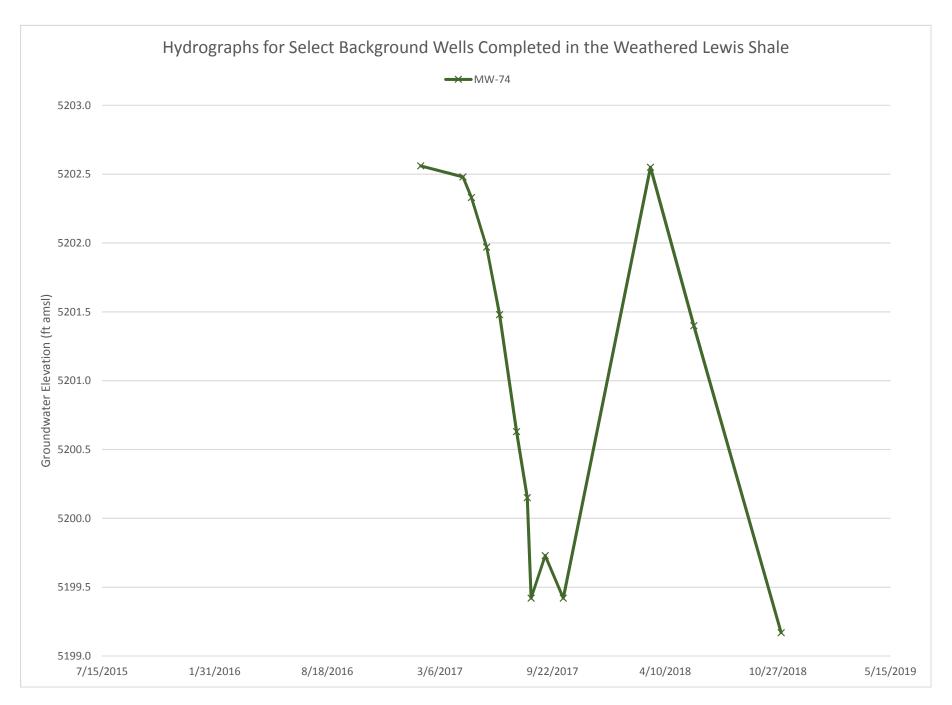
Per the September 8, 2015 letter to the Navajo Nation, this notification of intent to close should not be construed as a waiver of the covenant not to regulate contained in the site lease for the Four Corners Power Plant.

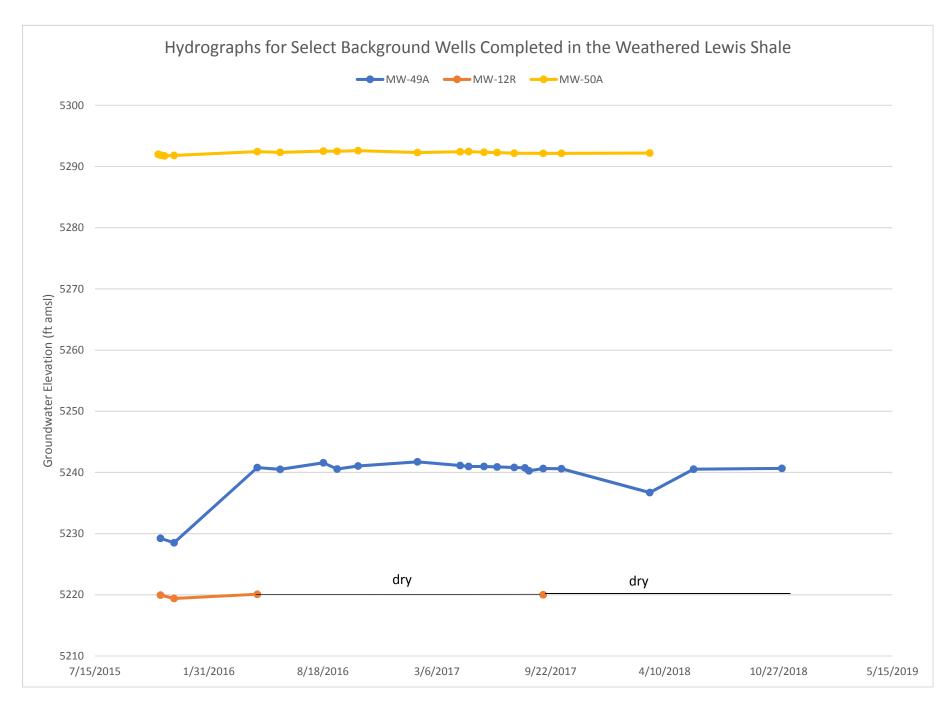


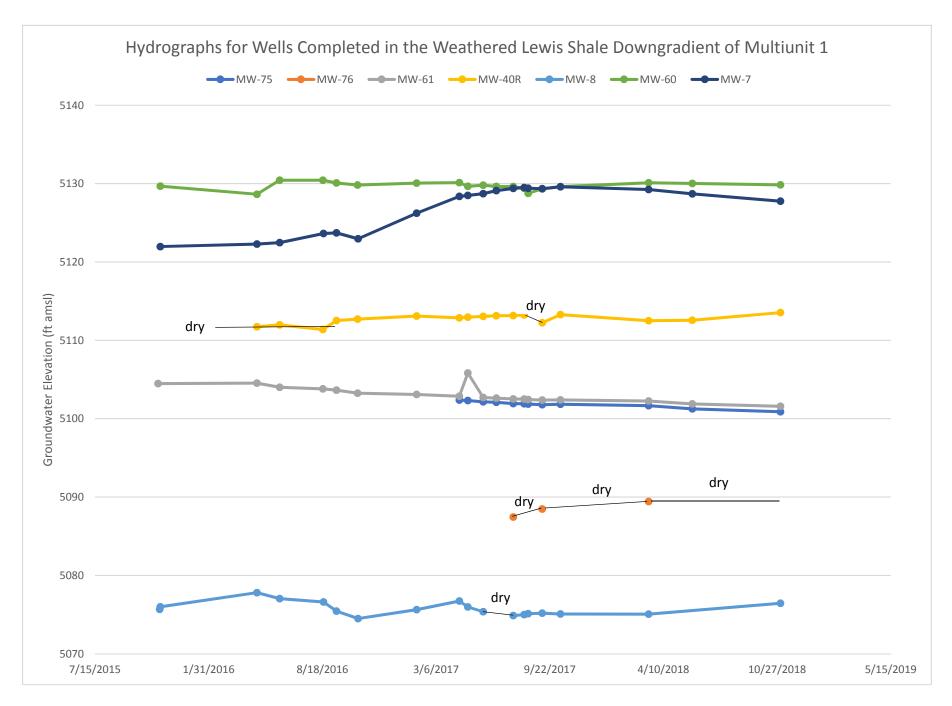
## **APPENDIX D**

**GROUNDWATER ELEVATION DATA AND HYDROGRAPHS** 









MW-7					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/7/2015	5149.32	27.35	5121.97		
4/25/2016	5149.32	27.04	5122.28		
6/4/2016	5149.32	26.85	5122.47		
8/20/2016	5149.32	25.68	5123.64		
9/12/2016	5149.32	25.61	5123.71		
10/20/2016	5149.32	26.36	5122.96		
1/31/2017	5149.32	23.08	5126.24	36.04	
4/16/2017	5149.32	20.95	5128.37		
5/1/2017	5149.32	20.83	5128.49		
5/28/2017	5149.32	20.59	5128.73		
6/20/2017	5149.32	20.21	5129.11		
7/20/2017	5149.32	19.93	5129.39		
8/8/2017	5149.32	19.83	5129.49		
8/15/2017	5149.32	19.91	5129.41		
9/9/2017	5149.32	19.97	5129.35		
10/11/2017	5149.32	19.72	5129.6		
3/15/2018	5149.32	20.07	5129.25		
5/31/2018	5149.32	20.62	5128.7	_	
11/2/2018	5149.32	21.55	5127.77		

	MW-8					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD		
11/6/2015	5122.56	46.9	5075.66			
11/7/2015	5122.56	46.56	5076			
4/25/2016	5122.56	44.76	5077.8			
6/4/2016	5122.56	45.52	5077.04			
8/20/2016	5122.56	45.95	5076.61			
9/12/2016	5122.56	47.11	5075.45			
10/20/2016	5122.56	48.07	5074.49			
1/31/2017	5122.56	46.94	5075.62			
4/16/2017	5122.56	45.82	5076.74			
5/1/2017	5122.56	46.59	5075.97			
5/28/2017	5122.56	47.19	5075.37			
6/20/2017	5122.56	Dry				
7/20/2017	5122.56	47.68	5074.88			
8/8/2017	5122.56	47.57	5074.99			
8/15/2017	5122.56	47.44	5075.12			
9/9/2017	5122.56	47.39	5075.17			
10/11/2017	5122.56	47.49	5075.07			
3/15/2018	5122.56	47.51	5075.05	_		
5/31/2018	5122.56	45.56	5077			
11/2/2018	5122.56	46.12	5076.44			

MW-12R					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/7/2015	5264.70	44.75	5219.95		
12/1/2015	5264.70	45.29	5219.41		
4/25/2016	5264.70	44.6	5220.10		
6/4/2016	5264.70	DRY			
8/20/2016	5264.70	DRY			
9/12/2016	5264.70	DRY			
10/19/2016	5264.70	DRY			
1/31/2017	5264.70	DRY			
4/16/2017	5264.70	DRY			
5/1/2017	5264.70	DRY			
5/28/2017	5264.70	DRY			
6/20/2017	5264.70	DRY			
7/20/2017	5264.70	DRY			
8/8/2017	5264.70	DRY			
8/15/2017	5264.70	DRY			
9/9/2017	5264.70	44.68			
10/11/2017	5264.70	DRY			
3/15/2018	5264.70	DRY			
5/31/2018	5264.70	DRY			
11/2/2018	5264.70	DRY			

	MW-40R					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD		
11/7/2015	5137.43	DRY				
4/25/2016	5137.43	25.7	5111.73			
6/4/2016	5137.43	25.46	5111.97			
8/19/2016	5137.43	26.05	5111.38			
9/12/2016	5137.43	24.9	5112.53			
10/19/2016	5137.43	24.72	5112.71			
1/31/2017	5137.43	24.34	5113.09			
4/16/2017	5137.43	24.56	5112.87			
5/1/2017	5137.43	24.47	5112.96			
5/28/2017	5137.43	24.38	5113.05			
6/20/2017	5137.43	24.29	5113.14			
7/20/2017	5137.43	24.26	5113.17			
8/8/2017	5137.43	24.19	5113.24			
8/15/2017	5137.43	Dry				
9/9/2017	5137.43	25.18	5112.25			
10/11/2017	5137.43	24.14	5113.29			
3/15/2018	5137.43	24.92	5112.51			
5/31/2018	5137.43	24.86	5112.57			
11/2/2018	5137.43	23.89	5113.54			

MW-49A					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/7/2015	5285.96	56.71	5229.25		
12/1/2015	5285.96	57.45	5228.51		
4/25/2016	5285.96	45.17	5240.79		
6/4/2016	5285.96	45.44	5240.52		
8/19/2016	5285.96	44.38	5241.58		
9/12/2016	5285.96	45.4	5240.56		
10/19/2016	5285.96	44.90	5241.06		
1/31/2017	5285.96	44.23	5241.73		
4/16/2017	5285.96	44.82	5241.14		
5/1/2017	5285.96	44.98	5240.98		
5/28/2017	5285.96	44.98	5240.98		
6/20/2017	5285.96	45.06	5240.9		
7/20/2017	5285.96	45.13	5240.83		
8/8/2017	5285.96	45.22	5240.74		
8/15/2017	5285.96	45.68	5240.28		
9/9/2017	5285.96	45.32	5240.64		
10/11/2017	5285.96	45.34	5240.62		
3/15/2018	5285.96	49.23	5236.73		
5/31/2018	5285.96	45.42	5240.54		
11/2/2018	5285.96	45.29	5240.67		

MW-50A					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/3/2015	5335.67	43.69	5291.98		
11/8/2015	5335.67	43.84	5291.83		
11/14/2015	5335.67	43.95	5291.72		
12/1/2015	5335.67	43.85	5291.82		
4/25/2016	5335.67	43.23	5292.44		
6/4/2016	5335.67	43.36	5292.31		
8/19/2016	5335.67	43.16	5292.51		
9/12/2016	5335.67	43.18	5292.49		
10/19/2016	5335.67	43.07	5292.6		
1/31/2017	5335.67	43.38	5292.29		
4/16/2017	5335.67	43.25	5292.42		
5/1/2017	5335.67	43.24	5292.43		
5/28/2017	5335.67	43.33	5292.34		
6/20/2017	5335.67	43.39	5292.28		
7/20/2017	5335.67	43.49	5292.18		
8/8/2017	5335.67	Dry			
8/15/2017	5335.67	Dry			
9/9/2017	5335.67	43.51	5292.16		
10/11/2017	5335.67	43.52	5292.15		
3/15/2018	5335.67	43.46	5292.21		
5/31/2018	5335.67	Dry			
11/2/2018	5335.67	Dry			

MW-60					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/7/2015	5144.10	14.41	5129.69		
4/25/2016	5144.10	15.45	5128.65		
6/4/2016	5144.10	13.66	5130.44		
8/19/2016	5144.10	13.66	5130.44		
9/12/2016	5144.10	14.02	5130.08		
10/19/2016	5144.10	14.28	5129.82		
1/31/2017	5144.10	14.03	5130.07		
4/16/2017	5144.10	13.96	5130.14		
5/1/2017	5144.10	14.43	5129.67		
5/28/2017	5144.10	14.30	5129.80		
6/20/2017	5144.10	14.45	5129.65		
7/20/2017	5144.10	14.47	5129.63		
8/8/2017	5144.10	14.69	5129.41		
8/15/2017	5144.10	15.33	5128.77		
9/9/2017	5144.10	14.76	5129.34		
10/11/2017	5144.10	14.47	5129.63	_	
3/15/2018	5144.10	13.98	5130.12		
5/31/2018	5144.10	14.08	5130.02		
11/2/2018	5144.10	14.26	5129.84		

MW-61					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/3/2015	5129.19	24.70	5104.49		
4/25/2016	5129.19	24.64	5104.55		
6/4/2016	5129.19	25.18	5104.01		
8/19/2016	5129.19	25.38	5103.81		
9/12/2016	5129.19	25.55	5103.64		
10/19/2016	5129.19	25.94	5103.25		
1/31/2017	5129.19	26.1	5103.09		
4/16/2017	5129.19	26.32	5102.87		
5/1/2017	5129.19	23.36	5105.83		
5/28/2017	5129.19	26.48	5102.71		
6/20/2017	5129.19	26.56	5102.63		
7/20/2017	5129.19	26.67	5102.52		
8/8/2017	5129.19	26.69	5102.50		
8/15/2017	5129.19	26.75	5102.44		
9/9/2017	5129.19	26.81	5102.38		
10/11/2017	5129.19	26.79	5102.40	_	
3/15/2018	5129.19	26.93	5102.26		
5/31/2018	5129.19	27.31	5101.88		
11/2/2018	5129.19	27.61	5101.58		

MW-62					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/5/2015	5341.87	11.53	5330.34		
4/25/2016	5341.87	11.15	5330.72		
6/4/2016	5341.87	11.31	5330.56		
8/20/2016	5341.87	10.98	5330.89		
9/12/2016	5341.87	11.00	5330.87		
10/19/2016	5341.87	11.63	5330.24		
1/31/2017	5341.87	11.26	5330.61		
4/16/2017	5341.87	11.58	5330.29		
5/1/2017	5341.87	11.39	5330.48		
5/28/2017	5341.87	11.69	5330.18		
6/20/2017	5341.87	11.54	5330.33		
7/20/2017	5341.87	11.94	5329.93		
8/8/2017	5341.87	12.05	5329.82		
8/15/2017	5341.87	12.02	5329.85		
9/9/2017	5341.87	11.83	5330.04		
10/11/2017	5341.87	11.78	5330.09		
4/6/2018	5341.87	11.44	5330.43		
5/31/2018	5341.87	11.61	5330.26		
11/2/2018	5341.87	11.71	5330.16		

	MW-63					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD		
11/4/2015	5337.02	6.70	5330.32			
4/25/2016	5337.02	6.7	5330.32			
6/4/2016	5337.02	6.34	5330.68			
8/20/2016	5337.02	6.33	5330.69			
9/12/2016	5337.02	6.58	5330.44			
10/19/2016	5337.02	7.0	5330.02			
1/31/2017	5337.02	6.61	5330.41			
4/16/2017	5337.02	7.11	5329.91			
5/1/2017	5337.02	6.78	5330.24			
5/28/2017	5337.02	7.33	5329.69			
6/20/2017	5337.02	6.96	5330.06			
7/20/2017	5337.02	7.47	5329.55			
8/8/2017	5337.02	7.58	5329.44			
8/15/2017	5337.02	7.6	5329.42			
9/9/2017	5337.02	7.29	5329.73			
10/11/2017	5337.02	7.51	5329.51			
3/15/2018	5337.02	7.14	5329.88			
4/6/2018	5337.02	7.17	5329.85			
5/31/2018	5337.02	7.14	5329.88			
11/2/2018	5337.02	7.06	5329.96			

MW-64						
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD		
11/5/2015	5337.66	6.80	5330.86			
4/25/2016	5337.66	6.75	5330.91			
6/4/2016	5337.66	6.62	5331.04			
8/20/2016	5337.66	6.63	5331.03			
9/12/2016	5337.66	6.76	5330.90			
10/19/2016	5337.66	7.08	5330.58			
1/31/2017	5337.66	6.86	5330.80			
4/16/2017	5337.66	7.25	5330.41			
5/1/2017	5337.66	6.97	5330.69			
5/28/2017	5337.66	7.53	5330.13			
6/20/2017	5337.66	7.27	5330.39			
7/20/2017	5337.66	7.56	5330.10			
8/8/2017	5337.66	7.61	5330.05			
8/15/2017	5337.66	7.62	5330.04			
9/9/2017	5337.66	7.41	5330.25			
10/11/2017	5337.66	7.49	5330.17			
3/15/2018	5337.66	7.23	5330.43			
4/6/2018	5337.66	7.26	5330.40			
5/31/2018	5337.66	7.31	5330.35			
11/2/2018	5337.66	7.16	5330.50			

MW-65					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
11/5/2015	5339.74	8.72	5331.02		
4/25/2016	5339.74	8.5	5331.24		
6/4/2016	5339.74	8.64	5331.10		
8/20/2016	5339.74	8.36	5331.38		
9/12/2016	5339.74	8.41	5331.33		
10/19/2016	5339.74	8.86	5330.88		
1/31/2017	5339.74	8.71	5331.03		
4/16/2017	5339.74	8.84	5330.90		
5/1/2017	5339.74	8.81	5330.93		
5/28/2017	5339.74	9.22	5330.52		
6/20/2017	5339.74	9.14	5330.60		
7/20/2017	5339.74	9.38	5330.36		
8/8/2017	5339.74	9.36	5330.38		
8/15/2017	5339.74	9.42	5330.32		
9/9/2017	5339.74	9.33	5330.41		
10/11/2017	5339.74	9.23	5330.51		
3/15/2018	5339.74	8.98	5330.76		
4/6/2018	5339.74	8.93	5330.81		
5/31/2018	5339.74	9.09	5330.65		
11/2/2018	5339.74	9.09	5330.65		

MW-66				
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD
11/3/2015	5344.69	12.87	5331.82	
11/5/2015	5344.69	13.05	5331.64	
12/1/2015	5344.69	12.93	5331.76	
3/4/2016	5344.69	12.91	5331.78	
4/25/2016	5344.69	12.6	5332.09	
6/4/2016	5344.69	13.02	5331.67	
8/20/2016	5344.69	12.03	5332.66	
9/12/2016	5344.69	12.13	5332.56	
10/19/2016	5344.69	12.54	5332.15	
2/1/2017	5344.69	12.76	5331.93	
4/16/2017	5344.69	12.78	5331.91	
5/1/2017	5344.69	12.92	5331.77	
5/28/2017	5344.69	13.18	5331.51	
6/20/2017	5344.69	13.3	5331.39	
7/20/2017	5344.69	13.36	5331.33	
8/8/2017	5344.69	13.67	5331.02	
8/15/2017	5344.69	13.79	5330.90	
9/9/2017	5344.69	13.65	5331.04	
10/11/2017	5344.69	13.43	5331.26	
3/15/2018	5344.69	13.07	5331.62	
5/31/2018	5344.69	13.21	5331.48	
11/2/2018	5344.69	14.47	5330.22	

MW-67				
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD
10/6/2015	5356.42	25.1	5331.32	
11/4/2015	5356.42	24.51	5331.91	
11/6/2015	5356.42	24.51	5331.91	
12/1/2015	5356.42	24.6	5331.82	
3/4/2016	5356.42	24.6	5331.82	
4/25/2016	5356.42	24.58	5331.84	
6/4/2016	5356.42	24.28	5332.14	
8/20/2016	5356.42	23.74	5332.68	
9/12/2016	5356.42	23.83	5332.59	
10/19/2016	5356.42	24.59	5331.83	
1/31/2017	5356.42	24.44	5331.98	
4/16/2017	5356.42	24.59	5331.83	
5/1/2017	5356.42	24.71	5331.71	
5/28/2017	5356.42	24.91	5331.51	
6/20/2017	5356.42	25.13	5331.29	
7/20/2017	5356.42	25.12	5331.3	
8/8/2017	5356.42	25.46	5330.96	
8/15/2017	5356.42	25.44	5330.98	
9/9/2017	5356.42	25.58	5330.84	
10/11/2017	5356.42	25.16	5331.26	
3/15/2018	5356.42	24.26	5332.16	
5/31/2018	5356.42	25.14	5331.28	
11/2/2018	5352.76	22.26	5330.5	

MW-68				
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD
10/6/2015	5353.58	21.21	5332.37	
11/3/2015	5353.58	20.54	5333.04	
11/6/2015	5353.58	20.58	5333	
12/1/2015	5353.58	20.48	5333.1	
4/25/2016	5353.58	20.0	5333.58	
6/4/2016	5353.58	20.81	5332.77	
8/19/2016	5353.58	19.21	5334.37	
9/12/2016	5353.58	19.4	5334.18	
10/19/2016	5353.58	19.67	5333.91	
1/31/2017	5353.58	19.58	5334	
4/16/2017	5353.58	19.76	5333.82	
5/1/2017	5353.58	20.13	5333.45	
5/28/2017	5353.58	20.20	5333.38	
6/20/2017	5353.58	20.64	5332.94	
7/20/2017	5353.58	19.27	5334.31	
8/8/2017	5353.58	20.97	5332.61	
8/15/2017	5353.58	21.02	5332.56	
9/9/2017	5353.58	20.97	5332.61	
10/11/2017	5353.58	20.24	5333.34	
3/15/2018	5353.58	19.92	5333.66	
5/31/2018	5353.58	20.34	5333.24	
11/2/2018	5353.58	22.31	5331.27	

MW-69				
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD
10/6/2015	5357.66	23.7	5333.96	
11/3/2015	5357.66	23.09	5334.57	
11/4/2015	5357.66	23.11	5334.55	
12/1/2015	5357.66	23.01	5334.65	
3/4/2016	5357.66	22.64	5335.02	
4/25/2016	5357.66	22.2	5335.46	
6/4/2016	5357.66	23.32	5334.34	
8/19/2016	5357.66	21.65	5336.01	
9/12/2016	5357.66	21.83	5335.83	
10/19/2016	5357.66	22.33	5335.33	
1/31/2017	5357.66	22.39	5335.27	
4/16/2017	5357.66	22.36	5335.3	
5/1/2017	5357.66	22.77	5334.89	
5/28/2017	5357.66	23.37	5334.29	
6/20/2017	5357.66	23.75	5333.91	
7/20/2017	5357.66	23.38	5334.28	
8/8/2017	5357.66	23.86	5333.8	
8/15/2017	5357.66	23.86	5333.8	
9/9/2017	5357.66	23.87	5333.79	
10/11/2017	5357.66	23.08	5334.58	
3/15/2018	5357.66	22.62	5335.04	
5/31/2018	5357.66	22.81	5334.85	_
11/2/2018	5357.66	25.58	5332.08	

MW-70					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
10/5/2015	5371.12	37.89	5333.23		
11/3/2015	5371.12	37.33	5333.79		
11/9/2015	5371.12	37.48	5333.64		
12/1/2015	5371.12	37.33	5333.79		
3/4/2016	5371.12	37.07	5334.05		
4/25/2016	5371.12	36.7	5334.42		
6/4/2016	5371.12	37.32	5333.8		
8/20/2016	5371.12	36.45	5334.67		
9/12/2016	5371.12	36.38	5334.74		
10/19/2016	5371.12	36.59	5334.53		
2/1/2017	5371.12	36.95	5334.17		
4/25/2017	5371.12	36.7	5334.42		
5/1/2017	5371.12	36.97	5334.15		
5/28/2017	5371.12	37.44	5333.68		
6/20/2017	5371.12	37.57	5333.55		
7/20/2017	5371.12	37.7	5333.42		
8/8/2017	5371.12	37.77	5333.35		
8/15/2017	5371.12	37.93	5333.19		
9/9/2017	5371.12	37.91	5333.21		
10/11/2017	5371.12	37.59	5333.53		
3/15/2018	5371.12	37.19	5333.93		
5/31/2018	5371.12	37.08	5334.04	_	
11/2/2018	5371.12	39.13	5331.99		

MW-71					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
3/5/2016	5362.91	31.5	5331.41		
4/25/2016	5362.91	31.41	5331.5		
6/4/2016	5362.91	31.69	5331.22		
8/19/2016	5362.91	31.34	5331.57		
9/12/2016	5362.91	31.21	5331.7		
10/19/2016	5362.91	31.58	5331.33		
1/31/2017	5362.91	31.51	5331.4		
4/16/2017	5362.91	31.50	5331.41		
5/1/2017	5362.91	31.49	5331.42		
5/28/2017	5362.91	31.70	5331.21		
6/20/2017	5362.91	31.72	5331.19		
7/20/2017	5362.91	31.71	5331.2		
8/8/2017	5362.91	31.72	5331.19		
8/15/2017	5362.91	31.66	5331.25		
9/9/2017	5362.91	31.89	5331.02		
10/11/2017	5362.91	31.82	5331.09		
3/15/2018	5362.91	31.18	5331.73		
5/31/2018	5362.91	31.71	5331.2		
11/2/2018	5362.91	32.09	5330.82		

MW-72					
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD	
3/5/2016	5381.62	49.72	5331.9		
4/25/2016	5381.62	49.12	5332.5		
6/4/2016	5381.62	49.76	5331.86		
8/19/2016	5381.62	49.54	5332.08		
9/12/2016	5381.62	49.43	5332.19		
10/19/2016	5381.62	49.49	5332.13		
1/31/2014	5381.62	49.49	5332.13		
4/16/2017	5381.62	49.37	5332.25		
5/1/2017	5381.62	49.33	5332.29		
5/28/2017	5381.62	49.63	5331.99		
6/20/2017	5381.62	49.65	5331.97		
7/20/2017	5381.62	49.68	5331.94		
8/8/2017	5381.62	49.68	5331.94		
8/15/2017	5381.62	49.54	5332.08		
9/9/2017	5381.62	49.75	5331.87		
10/11/2017	5381.62	49.81	5331.81		
3/15/2018	5381.62	49.21	5332.41		
5/31/2018	5381.62	49.65	5331.97		
11/2/2018	5381.62	50.06	5331.56		

MW-73								
Date of Measuring Pt Measurement Elevation		Water Level	GW Elevation	Well TD				
1/31/2017	5353.95	23.99	5329.96					
4/16/2017	5353.95	24.38	5329.57					
5/1/2017	5353.95	24.28	5329.67					
5/28/2017	5/28/2017 5353.95 6/20/2017 5353.95 7/20/2017 5353.95		5329.66					
6/20/2017			5329.41					
7/20/2017			5328.68					
8/8/2017	5353.95	25.47	5328.48					
8/15/2017	5353.95	25.74	5328.21					
9/9/2017	5353.95	25.32	5328.63					
10/11/2017	5353.95	24.59	5329.36					
3/15/2018	3/15/2018 5353.95 5/31/2018 5353.95		5330.05					
5/31/2018			5329.09					
11/2/2018	5353.95	24.89	5329.06					

MW-74								
Date of Measurement			GW Elevation	Well TD				
1/31/2017	5219.09	16.53	5202.56					
4/16/2017	5219.09	16.61	5202.48	20.86				
5/1/2017	5219.09	16.76	5202.33					
5/28/2017	5219.09	17.12	5201.97					
6/20/2017	5219.09	17.61	5201.48					
7/20/2017	5219.09	18.46	5200.63					
8/8/2017	5219.09	18.94	5200.15					
8/15/2017	5219.09	19.67	5199.42					
9/9/2017	5219.09	19.36	5199.73					
10/11/2017	5219.09	19.67	5199.42					
3/15/2018	3/15/2018 5219.09		5202.55					
5/31/2018	5219.09	17.69	5201.4					
11/2/2018	5219.09	19.92	5199.17					

MW-75							
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD			
4/16/2017	5126.80	24.42	5102.38	41.85			
5/1/2017	5126.80	24.48	5102.32				
5/28/2017	5126.80	24.64	5102.16				
6/20/2017	5126.80	24.71	5102.09				
7/20/2017	5126.80	24.88	5101.92				
8/8/2017	5126.80	24.89	5101.91				
8/15/2017	5126.80	24.93	5101.87				
9/9/2017	5126.80	25.02	5101.78				
10/11/2017	5126.80	24.95	5101.85				
3/15/2018	5126.80	25.13	5101.67				
5/31/2018	5126.80	25.54	5101.26				
11/2/2018	5126.80	25.92	5100.88	_			

MW-76								
Date of Measurement	Measuring Pt Elevation	Water Level	GW Elevation	Well TD				
4/16/2017	5116.23	Dry		29.34				
5/1/2017	5116.23	Dry						
5/28/2017	5116.23	Dry						
6/20/2017	5116.23	Dry						
7/20/2017	5116.23	28.78	5087.45					
8/8/2017	5116.23	Dry						
8/15/2017	5116.23	Dry						
9/9/2017	5116.23	27.76	5088.47					
10/11/2017	5116.23	Dry						
3/15/2018	5116.23	26.79	5089.44					
5/31/2018	5116.23	Dry						
11/2/2018	5116.23	Dry						



## **APPENDIX E**

**ANALYTICAL LABORATORY REPORTS** 





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: 550-100875-1

TestAmerica Sample Delivery Group: Four Corners

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Authorized for release by: 4/13/2018 12:03:05 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

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**Have a Question?** 



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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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	7
QC Sample Results	8
QC Association Summary	9
Lab Chronicle	10
Certification Summary	11
Method Summary	12
Chain of Custody	13
Receipt Checklists	14

4

5

6

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11

## **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-100875-1

SDG: Four Corners

#### **Qualifiers**

#### **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.
¤	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 ML

Method Detection Limit 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** 

Relative Error Ratio (Radiochemistry) **RER** 

RLReporting Limit or Requested Limit (Radiochemistry)

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin) Toxicity Equivalent Quotient (Dioxin) **TEQ** 

TestAmerica Phoenix

Page 3 of 14

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-100875-1

SDG: Four Corners

Job ID: 550-100875-1

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-100875-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 4/10/2018 9:07 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1° C.

#### **Receipt Exceptions**

Rush TAT requested.

FC-CCR-MW62-4618 (550-100875-1), FC-CCR-MW62-4618 (550-100875-1[MS]), FC-CCR-MW62-4618 (550-100875-1[MSD]) and FC-CCR-MW63-4618 (550-100875-2)

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: 550-100875-1

SDG: Four Corners

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-100875-1	FC-CCR-MW62-4618	Water	04/06/18 10:22	04/10/18 09:07
550-100875-2	FC-CCR-MW63-4618	Water	04/06/18 10:52	04/10/18 09:07

## **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-100875-1

SDG: Four Corners

## Client Sample ID: FC-CCR-MW62-4618

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Boron	2.1	0.050	mg/L	1 -	200.7 Rev 4.4	Total/NA
Calcium	520 M3	2.0	mg/L	1	200.7 Rev 4.4	Total/NA

## Client Sample ID: FC-CCR-MW63-4618

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Boron	1.3	0.050	mg/L		200.7 Rev 4.4	Total/NA
Calcium	530	2.0	mg/L	1	200.7 Rev 4.4	Total/NA

Lab Sample ID: 550-100875-1

Lab Sample ID: 550-100875-2

## **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-100875-1

SDG: Four Corners

Client Sample ID: FC-CCR-MW62-4618

Date Collected: 04/06/18 10:22 Date Received: 04/10/18 09:07

Lab Sample ID: 550-100875-1

**Matrix: Water** 

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte **Result Qualifier** RL Unit D Prepared Analyzed Dil Fac 0.050 04/10/18 11:37 04/11/18 14:09 Boron 2.1 mg/L 04/10/18 11:37 04/11/18 14:09 **Calcium** 2.0 mg/L 520 M3

Client Sample ID: FC-CCR-MW63-4618

Date Collected: 04/06/18 10:52

Lab Sample ID: 550-100875-2 **Matrix: Water** 

Date Received: 04/10/18 09:07

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.3		0.050	mg/L	_	04/10/18 11:37	04/11/18 14:14	1
Calcium	530		2.0	mg/L		04/10/18 11:37	04/11/18 14:14	1

TestAmerica Job ID: 550-100875-1 SDG: Four Corners

Client: Arizona Public Service Company

Lab Sample ID: MB 550-144088/1-A

**Matrix: Water** 

Analysis Batch: 144264

Method: 200.7 Rev 4.4 - Metals (ICP)

Project/Site: CCR

Client Sample ID: Method Blank

Prep Type: Total/NA Prep Batch: 144088

1	MB	MB					•	
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		04/10/18 11:37	04/11/18 13:49	1
Calcium	ND		20	ma/l		04/10/18 11:37	04/11/18 13:49	1

Lab Sample ID: LCS 550-144088/2-A				Clie	ent Sar	mple ID	: Lab Con	trol Sample
Matrix: Water							Prep Typ	e: Total/NA
Analysis Batch: 144264							Prep Ba	tch: 144088
	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Boron	1.00	0.966		mg/L		97	85 - 115	
Calcium	21.0	20.8		mg/L		99	85 - 115	

Lab Sample ID: LCSD 550-144088/3-A			(	Client S	Sample	ID: Lab	Control :	Sample	e Dup
Matrix: Water							Prep Ty	e: Tot	al/NA
Analysis Batch: 144264							Prep Ba	itch: 14	44088
-	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	 1.00	0.977		mg/L		98	85 - 115	1	20
Calcium	21.0	20.8		mg/L		99	85 - 115	0	20

Lab Sample ID: 550-100875-	1 MS					Clie	nt San	nple ID	: FC-CCR-MW62-4618
Matrix: Water									Prep Type: Total/NA
Analysis Batch: 144264									Prep Batch: 144088
_	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	2.1		1.00	2.96		mg/L		91	70 - 130
Calcium	520	M3	21.0	508	M3	mg/L		-44	70 - 130

Lab Sample ID: 550-100875	-1 MSD					Ciler	it Sar	חו npie	: FC-CCR-	·WW62	-4618
Matrix: Water									Prep Typ	e: Tot	al/NA
Analysis Batch: 144264									Prep Ba	itch: 14	14088
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	2.1		1.00	2.93		mg/L		88	70 - 130	1	20
Calcium	520	M3	21.0	508	M3	mg/L		-44	70 - 130	0	20

4/13/2018

# **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

ice Company TestAmerica Job ID: 550-100875-1 SDG: Four Corners

#### **Metals**

## **Prep Batch: 144088**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-100875-1	FC-CCR-MW62-4618	Total/NA	Water	200.7	
550-100875-2	FC-CCR-MW63-4618	Total/NA	Water	200.7	
MB 550-144088/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-144088/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-144088/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-100875-1 MS	FC-CCR-MW62-4618	Total/NA	Water	200.7	
550-100875-1 MSD	FC-CCR-MW62-4618	Total/NA	Water	200.7	

## Analysis Batch: 144264

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-100875-1	FC-CCR-MW62-4618	Total/NA	Water	200.7 Rev 4.4	144088
550-100875-2	FC-CCR-MW63-4618	Total/NA	Water	200.7 Rev 4.4	144088
MB 550-144088/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	144088
LCS 550-144088/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	144088
LCSD 550-144088/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	144088
550-100875-1 MS	FC-CCR-MW62-4618	Total/NA	Water	200.7 Rev 4.4	144088
550-100875-1 MSD	FC-CCR-MW62-4618	Total/NA	Water	200.7 Rev 4.4	144088

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### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-100875-1

SDG: Four Corners

Client Sample ID: FC-CCR-MW62-4618

Date Collected: 04/06/18 10:22 Date Received: 04/10/18 09:07 Lab Sample ID: 550-100875-1

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			144088	04/10/18 11:37	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	144264	04/11/18 14:09	ARE	TAL PHX

Client Sample ID: FC-CCR-MW63-4618 Lab Sample ID: 550-100875-2

Date Collected: 04/06/18 10:52 Matrix: Water

Date Received: 04/10/18 09:07

		Batch	Batch		Dilution	Batch	Prepared		
ı	Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
	Total/NA	Prep	200.7			144088	04/10/18 11:37	SGO	TAL PHX
ı	Total/NA	Analysis	200.7 Rev 4.4		1	144264	04/11/18 14:14	ARE	TAL PHX

**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: 550-100875-1

SDG: Four Corners

## **Laboratory: TestAmerica Phoenix**

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

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
Arizona	State Program	9	AZ0728	06-09-18

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# **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-100875-1

SDG: Four Corners

Method	Method Description	Protocol	Laboratory
200.7 Rev 4.4	Metals (ICP)	40CFR136A	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.

#### **Laboratory References:**

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

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

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## **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-100875-1

SDG Number: Four Corners

Login Number: 100875 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.</td <td>True</td> <td></td>	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.

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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: 550-103738-1

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 6/12/2018 1:51:15 PM

Ken Baker, Project Manager II (602)659-7624

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.

				- 4 -
<b>Table</b>	OT .	Col	ntei	nts

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	11
QC Association Summary	18
Lab Chronicle	21
Certification Summary	23
Method Summary	24
Chain of Custody	25
Receipt Checklists	26

## **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

#### **Qualifiers**

#### **HPLC/IC**

Qualitier	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.
D2	Sample required dilution due to high concentration of analyte.

## Glossary

RL

RPD

TEF TEQ

Abbreviation	These commonly used abbreviations may or may not be present in this report.
<del>n</del>	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)

Reporting Limit or Requested Limit (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Relative Percent Difference, a measure of the relative difference between two points

TestAmerica Phoenix

Page 3 of 26 6/12/2018

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

Job ID: 550-103738-1

**Laboratory: TestAmerica Phoenix** 

Narrative

Job Narrative 550-103738-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 6/4/2018 1:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.8° C, 1.8° C, 2.0° 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.

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# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103738-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-103738-1	FC-CCR-MW-62-6318	Water	06/03/18 09:08	06/04/18 13:25
550-103738-2	FC-CCR-MW-63-6318	Water	06/03/18 09:32	06/04/18 13:25
550-103738-3	FC-CCR-MW-64-6318	Water	06/03/18 09:50	06/04/18 13:25
550-103738-4	FC-CCR-MW-65-6318	Water	06/03/18 08:50	06/04/18 13:25

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW-62-6318

Lab Sample ID: 550-103738-1

Lab Sample ID: 550-103738-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	120		2.0	mg/L	1	_	300.0	Total/NA
Fluoride	1.6		0.40	mg/L	1		300.0	Total/NA
Sulfate	3500	D2	100	mg/L	50		300.0	Total/NA
Boron	1.8		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	490	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	320	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	8.5		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	640	M3	0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	750		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	750		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	5900	D2	100	mg/L	1		SM 2540C	Total/NA
pH	6.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	20.3	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

# Client Sample ID: FC-CCR-MW-63-6318

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	90		2.0	mg/L	1	_	300.0	Total/NA
Fluoride	1.7		0.40	mg/L	1		300.0	Total/NA
Sulfate	2600	D2	100	mg/L	50		300.0	Total/NA
Boron	1.4		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	510		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	260		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	320		0.50	mg/L	1		200.7 Rev 4.4	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	4500	D2	40	mg/L	1		SM 2540C	Total/NA
pH	7.1	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	20.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

### Client Sample ID: FC-CCR-MW-64-6318

- Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type			
Chloride	50		2.0	mg/L	<del>-                                    </del>	300.0	Total/NA			
Fluoride	1.4		0.40	mg/L	1	300.0	Total/NA			
Sulfate	390	D2	40	mg/L	20	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			
Magnesium	34		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	110		0.50	mg/L	1	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	800		20	mg/L	1	SM 2540C	Total/NA			
pH	7.7	H5	1.7	SU	1	SM 4500 H+ B	Total/NA			
Temperature	20.1	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA			

## Client Sample ID: FC-CCR-MW-65-6318

Lab Sample ID: 550-103738-4

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 26

2

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## **Detection Summary**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW-65-6318 (Continued)

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

Lab Sample ID: 550-103738-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	52		2.0	mg/L	1 -	300.0	Total/NA
Fluoride	1.9		0.40	mg/L	1	300.0	Total/NA
Sulfate	480	D2	40	mg/L	20	300.0	Total/NA
Boron	0.62		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	98		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	56		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	3.3		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	130		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	290		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	290		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	1000		20	mg/L	1	SM 2540C	Total/NA
pH	7.5	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.0	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

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Client: Arizona Public Service Company

Date Collected: 06/03/18 09:08

Date Received: 06/04/18 13:25

Client Sample ID: FC-CCR-MW-62-6318

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

Lab Sample ID: 550-103738-1

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	120		2.0	mg/L			06/04/18 18:12	1
Fluoride	1.6		0.40	mg/L			06/04/18 18:12	1
Sulfate	3500	D2	100	mg/L			06/04/18 18:40	50
Method: 200.7 Rev 4.4 - Metals (	(ICP)							
Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.8		0.050	mg/L	_	06/05/18 12:27	06/06/18 22:15	1
Calcium	490	M3	2.0	mg/L		06/05/18 12:27	06/06/18 22:15	1
Magnesium	320	M3	2.0	mg/L		06/05/18 12:27	06/06/18 22:15	1
Potassium	8.5		0.50	mg/L		06/05/18 12:27	06/07/18 18:44	1
Sodium	640	M3	0.50	mg/L		06/05/18 12:27	06/07/18 18:44	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	750		6.0	mg/L			06/10/18 12:30	1
Bicarbonate Alkalinity as CaCO3	750		6.0	mg/L			06/10/18 12:30	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/10/18 12:30	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1
Total Dissolved Solids	5900	D2	100	mg/L			06/06/18 11:39	1
pH	6.8	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.3	H5	0.1	Degrees C			06/05/18 11:50	1

Lab Sample ID: 550-103738-2 Client Sample ID: FC-CCR-MW-63-6318

Date Collected: 06/03/18 09:32 **Matrix: Water** 

Method: 300.0 - Anions, Ion Chr	_	•						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	90		2.0	mg/L			06/04/18 20:30	1
Fluoride	1.7		0.40	mg/L			06/04/18 20:30	1
Sulfate	2600	D2	100	mg/L			06/04/18 20:49	50
Method: 200.7 Rev 4.4 - Metals (	(ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.4		0.050	mg/L		06/05/18 12:27	06/06/18 22:21	1
Calcium	510		2.0	mg/L		06/05/18 12:27	06/06/18 22:21	1
Magnesium	260		2.0	mg/L		06/05/18 12:27	06/06/18 22:21	1
Potassium	5.4		0.50	mg/L		06/05/18 12:27	06/07/18 18:50	1
Sodium	320		0.50	mg/L		06/05/18 12:27	06/07/18 18:50	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	500		6.0	mg/L			06/06/18 14:30	1
Bicarbonate Alkalinity as CaCO3	500		6.0	mg/L			06/06/18 14:30	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 14:30	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 14:30	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 14:30	1
<b>Total Dissolved Solids</b>	4500	D2	40	mg/L			06/05/18 08:44	1
Н	7.1	H5	1.7	SU			06/05/18 11:50	1

TestAmerica Phoenix

Page 8 of 26

## **Client Sample Results**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW-63-6318

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

Lab Sample ID: 550-103738-2

**Matrix: Water** 

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General	Circinisti y	(Continued)

Date Collected: 06/03/18 09:32

Date Received: 06/04/18 13:25

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Temperature	20.0	H5	0.1	Degrees C	_		06/05/18 11:50	1

Lab Cample ID: EE0 102720 2 Client Sample ID: FC-CCR-MW-64-6318

Date Collected: 06/03/18 09:50 Date Received: 06/04/18 13:25

Lab Sample ID.	330-103/30-3
	Matrix: Water

Method: 300.0 - Anions, Ion Chromatography Result Qualifier Analyte RL Unit Prepared Analyzed Dil Fac 2.0 Chloride 50 mg/L 06/04/18 21:07 **Fluoride** 1.4 0.40 mg/L 06/04/18 21:07 **Sulfate** 390 D2 40 mg/L 06/04/18 21:26 20

Analyte	Result C	Qualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.48	0.050	mg/L		06/05/18 12:27	06/06/18 22:26	1
Calcium	85	2.0	mg/L		06/05/18 12:27	06/06/18 22:26	1
Magnesium	34	2.0	mg/L		06/05/18 12:27	06/06/18 22:26	1
Potassium	5.4	0.50	mg/L		06/05/18 12:27	06/07/18 18:56	1
Sodium	110	0.50	mg/L		06/05/18 12:27	06/07/18 18:56	1

General Chemistry	Decult Ovelifier	D.I.	11:4	_	Dunnanad	Amahamad	Dil Faa
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	190	6.0	mg/L			06/06/18 14:39	1
Bicarbonate Alkalinity as CaCO3	190	6.0	mg/L			06/06/18 14:39	1
Carbonate Alkalinity as CaCO3	ND	6.0	mg/L			06/06/18 14:39	1
Alkalinity, Phenolphthalein	ND	6.0	mg/L			06/06/18 14:39	1
Hydroxide Alkalinity as CaCO3	ND	6.0	mg/L			06/06/18 14:39	1
Total Dissolved Solids	800	20	mg/L			06/05/18 08:44	1
pH	7.7 H5	1.7	SU			06/05/18 11:50	1
Temperature	20.1 H5	0.1	Degrees C			06/05/18 11:50	1

Client Sample ID: FC-CCR-MW-65-6318 Lab Sample ID: 550-103738-4 **Matrix: Water** 

Date Collected: 06/03/18 08:50 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion	Chromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	52		2.0	mg/L			06/04/18 21:44	1
Fluoride	1.9		0.40	mg/L			06/04/18 21:44	1
Sulfate	480	D2	40	mg/L			06/04/18 22:02	20

Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.62		0.050	mg/L		06/05/18 12:27	06/06/18 22:29	1
Calcium	98		2.0	mg/L		06/05/18 12:27	06/06/18 22:29	1
Magnesium	56		2.0	mg/L		06/05/18 12:27	06/06/18 22:29	1
Potassium	3.3		0.50	mg/L		06/05/18 12:27	06/07/18 18:58	1
Sodium	130		0.50	mg/L		06/05/18 12:27	06/07/18 18:58	1

TestAmerica Phoenix

Page 9 of 26

6/12/2018

## **Client Sample Results**

Client: Arizona Public Service Company

Date Collected: 06/03/18 08:50

Date Received: 06/04/18 13:25

Client Sample ID: FC-CCR-MW-65-6318

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

Lab Sample ID: 550-103738-4

Matrix: Water

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	290		6.0	mg/L			06/06/18 14:49	1
Bicarbonate Alkalinity as CaCO3	290		6.0	mg/L			06/06/18 14:49	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 14:49	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 14:49	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 14:49	1
Total Dissolved Solids	1000		20	mg/L			06/05/18 08:44	1
pH	7.5	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.0	H5	0.1	Degrees C			06/05/18 11:50	1

Client: Arizona Public Service Company Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-148809/2

**Matrix: Water** 

Analysis Batch: 148809

**Client Sample ID: Method Blank** 

**Prep Type: Total/NA** 

MB MB Analyte **Result Qualifier** RL Unit Prepared Analyzed Dil Fac 2.0 mg/L Chloride ND 06/04/18 14:04 Fluoride ND 0.40 mg/L 06/04/18 14:04 ND Sulfate 06/04/18 14:04 2.0 mg/L

Lab Sample ID: LCS 550-148809/5

**Matrix: Water** 

Analyte

Chloride

Fluoride

Sulfate

Analysis Batch: 148809

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

Spike LCS LCS %Rec. Added Result Qualifier Unit Limits D %Rec 20.0 21.2 mg/L 106 90 - 110 4.00 4.14 mg/L 104 90 - 110 20.0 20.6 mg/L 90 - 110 103

Lab Sample ID: LCSD 550-148809/6

**Matrix: Water** 

**Analysis Batch: 148809** 

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

**Client Sample ID: Matrix Spike Duplicate** 

**Client Sample ID: Matrix Spike** 

Prep Type: Total/NA

**Prep Type: Total/NA** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	20.0	21.1		mg/L		106	90 - 110	0	20
Fluoride	4.00	4.15		mg/L		104	90 - 110	0	20
Sulfate	20.0	20.6		mg/L		103	90 - 110	0	20

Lab Sample ID: 550-103647-A-8 MS

**Matrix: Water** 

Analysis Batch: 148809

Tinalyolo Batolii 140000	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	12	-	20.0	33.7		mg/L		110	80 - 120	
Fluoride	3.3		4.00	7.53		mg/L		105	80 - 120	
Sulfate	4.2		20.0	25.6		mg/L		107	80 - 120	

Lab Sample ID: 550-103647-A-8 MSD

**Matrix: Water** 

Analysis Batch: 148809

7 mary 510 Batom 140000	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	•	Qualifier	Added	_	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	12		20.0	33.4		mg/L	<del></del> _	108	80 - 120	1	20	
Fluoride	3.3		4.00	7.47		mg/L		103	80 - 120	1	20	
Sulfate	4.2		20.0	25 1		ma/l		105	80 - 120	2	20	

Lab Sample ID: MB 550-148810/2

**Matrix: Water** 

**Analysis Batch: 148810** 

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

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			06/04/18 14:33	1
Fluoride	ND		0.40	mg/L			06/04/18 14:33	1
Sulfate	ND		2.0	mg/L			06/04/18 14:33	1

TestAmerica Phoenix

Page 11 of 26

6/12/2018

**Client Sample ID: Lab Control Sample** 

Client Sample ID: Lab Control Sample Dup

Client Sample ID: FC-CCR-MW-62-6318

Client Sample ID: FC-CCR-MW-62-6318

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 550-148810/5

**Matrix: Water Analysis Batch: 148810** 

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit D %Rec Limits 20.0 Chloride 20.4 mg/L 102 90 - 110 Fluoride 4.00 4.18 104 90 - 110 mg/L Sulfate 20.0 20.8 90 - 110 mg/L 104

Lab Sample ID: LCSD 550-148810/6

Client: Arizona Public Service Company

**Matrix: Water** 

**Analysis Batch: 148810** 

Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit Chloride 20.0 20.4 90 - 110 0 mg/L 102 20 Fluoride 4.00 4.18 mg/L 105 90 - 110 0 20 Sulfate 20.0 20.8 mg/L 104 90 - 110 20

Lab Sample ID: 550-103738-1 MS

**Matrix: Water** 

**Analysis Batch: 148810** 

Sample Sample MS MS %Rec. Spike Result Qualifier Added Limits **Analyte** Result Qualifier Unit D %Rec Chloride 110 D2 1000 1190 D2 mg/L 108 80 - 120 Fluoride ND D1 200 219 D1 mg/L 109 80 - 120Sulfate 3500 D2 1000 4550 D2 mg/L 107 80 - 120

Lab Sample ID: 550-103738-1 MSD

**Matrix: Water** 

Analysis Batch: 148810

Alialysis Datcii. 1700 iu											
_	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	110	D2	1000	1180	D2	mg/L		107	80 - 120	1	20
Fluoride	ND	D1	200	217	D1	mg/L		109	80 - 120	1	20
Sulfate	3500	D2	1000	4540	D2	mg/L		106	80 - 120	0	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-148865/1-A

Client Sample ID: Method Blank Prep Type: Total/NA **Matrix: Water** Analysis Batch: 149072 **Prep Batch: 148865** MB MB

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L	_	06/05/18 12:27	06/06/18 21:55	1
Calcium	ND		2.0	mg/L		06/05/18 12:27	06/06/18 21:55	1
Magnesium	ND		2.0	mg/L		06/05/18 12:27	06/06/18 21:55	1

Lab Sample ID: MB 550-148865/1-A

**Matrix: Water** 

**Analysis Batch: 149140** 

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Potassium ND 0.50 mg/L 06/05/18 12:27 06/07/18 18:24 06/05/18 12:27 06/07/18 18:24 Sodium ND 0.50 mg/L

TestAmerica Phoenix

Prep Type: Total/NA

**Prep Batch: 148865** 

**Client Sample ID: Method Blank** 

Page 12 of 26 6/12/2018

Client: Arizona Public Service Company Project/Site: CCR

Lab Sample ID: LCS 550-148865/2-A

**Matrix: Water** 

**Analysis Batch: 149072** 

Client Sample	D:	Lab	<b>Control</b>	Samp	le
		Dror	Type: 1	Cotal/N	۸

Client Sample ID: Lab Control Sample Dup

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

Client Sample ID: FC-CCR-MW-62-6318

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59

Prep Type: Total/NA **Prep Batch: 148865** 

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Boron	1.00	0.947		mg/L		95	85 - 115	
Calcium	21.0	20.6		mg/L		98	85 - 115	
Magnesium	21.0	20.3		mg/L		97	85 - 115	

Lab Sample ID: LCS 550-148865/2-A **Client Sample ID: Lab Control Sample** 

**Matrix: Water** 

Analyte Potassium Sodium

Analysis Batch: 149140

Spike	LCS	LCS				Prep Ba %Rec.	•	
Added	Result	Qualifier	Unit	D	%Rec	Limits		
20.0	19.1		mg/L		95	85 - 115		
20.0	18.6		mg/L		93	85 - 115		

Lab Sample ID: LCSD 550-148865/3-A

Matrix: water							Prep Iy	pe: rot	al/NA
Analysis Batch: 149072							Prep Ba	atch: 14	18865
-	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	 1 00	0.950		ma/l		95	85 _ 115		20

20 Calcium 21.0 20.5 mg/L 98 85 - 115 0 Magnesium 21.0 20.2 96 85 - 115 20 mg/L

Lab Sample ID: LCSD 550-148865/3-A

Matrix: Water							Prep Typ	ce: Tot	al/NA	
Analysis Batch: 149140							Prep Ba	itch: 14	<del>18865</del>	
-	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Potassium	20.0	19.0		mg/L		95	85 - 115	0	20	
Sodium	20.0	18.8		mg/L		94	85 <sub>-</sub> 115	1	20	

Lab Sample ID: 550-103738-1 MS Client Sample ID: FC-CCR-MW-62-6318

**Matrix: Water** 

**Prep Batch: 148865 Analysis Batch: 149072** Sample Sample Spike MS MS %Rec.

Analyte	Result Qualifier	Added	Result Qualifier	Unit	D %Rec	Limits
Boron	1.8	1.00	2.77	mg/L	95	70 - 130
Calcium	490 M3	21.0	500 M3	mg/L	49	70 - 130
Magnesium	320 M3	21.0	334 M3	mg/L	61	70 - 130

Lab Sample ID: 550-103738-1 MS

640 M3

Sodium

Matrix: Water									Prep Type: Total/NA
Analysis Batch: 149140									<b>Prep Batch: 148865</b>
-	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Potassium	8.5		20.0	28.6		mg/L		100	70 - 130

653 M3

mg/L

Lab Sample ID: 550-103738-1 MSD Client Sample ID: FC-CCR-MW-62-6318 **Matrix: Water** Prep Type: Total/NA

20.0

**Analysis Batch: 149072 Prep Batch: 148865** Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit Boron 1.8 1.00 2.76 mg/L 94 70 - 130 1

TestAmerica Phoenix

Prep Type: Total/NA

Client: Arizona Public Service Company Project/Site: CCR

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

Lab Sample ID: 550-103738-1 MSD Client Sample ID: FC-CCR-MW-62-6318 Prep Type: Total/NA

**Matrix: Water** 

matrix rrate.												
Analysis Batch: 149072									Prep Ba	itch: 14	18865	
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Calcium	490	M3	21.0	496	M3	mg/L		27	70 - 130	1	20	
Magnesium	320	M3	21.0	331	M3	mg/L		44	70 - 130	1	20	

Lab Sample ID: 550-103738-1 MSD Client Sample ID: FC-CCR-MW-62-6318

Matrix: Water									Prep Typ	pe: Tot	al/NA
Analysis Batch: 149140									Prep Ba	itch: 14	18865
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Potassium	8.5		20.0	28.2		mg/L		99	70 - 130	1	20
Sodium	640	M3	20.0	653	M3	mg/L		60	70 - 130	0	20

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 550-149023/5 **Client Sample ID: Method Blank** 

**Matrix: Water** 

**Analysis Batch: 149023** 

MB MB						
Result Qua	lifier RL	Unit	D	Prepared	Analyzed	Dil Fac
ND	6.0	mg/L			06/06/18 13:52	1
ND	6.0	mg/L			06/06/18 13:52	1
ND	6.0	mg/L			06/06/18 13:52	1
ND	6.0	mg/L			06/06/18 13:52	1
ND	6.0	mg/L			06/06/18 13:52	1
	Result Qua	Result         Qualifier         RL           ND         6.0           ND         6.0           ND         6.0           ND         6.0	Result         Qualifier         RL         Unit           ND         6.0         mg/L           ND         6.0         mg/L           ND         6.0         mg/L           ND         6.0         mg/L	Result         Qualifier         RL         Unit         D           ND         6.0         mg/L         mg/L           ND         6.0         mg/L         mg/L           ND         6.0         mg/L           ND         6.0         mg/L	Result         Qualifier         RL         Unit         D         Prepared           ND         6.0         mg/L           ND         6.0         mg/L           ND         6.0         mg/L           ND         6.0         mg/L	Result         Qualifier         RL         Unit         D         Prepared         Analyzed           ND         6.0         mg/L         06/06/18 13:52           ND         6.0         mg/L         06/06/18 13:52           ND         6.0         mg/L         06/06/18 13:52           ND         6.0         mg/L         06/06/18 13:52

Lab Sample ID: LCS 550-149023/4 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149023** 

	Spike	LCS LCS			%Rec.	
Analyte	Added	Result Qual	D	%Rec	Limits	
Alkalinity as CaCO3	250	256	 	102	90 - 110	 

Lab Sample ID: LCSD 550-149023/17 **Client Sample ID: Lab Control Sample Dup Matrix: Water** 

**Analysis Batch: 149023** 

Spike LCSD LCSD %Rec. Added Result Qualifier Unit Limit D %Rec Limits RPD Alkalinity as CaCO3 250 258 mg/L 103 90 - 110

Lab Sample ID: 550-103741-D-1 DU **Client Sample ID: Duplicate** 

**Matrix: Water** 

Analysis Batch: 149023

7 mm, y 010 = 0100 m 1 100 = 0								
	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	300		305		mg/L		 0.1	20
Bicarbonate Alkalinity as CaCO3	300		305		mg/L		0.1	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

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**Prep Type: Total/NA** 

Prep Type: Total/NA

Client: Arizona Public Service Company

Project/Site: CCR

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: MB 550-149226/1

**Matrix: Water** 

**Analysis Batch: 149226** 

**Client Sample ID: Method Blank** 

Prep Type: Total/NA

**Client Sample ID: Lab Control Sample** 

Client Sample ID: Lab Control Sample Dup

Client Sample ID: FC-CCR-MW-62-6318

**Client Sample ID: Method Blank** 

Prep Type: Total/NA

Prep Type: Total/NA

**Prep Type: Total/NA** 

MB MB Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac 6.0 Alkalinity as CaCO3 ND mg/L 06/10/18 12:30 Bicarbonate Alkalinity as CaCO3 ND 6.0 06/10/18 12:30 mg/L ND Carbonate Alkalinity as CaCO3 6.0 mg/L 06/10/18 12:30 Alkalinity, Phenolphthalein ND 6.0 mg/L 06/10/18 12:30 Hydroxide Alkalinity as CaCO3 ND 6.0 mg/L 06/10/18 12:30

Lab Sample ID: LCS 550-149226/2

**Matrix: Water** 

**Analysis Batch: 149226** 

	<b>Бріке</b>	LC2	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Alkalinity as CaCO3	250	244		mg/L	_	98	90 - 110

Lab Sample ID: LCSD 550-149226/5

**Matrix: Water** 

**Analysis Batch: 149226** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Alkalinity as CaCO3	250	250		mg/L		100	90 - 110	2	20

Lab Sample ID: 550-103738-1 DU

**Matrix: Water** 

Analysis Batch: 149227

7 manyone Datom 1 10221	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	750		700		mg/L		7	20
Bicarbonate Alkalinity as CaCO3	750		700		mg/L		7	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 550-148821/1

**Matrix: Water** 

**Analysis Batch: 148821** 

MB MB

Analyte	Result Qual	lifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND	20	mg/L			06/05/18 08:44	1

Lab Sample ID: LCS 550-148821/2

**Matrix: Water** 

Analysis Batch: 148821

Analysis Baton: 1400E1								
	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Total Dissolved Solids	1000	990		mg/L		99	90 - 110	

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**Prep Type: Total/NA** 

**Prep Type: Total/NA** 

6/12/2018

Project/Site: CCR

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCSD 550-148821/3	Client Sample ID: Lab Control Sample Dup
Matrix: Water	Prep Type: Total/NA

Analysis Batch: 148821

Client: Arizona Public Service Company

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Total Dissolved Solids	1000	986		mg/L		99	90 - 110	0	10

Lab Sample ID: 550-103742-A-1 DU **Client Sample ID: Duplicate Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 148821** 

	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
Total Dissolved Solids	10000	D2	9960	D2	mg/L			5	10

Lab Sample ID: MB 550-148964/1 **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 148964

MB MB Result Qualifier RL Unit Analyte Prepared Analyzed Dil Fac Total Dissolved Solids ND 20 mg/L 06/06/18 11:39

Lab Sample ID: LCS 550-148964/2 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 148964

Spike LCS LCS %Rec. Added Result Qualifier Unit %Rec Limits Total Dissolved Solids 1000 962 96 90 - 110 mg/L

Lab Sample ID: LCSD 550-148964/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 148964** 

	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Total Dissolved Solids	1000	952		ma/l		95	90 - 110		10	

Lab Sample ID: 550-103738-1 DU Client Sample ID: FC-CCR-MW-62-6318 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 148964

,	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
Total Dissolved Solids	5900	D2	5540	D2	mg/L	_	 	6	10

Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-148864/1 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA **Matrix: Water** 

Analysis Batch: 148864

Allalysis Dalcil. 140004								
	Spike	LCSSRM	LCSSRM				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
pH	 7.00	7.0		SU		100.3	98.5 - 101.	
							5	

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6/12/2018

## **QC Sample Results**

Client: Arizona Public Service Company

Method: SM 4500 H+ B - pH (Continued)

20.3 H5

Lab Sample ID: LCSSRM 550-148864/13

Lab Sample ID: 550-103738-1 DU

Project/Site: CCR

**Matrix: Water** 

**Matrix: Water** 

Temperature

Analyte

рН

Analysis Batch: 148864

TestAmerica Job ID: 550-103738-1

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA

Spike LCSSRM LCSSRM %Rec. Added Result Qualifier Unit D %Rec Limits 7.00 7.1 SU 100.7 98.5 - 101.

Degrees C

Client Sample ID: FC-CCR-MW-62-6318

**Prep Type: Total/NA** 

0.5

Analysis Batch: 148864 DU DU RPD Sample Sample Analyte Result Qualifier Result Qualifier RPD Limit Unit рН 6.8 H5 6.8 H5 SU 0.1

20.2 H5

TestAmerica Phoenix

Client: Arizona Public Service Company Project/Site: CCR

## HPLC/IC

#### **Analysis Batch: 148809**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	300.0	
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	300.0	
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	300.0	
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	300.0	
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	300.0	
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	300.0	
MB 550-148809/2	Method Blank	Total/NA	Water	300.0	
LCS 550-148809/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-148809/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-103647-A-8 MS	Matrix Spike	Total/NA	Water	300.0	
550-103647-A-8 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

#### **Analysis Batch: 148810**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	300.0	<del>-</del>
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	300.0	
MB 550-148810/2	Method Blank	Total/NA	Water	300.0	
LCS 550-148810/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-148810/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-103738-1 MS	FC-CCR-MW-62-6318	Total/NA	Water	300.0	
550-103738-1 MSD	FC-CCR-MW-62-6318	Total/NA	Water	300.0	

#### **Metals**

#### **Prep Batch: 148865**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	200.7	
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	200.7	
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	200.7	
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	200.7	
MB 550-148865/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-148865/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-148865/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-103738-1 MS	FC-CCR-MW-62-6318	Total/NA	Water	200.7	
550-103738-1 MSD	FC-CCR-MW-62-6318	Total/NA	Water	200.7	

#### **Analysis Batch: 149072**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	200.7 Rev 4.4	148865
MB 550-148865/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	148865
LCS 550-148865/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	148865
LCSD 550-148865/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-1 MS	FC-CCR-MW-62-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-1 MSD	FC-CCR-MW-62-6318	Total/NA	Water	200.7 Rev 4.4	148865

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Page 18 of 26

Client: Arizona Public Service Company Project/Site: CCR

# **Metals (Continued)**

#### **Analysis Batch: 149140**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	200.7 Rev 4.4	148865
MB 550-148865/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	148865
LCS 550-148865/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	148865
LCSD 550-148865/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-1 MS	FC-CCR-MW-62-6318	Total/NA	Water	200.7 Rev 4.4	148865
550-103738-1 MSD	FC-CCR-MW-62-6318	Total/NA	Water	200.7 Rev 4.4	148865

## **General Chemistry**

#### **Analysis Batch: 148821**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	SM 2540C	
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	SM 2540C	
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	SM 2540C	
MB 550-148821/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-148821/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-148821/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-103742-A-1 DU	Duplicate	Total/NA	Water	SM 2540C	

#### Analysis Batch: 148864

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	SM 4500 H+ B	-
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	SM 4500 H+ B	
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	SM 4500 H+ B	
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-103738-1 DU	FC-CCR-MW-62-6318	Total/NA	Water	SM 4500 H+ B	

#### Analysis Batch: 148964

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	SM 2540C	
MB 550-148964/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-148964/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-148964/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-103738-1 DU	FC-CCR-MW-62-6318	Total/NA	Water	SM 2540C	

#### **Analysis Batch: 149023**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-2	FC-CCR-MW-63-6318	Total/NA	Water	SM 2320B	
550-103738-3	FC-CCR-MW-64-6318	Total/NA	Water	SM 2320B	
550-103738-4	FC-CCR-MW-65-6318	Total/NA	Water	SM 2320B	
MB 550-149023/5	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-149023/4	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-149023/17	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-103741-D-1 DU	Duplicate	Total/NA	Water	SM 2320B	

Page 19 of 26

# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

# **General Chemistry (Continued)**

## Analysis Batch: 149226

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-149226/1	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-149226/2	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-149226/5	Lab Control Sample Dup	Total/NA	Water	SM 2320B	

#### **Analysis Batch: 149227**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103738-1	FC-CCR-MW-62-6318	Total/NA	Water	SM 2320B	
550-103738-1 DU	FC-CCR-MW-62-6318	Total/NA	Water	SM 2320B	

4

6

7

8

9

10

Project/Site: CCR

Client Sample ID: FC-CCR-MW-62-6318 Lab Sample ID: 550-103738-1

Date Collected: 06/03/18 09:08 **Matrix: Water** 

Date Received: 06/04/18 13:25

Client: Arizona Public Service Company

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/04/18 18:12	NBL	TAL PHX
Total/NA	Analysis	300.0		50	148810	06/04/18 18:40	NBL	TAL PHX
Total/NA	Prep	200.7			148865	06/05/18 12:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149072	06/06/18 22:15	ARE	TAL PHX
Total/NA	Prep	200.7			148865	06/05/18 12:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149140	06/07/18 18:44	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149227	06/10/18 12:30	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	,	06/06/18 11:39 06/07/18 11:00	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-MW-63-6318

Lab Sample ID: 550-103738-2

Date Collected: 06/03/18 09:32 **Matrix: Water** Date Received: 06/04/18 13:25

Batch **Batch** Dilution Batch Prepared **Prep Type** Type Method Run **Factor** Number or Analyzed Analyst Lab 148809 06/04/18 20:30 NBL Total/NA 300.0 TAL PHX Analysis Total/NA TAL PHX Analysis 300.0 50 148809 06/04/18 20:49 NBL TAL PHX Total/NA Prep 200.7 148865 06/05/18 12:27 SGO Total/NA TAL PHX Analysis 200.7 Rev 4.4 149072 06/06/18 22:21 ARE 1 Total/NA Prep 200.7 148865 06/05/18 12:27 SGO TAL PHX Total/NA Analysis 200.7 Rev 4.4 149140 06/07/18 18:50 SGO TAL PHX 1 Total/NA Analysis SM 2320B 149023 06/06/18 14:30 DGS TAL PHX TAL PHX Total/NA Analysis SM 2540C 1 148821 YET (Start) 06/05/18 08:44 (End) 06/06/18 10:20 Total/NA Analysis SM 4500 H+ B 148864 06/05/18 11:50 BDN TAL PHX

Client Sample ID: FC-CCR-MW-64-6318

Lab Sample ID: 550-103738-3 Date Collected: 06/03/18 09:50 **Matrix: Water** 

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148809	06/04/18 21:07	NBL	TAL PHX
Total/NA	Analysis	300.0		20	148809	06/04/18 21:26	NBL	TAL PHX
Total/NA	Prep	200.7			148865	06/05/18 12:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149072	06/06/18 22:26	ARE	TAL PHX
Total/NA	Prep	200.7			148865	06/05/18 12:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149140	06/07/18 18:56	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 14:39	DGS	TAL PHX

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Page 21 of 26

#### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

Lab Sample ID: 550-103738-3

Client Sample ID: FC-CCR-MW-64-6318 Date Collected: 06/03/18 09:50 **Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C			148821		YET	TAL PHX
					(Start) 0	6/05/18 08:44		
					(End) 0	6/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-MW-65-6318 Lab Sample ID: 550-103738-4

Date Collected: 06/03/18 08:50 **Matrix: Water** 

Date Received: 06/04/18 13:25

Date Received: 06/04/18 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148809	06/04/18 21:44		TAL PHX
Total/NA	Analysis	300.0		20	148809	06/04/18 22:02	NBL	TAL PHX
Total/NA	Prep	200.7			148865	06/05/18 12:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149072	06/06/18 22:29	ARE	TAL PHX
Total/NA	Prep	200.7			148865	06/05/18 12:27	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149140	06/07/18 18:58	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 14:49	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	06/05/18 08:44 06/06/18 10:20	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

#### **Laboratory References:**

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

TestAmerica Phoenix

# **Accreditation/Certification Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103738-1

# **Laboratory: TestAmerica Phoenix**

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

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
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: 550-103738-1

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
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

Page 25 of 26









# **Chain of Custody Record**

TestAmerica Phoenix 1625 E Cotton Center Blvd

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# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-103738-1

SDG Number:

Login Number: 103738 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.</td <td></td> <td>Comment</td>		Comment
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.

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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: 550-113007-1

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 11/26/2018 4:06:46 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	10
QC Sample Results	16
QC Association Summary	22
Lab Chronicle	25
Certification Summary	30
Method Summary	31
Subcontract Data	32
Chain of Custody	44
Receipt Checklists	47

3

4

8

9

11

13

14

# **Definitions/Glossary**

Client: Arizona Public Service Company

**Qualifier Description** 

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

#### **Qualifiers**

#### **HPLC/IC** Qualifier

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.
D2	Sample required dilution due to high concentration of analyte.

#### **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**

ND

PQL

QC

RLRPD

TEF

**TEQ** 

**RER** 

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

Not Detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

**Practical Quantitation Limit** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

**Quality Control** 

Page 3 of 47

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Job ID: 550-113007-1

Laboratory: TestAmerica Phoenix

Narrative

Job Narrative 550-113007-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.9° C, 3.0° C and 3.8° C.

#### **Receipt Exceptions**

Received 3 pages of COCs from the courier.

Samples #6 - #9 only request Appendix I.

All of the other samples request Appendix I and II.

Client did provide sample containers if Appendix II is needed.

 $FC-CCR-MW62-11218 \ (550-113007-6), \ FC-CCR-MW63-112818 \ (550-113007-7), \ FC-CCR-MW64-11218 \ (550-113007-8) \ and \ FC-CCR-MW65-11218 \ (550-113007-9)$ 

#### 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: FC-CCR-MW71-11318 (550-113007-10), FC-CCR-MW72-11318 (550-113007-11), FC-CCR-MW73-11318 (550-113007-12) and FC-CCR-FD01-11318 (550-113007-13). This analyte was not detected in the diluted samples. 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: FC-CCR-FD02-11318 (550-113007-14). This analyte was not detected in the diluted samples. 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 additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TestAmerica Phoenix 11/26/2018

# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-113007-1	FC-CCR-MW66-11218	Water	11/02/18 13:28	11/07/18 13:00
550-113007-2	FC-CCR-MW67-11318	Water	11/03/18 09:57	11/07/18 13:00
550-113007-3	FC-CCR-MW68-11318	Water	11/03/18 11:01	11/07/18 13:00
550-113007-4	FC-CCR-MW69-11318	Water	11/03/18 08:49	11/07/18 13:00
550-113007-5	FC-CCR-MW70-11218	Water	11/02/18 15:32	11/07/18 13:00
550-113007-6	FC-CCR-MW62-11218	Water	11/02/18 14:10	11/07/18 13:00
550-113007-7	FC-CCR-MW63-112818	Water	11/02/18 14:49	11/07/18 13:00
550-113007-8	FC-CCR-MW64-11218	Water	11/02/18 12:52	11/07/18 13:00
550-113007-9	FC-CCR-MW65-11218	Water	11/02/18 12:08	11/07/18 13:00
550-113007-10	FC-CCR-MW71-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-11	FC-CCR-MW72-11318	Water	11/03/18 12:31	11/07/18 13:00
550-113007-12	FC-CCR-MW73-11318	Water	11/03/18 13:24	11/07/18 13:00
550-113007-13	FC-CCR-FD01-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-14	FC-CCR-FD02-11318	Water	11/03/18 12:31	11/07/18 13:00

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218

Lab Sample ID: 550-113007-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1800	D2	400	mg/L	200	_	300.0	Total/NA
Fluoride	25	D1	2.0	mg/L	5		300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200		300.0	Total/NA
Boron	140	D2 M3	0.20	mg/L	4		200.7 Rev 4.4	Total/NA
Calcium	470	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	20000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: FC-CCR-MW67-11318

Lab Sample ID: 550-113007-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2000	D2	400	mg/L	200	_	300.0	Total/NA
Fluoride	16	D1	2.0	mg/L	5		300.0	Total/NA
Sulfate	13000	D2	400	mg/L	200		300.0	Total/NA
Boron	170	D2	0.20	mg/L	4		200.7 Rev 4.4	Total/NA
Calcium	470		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
рН	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	14.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: FC-CCR-MW68-11318

Lab Sample ID: 550-113007-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	1500	D2 -	400	mg/L	200	300.0	Total/NA
Fluoride	12	D1	2.0	mg/L	5	300.0	Total/NA
Sulfate	11000	D2	400	mg/L	200	300.0	Total/NA
Boron	150	D2	0.20	mg/L	4	200.7 Rev 4.4	Total/NA
Calcium	460		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	18000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.2	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: FC-CCR-MW69-11318

Lab Sample ID: 550-113007-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	1200	D2	400	mg/L	200	300.0	Total/NA
Fluoride	11	D1	2.0	mg/L	5	300.0	Total/NA
Sulfate	8700	D2	400	mg/L	200	300.0	Total/NA
Boron	92	D2	0.10	mg/L	2	200.7 Rev 4.4	Total/NA
Calcium	470		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	14000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	13.0	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

Client Sample ID: FC-CCR-MW70-11218

Lab Sample ID: 550-113007-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1100	D2	400	mg/L	200	_	300.0	Total/NA
Fluoride	2.7	D1	0.80	mg/L	2		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 47

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW70-11218 (Continued)

Lab Sample ID: 550-113007-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	6400	D2 -	400	mg/L	200	_	300.0	Total/NA
Boron	88	D2	0.10	mg/L	2		200.7 Rev 4.4	Total/NA
Calcium	510		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.0	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: FC-CCR-MW62-11218

Lab Sample II	D: 550-113007-6
---------------	-----------------

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	110	D2	100	mg/L	50	_	300.0	Total/NA
Fluoride	1.5		0.40	mg/L	1		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	550		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	5600	D2	100	mg/L	1		SM 2540C	Total/NA
pН	6.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

# Client Sample ID: FC-CCR-MW63-112818

# Lab Sample ID: 550-113007-7

Analyte	Result Qualifier	RL	Unit	Dil Fac	Method	Prep Type
Chloride	88	2.0	mg/L		300.0	Total/NA
Fluoride	1.9	0.40	mg/L	1	300.0	Total/NA
Sulfate	2800 D2	100	mg/L	50	300.0	Total/NA
Boron	1.9	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
Total Dissolved Solids	4300 D2	40	mg/L	1	SM 2540C	Total/NA
pH	7.1 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	15.3 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW64-11218

#### Lab Sample ID: 550-113007-8

Analyte	Result Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	50	2.0	mg/L	1	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	0.64	0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	88	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	760	20	mg/L	1	SM 2540C	Total/NA
pH	7.8 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	14.8 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-MW65-11218

#### Lab Sample ID: 550-113007-9

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	51	2.0	mg/L		300.0	Total/NA
Fluoride	1.9	0.40	mg/L	1	300.0	Total/NA
Sulfate	420 D2	40	mg/L	20	300.0	Total/NA
Boron	0.77	0.050	mg/L	1	200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 7 of 47

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Client: Arizona Public Service Company

Project/Site: CCR

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Temperature

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-9

Lab Sample ID: 550-113007-10

SM 4500 H+ B

SM 4500 H+ B

Lab Sample ID: 550-113007-11

Lab Sample ID: 550-113007-12

Lab Sample ID: 550-113007-13

Lab Sample ID: 550-113007-14

Total/NA

Total/NA

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Calcium	100	2.0	mg/L		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	940	20	mg/L	1	SM 2540C	Total/NA
рH	7.5 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: FC-CCR-MW71-11318

Client Sample ID: FC-CCR-MW65-11218 (Continued)

7.0 H5

14.8 H5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	520	D2	400	mg/L	200	300.0	Total/NA
Sulfate	11000	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
Total Dissolved Solids	16000	D2	100	mg/L	1	SM 2540C	Total/NA

1.7

SU

Degrees C

### Client Sample ID: FC-CCR-MW72-11318

Analyte	Result Qual	ifier RL	Unit	Dil Fac	D Method	Prep Type
Chloride	450	10	mg/L	5	300.0	Total/NA
Sulfate	11000 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	470	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	16000 D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.0 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	14.8 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-MW73-11318

Analyte	Result	Qualifier	RL	Unit	Dil Fac I	Method	Prep Type
Chloride	660	D2	200	mg/L	100	300.0	Total/NA
Sulfate	7500	D2	200	mg/L	100	300.0	Total/NA
Boron	1.7		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
Total Dissolved Solids	12000	D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.0	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: FC-CCR-FD01-11318

Analyte	Result (	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	520	D2 -	400	mg/L	200	300.0	Total/NA
Sulfate	11000 [	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	450		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	16000 I	D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.2 H	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	7.4 l	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-FD02-11318

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 8 of 47 11/26/2018

2

3

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# **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-14

# Client Sample ID: FC-CCR-FD02-11318 (Continued)

Analyte	Result Qu	ualifier	RL	Unit	Dil Fac	Method	Prep Type
Chloride	450 D1	1	10	mg/L	5	300.0	Total/NA
Sulfate	11000 D2	2	400	mg/L	200	300.0	Total/NA
Boron	0.21		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	460		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	16000 D2	2	100	mg/L	1	SM 2540C	Total/NA
pН	7.1 H5	5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	9.5 H5	5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

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Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218 Lab Sample ID: 550-113007-1

Date Collected: 11/02/18 13:28

9.6 H5

**Matrix: Water** 

11/09/18 16:54

Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1800	D2	400	mg/L			11/13/18 19:51	200
Fluoride	25	D1	2.0	mg/L			11/13/18 19:33	5
Sulfate	12000	D2	400	mg/L			11/13/18 19:51	200
- Method: 200.7 Rev 4.4 - Me	etals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	140	D2 M3	0.20	mg/L		11/09/18 07:19	11/16/18 04:05	4
Calcium	470	M3	2.0	mg/L		11/09/18 07:19	11/14/18 21:27	1
-	410		2.0	mg/L		11/03/10 07:13	11/14/10 21.21	
General Chemistry	470		2.0	9/2		11/03/10 07:13	11/14/10 21.2/	'
General Chemistry		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
- · · · · · · · · · · · · · · · · · · ·		Qualifier		Ü	<u>D</u>			Dil Fac

Client Sample ID: FC-CCR-MW67-11318 Lab Sample ID: 550-113007-2

0.1

Degrees C

Date Collected: 11/03/18 09:57 **Matrix: Water** 

Date Received: 11/07/18 13:00

**Temperature** 

Method: 300.0 - Anions, Ion C	hromatogra	iphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2000	D2	400	mg/L			11/13/18 21:42	200
Fluoride	16	D1	2.0	mg/L			11/13/18 21:23	5
Sulfate	13000	D2	400	mg/L			11/13/18 21:42	200
Method: 200.7 Rev 4.4 - Metal	s (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	170	D2	0.20	mg/L		11/09/18 07:19	11/16/18 04:11	4
Calcium	470		2.0	mg/L		11/09/18 07:19	11/14/18 21:33	1

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	19000	D2	200	mg/L			11/08/18 12:33	1
pH	7.4	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.7	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW68-11318 Lab Sample ID: 550-113007-3 Matrix: Water Date Collected: 11/03/18 11:01

Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1500	D2	400	mg/L			11/13/18 22:18	200
Fluoride	12	D1	2.0	mg/L			11/13/18 22:00	5
Sulfate	11000	D2	400	mg/L			11/13/18 22:18	200

Method: 200.7 Rev 4.4 - Metals (	ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	150	D2	0.20	mg/L		11/09/18 07:19	11/16/18 04:17	4
Calcium	460		2.0	mg/L		11/09/18 07:19	11/14/18 21:39	1

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW68-11318

Date Collected: 11/03/18 11:01 Date Received: 11/07/18 13:00 Lab Sample ID: 550-113007-3

Matrix: Water

**Matrix: Water** 

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	18000	D2	100	mg/L			11/08/18 12:33	1
pH	7.2	H5	1.7	SU			11/09/18 16:54	1
Temperature	13.5	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW69-11318 Lab Sample ID: 550-113007-4

Date Collected: 11/03/18 08:49 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1200	D2	400	mg/L			11/13/18 23:32	200
Fluoride	11	D1	2.0	mg/L			11/13/18 23:14	5
Sulfate	8700	D2	400	mg/L			11/13/18 23:32	200

Method: 200.7 Rev 4.4 - Metals	(ICP)							
Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	92	02	0.10	mg/L		11/09/18 07:19	11/16/18 04:22	2
Calcium	470		2.0	mg/L		11/09/18 07:19	11/14/18 21:45	1

General Chemistry	Danult	Ovelities.	DI.	11	_	D	A seek see al	D:: F
Analyte	Result	Qualifier	RL	Unit	ט	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	14000	D2	100	mg/L			11/08/18 12:33	1
pH	7.3	H5	1.7	SU			11/09/18 16:54	1
Temperature	13.0	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW70-11218

Lab Sample ID: 550-113007-5

Date Collected: 11/02/18 15:32

Matrix: Water

Date Collected: 11/02/18 15:32 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Ch	romatogra	iphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1100	D2	400	mg/L			11/14/18 00:09	200
Fluoride	2.7	D1	0.80	mg/L			11/13/18 23:50	2
Sulfate	6400	D2	400	mg/L			11/14/18 00:09	200

	(ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	88	D2	0.10	mg/L		11/09/18 07:19	11/16/18 04:28	2
Calcium	510		2.0	mg/L		11/09/18 07:19	11/14/18 21:51	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.2	H5	0.1	Degrees C			11/09/18 16:54	1

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Client: Arizona Public Service Company

Project/Site: CCR

**Calcium** 

Client Sample ID: FC-CCR-MW62-11218

Date Collected: 11/02/18 14:10 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113007-6

11/09/18 07:19 11/14/18 21:57

**Matrix: Water** 

Method: 300.0 - Anior	ns, Ion Chromatogra	aphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	110	D2	100	mg/L			11/14/18 00:46	50
Fluoride	1.5		0.40	mg/L			11/14/18 00:27	1
Sulfate	3300	D2	100	mg/L			11/14/18 00:46	50
Method: 200.7 Rev 4.4	4 - Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.4		0.050	ma/L		11/09/18 07:19	11/14/18 21:57	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5600	D2	100	mg/L			11/08/18 12:33	1
pH	6.8	H5	1.7	SU			11/09/18 16:54	1
Temperature	13.9	H5	0.1	Degrees C			11/09/18 16:54	1

2.0

mg/L

**550** 

Client Sample ID: FC-CCR-MW63-112818 Lab Sample ID: 550-113007-7 **Matrix: Water** 

Date Collected: 11/02/18 14:49 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chloride 88 2.0 mg/L 11/14/18 01:04 **Fluoride** 0.40 mg/L 11/14/18 01:04 1.9 **Sulfate** 2800 D2 100 mg/L 11/14/18 01:22 50

Method: 200.7 Rev 4.4 - Me Analyte	etals (ICP) Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Allalyte	Tresuit Qualifier	112			Trepared	Allalyzea	Diriac
Boron	1.9	0.050	mg/L		11/09/18 07:19	11/14/18 22:02	1
Calcium	550	2.0	mg/L		11/09/18 07:19	11/14/18 22:02	1
General Chemistry							

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4300	D2	40	mg/L			11/08/18 12:33	1
pH	7.1	H5	1.7	SU			11/09/18 16:54	1
Temperature	15.3	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW64-11218 Lab Sample ID: 550-113007-8 Date Collected: 11/02/18 12:52 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anion	lethod: 300.0 - Anions, Ion Chromatography											
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac				
Chloride	50		2.0	mg/L			11/14/18 01:41	1				
Fluoride	1.4		0.40	mg/L			11/14/18 01:41	1				
Sulfate	350 [	D2	100	mg/L			11/14/18 01:59	50				

Method: 200.7 Rev 4.4 - Metals (	(ICP)						
Analyte	Result Qu	ualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.64	0.050	mg/L		11/09/18 07:19	11/14/18 22:08	1
Calcium	88	2.0	mg/L		11/09/18 07:19	11/14/18 22:08	1

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW64-11218

Date Collected: 11/02/18 12:52 Date Received: 11/07/18 13:00 Lab Sample ID: 550-113007-8

Matrix: Water

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	760		20	mg/L			11/08/18 12:33	1
pH	7.8	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.8	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW65-11218 Lab Sample ID: 550-113007-9

Date Collected: 11/02/18 12:08 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chloride 51 2.0 mg/L 11/14/18 02:54 **Fluoride** 0.40 11/14/18 02:54 1.9 mg/L 1 **Sulfate** 420 D2 40 mg/L 11/14/18 03:13 20

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Boron 0.77 0.050 mg/L 11/09/18 07:19 11/14/18 22:11 2.0 11/09/18 07:19 11/14/18 22:11 **Calcium** mg/L 100

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	940		20	mg/L			11/08/18 12:33	1
pH	7.5	H5	1.7	SU			11/09/18 16:54	1
Temperature	12.9	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW71-11318 Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography<br/>AnalyteResult<br/>QualifierRLUnit<br/>mg/LDPrepared<br/>11/14/18 03:50Analyzed<br/>11/14/18 03:50Dil Fac<br/>200

Fluoride ND D1 D5 2.0 mg/L 11/14/18 03:31 5 400 **Sulfate** mg/L 11/14/18 03:50 200 11000 D2 Method: 200.7 Rev 4.4 - Metals (ICP) Linit ы Popult Qualifier Analyzod

Allalyte	Result	Qualifier	NL.	Ollit	ט	Fiepaieu	Allalyzeu	DIIFac
Boron	0.56		0.050	mg/L		11/09/18 07:19	11/14/18 22:14	1
Calcium	470		2.0	mg/L		11/09/18 07:19	11/14/18 22:14	1
General Chemistry								

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.8	H5	0.1	Degrees C			11/09/18 16:54	1

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**Matrix: Water** 

**Matrix: Water** 

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Client: Arizona Public Service Company

Project/Site: CCR

Calcium

Client Sample ID: FC-CCR-MW72-11318

Date Collected: 11/03/18 12:31 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113007-11

11/09/18 07:19 11/14/18 22:25

**Matrix: Water** 

Method: 300.0 - Anions, Ion	Chromatograph	hy						
Analyte	Result Qu	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	450		10	mg/L			11/14/18 04:08	5
Fluoride	ND D1	1 D5	2.0	mg/L			11/14/18 04:08	5
Sulfate	11000 D2	2	400	mg/L			11/14/18 04:26	200
Method: 200.7 Rev 4.4 - Meta	als (ICP)							
Analyte	Result Qu	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.22		0.050	mg/L		11/09/18 07:19	11/14/18 22:25	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.8	H5	0.1	Degrees C			11/09/18 16:54	1

2.0

mg/L

470

Client Sample ID: FC-CCR-MW73-11318 Lab Sample ID: 550-113007-12 **Matrix: Water** 

Date Collected: 11/03/18 13:24 Date Received: 11/07/18 13:00

Method: 300.0 - Anior	ns, Ion Chromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	660	D2	200	mg/L			11/14/18 05:03	100
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 04:45	2
Sulfate	7500	D2	200	mg/L			11/14/18 05:03	100

Method: 200.7 Rev 4.4 - Meta	als (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.7	0.050	mg/L		11/09/18 07:19	11/14/18 22:31	1
Calcium	480	2.0	mg/L		11/09/18 07:19	11/14/18 22:31	1
Company Champiatus							

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/12/18 13:18	1
Temperature	8.6	H5	0.1	Degrees C			11/12/18 13:18	1

Client Sample ID: FC-CCR-FD01-11318 Lab Sample ID: 550-113007-13 **Matrix: Water** 

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	520	D2	400	mg/L			11/14/18 05:40	200
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 05:22	2
Sulfate	11000	D2	400	mg/L			11/14/18 05:40	200

Method: 200.7 Rev 4.4 - Metals (	(ICP)							
Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.54		0.050	mg/L	_	11/09/18 07:19	11/14/18 22:37	1
Calcium	450		2.0	mg/L		11/09/18 07:19	11/14/18 22:37	1

TestAmerica Phoenix

# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-13

Client Sample ID: FC-CCR-FD01-11318 Date Collected: 11/03/18 11:45

**Matrix: Water** 

Date Received: 11/07/18 13:00

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.2	H5	1.7	SU			11/12/18 13:18	1
Temperature	7.4	H5	0.1	Degrees C			11/12/18 13:18	1

Client Sample ID: FC-CCR-FD02-11318 Lab Sample ID: 550-113007-14

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	450	D1	10	mg/L			11/14/18 06:35	5
Fluoride	ND	D1 D5	2.0	mg/L			11/14/18 06:35	5
Sulfate	11000	D2	400	mg/L			11/14/18 06:54	200

Method: 200.7 Rev 4.4 - Meta	als (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.21	0.050	mg/L		11/09/18 07:19	11/14/18 22:43	1
Calcium	460	2.0	mg/L		11/09/18 07:19	11/14/18 22:43	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.1	H5	1.7	SU			11/12/18 13:18	1
Temperature	9.5	H5	0.1	Degrees C			11/12/18 13:18	1

Client: Arizona Public Service Company Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-161850/2 **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 161850

	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			11/13/18 18:01	1
Fluoride	ND		0.40	mg/L			11/13/18 18:01	1
Sulfate	ND		2.0	mg/L			11/13/18 18:01	1

Lab Sample ID: LCS 550-161850/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161850** 

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	20.0	21.6		mg/L		108	90 - 110	
Fluoride	4.00	4.12		mg/L		103	90 - 110	
Sulfate	20.0	20.7		mg/L		104	90 - 110	

Lab Sample ID: LCSD 550-161850/6 **Client Sample ID: Lab Control Sample Dup Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161850** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	20.0	21.5		mg/L		108	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	1	20

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161850

	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	25	D1	20.0	45.9	D1	ma/l	_	102	80 120	-

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 161850

	Sample	Sample	Spike	MS	MS				%Rec.		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Chloride	1800	D2	4000	6300	D2	mg/L		112	80 - 120		-
Sulfate	12000	D2	4000	15900	D2	mg/L		88	80 - 120		

Lab Sample ID: 550-113007-1 MSD Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161850

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	25	D1	20.0	46.5	D1	mg/L		105	80 - 120	1	20

TestAmerica Phoenix

Project/Site: CCR

Client: Arizona Public Service Company

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-113007-1 MSD

Client Sample ID: FC-CCR-MW66-11218

Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161850** 

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	1800	D2	4000	6340	D2	mg/L		113	80 - 120	1	20	
Sulfate	12000	D2	4000	16000	D2	mg/L		91	80 - 120	1	20	

Lab Sample ID: MB 550-161852/1042

Client Sample ID: Method Blank
Matrix: Water

Prep Type: Total/NA

Analysis Batch: 161852

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chloride 2.0  $\overline{\mathsf{ND}}$ mg/L 11/14/18 06:17 Fluoride ND 0.40 mg/L 11/14/18 06:17 Sulfate ND 2.0 mg/L 11/14/18 06:17

Lab Sample ID: LCS 550-161852/73

Client Sample ID: Lab Control Sample Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161852** 

Spike LCS LCS %Rec. Analyte Added Result Qualifier Limits Unit D %Rec Chloride 20.0 21.5 107 90 - 110 mg/L Fluoride 4.00 4.16 mg/L 104 90 - 110 90 - 110 Sulfate 20.0 20.5 mg/L 103

Lab Sample ID: LCSD 550-161852/74

Client Sample ID: Lab Control Sample Dup
Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161852** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	20.0	21.4		mg/L		107	90 - 110	0	20
Fluoride	4.00	4.16		mg/L		104	90 - 110	0	20
Sulfate	20.0	20.5		mg/L		102	90 - 110	0	20

Lab Sample ID: 550-113012-A-1 MS ^2

Client Sample ID: Matrix Spike
Matrix: Water

Prep Type: Total/NA

Analysis Ratch: 1618

Analysis balch: 161652										
-	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	1.3	D1	8 00	9 67	D1	ma/L		104	80 - 120	

Lab Sample ID: 550-113012-A-1 MS ^200

Client Sample ID: Matrix Spike
Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161852** 

Sample Sample Spike MS MS %Rec. Result Qualifier Added Limits **Analyte** Result Qualifier Unit %Rec Chloride 800 D2 4000 5340 D2 mg/L 114 80 - 120 Sulfate 1200 D2 4000 5490 D2 mg/L 107 80 - 120

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Client: Arizona Public Service Company

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-113012-A-1 MSD ^2 **Client Sample ID: Matrix Spike Duplicate Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161852** Sample Sample Spike MSD MSD %Rec. RPD Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit 8.00 Fluoride 1.3 D1 9.79 D1 mg/L 106 80 - 120 20 Lab Sample ID: 550-113012-A-1 MSD ^200 Client Sample ID: Matrix Spike Duplicate **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161852** Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Result Qualifier Added Limits **RPD** Analyte Unit %Rec Limit Chloride 800 D2 4000 5310 D2 mg/L 113 80 - 120 20 Sulfate 1200 D2 4000 5460 D2 mg/L 107 80 - 12020 Lab Sample ID: 550-113026-B-1 MS ^200 Client Sample ID: Matrix Spike **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161852** MS MS %Rec. Sample Sample Spike Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Chloride 680 D2 4000 5160 D2 112 80 - 120 mg/L Sulfate 6100 D2 4000 10400 D2 108 mg/L 80 - 120Lab Sample ID: 550-113026-B-1 MS ^5 **Client Sample ID: Matrix Spike** 

**Matrix: Water** 

**Analysis Batch: 161852** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits ND D1 D5 20.0 Fluoride 20.9 D1 mg/L 102 80 - 120

Lab Sample ID: 550-113026-B-1 MSD ^200

**Matrix: Water** 

**Analysis Batch: 161852** 

MSD MSD %Rec. **RPD** Sample Sample Spike Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits RPD Limit Chloride 680 D2 4000 5200 D2 80 - 120 20 mg/L 113 Sulfate 6100 D2 4000 10400 D2 mg/L 110 80 - 120 20

Lab Sample ID: 550-113026-B-1 MSD ^5

**Matrix: Water** 

**Analysis Batch: 161852** 

Sample Sample Spike MSD MSD %Rec. **RPD** Analyte **Result Qualifier** Added Result Qualifier Unit D %Rec Limits RPD Limit Fluoride ND D1 D5 20.0 21.0 D1 mg/L 103 80 - 120

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-161450/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161972 Prep Batch: 161450** 

	IVID IVID						
Analyte	Result Qualifie	er RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND	0.050	mg/L	_	11/09/18 07:19	11/14/18 21:06	1
Calcium	ND	2.0	mg/L		11/09/18 07:19	11/14/18 21:06	1

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Page 18 of 47

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

**Client Sample ID: Matrix Spike Duplicate** 

**Client Sample ID: Matrix Spike Duplicate** 

Client: Arizona Public Service Company

Project/Site: CCR

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

Lab Sample ID: LCS 550-161450/2-A Matrix: Water Analysis Batch: 161972	Spike	1.00	LCS	Clie	nt Saı	mple ID	Prep Type: Total/NA Prep Batch: 161450 **Rec.
	<b>эріке</b>	LUS	LUS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	1.00	0.971		mg/L		97	85 - 115
Calcium	21.0	21.0		mg/L		100	85 - 115
Lah Sample ID: LCSD 550-161450/3-A				Cliont Sa	mnla	ID: Lak	o Control Sample Dun

Lab Sample ID: LCSD 550-161450/3-A			(	Jilent Sa	mpie	ID: Lar	Control	Sample	e Dup
Matrix: Water							Prep Typ	e: Tot	al/NA
Analysis Batch: 161972							Prep Ba	itch: 10	31450
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	0.949		mg/L		95	85 - 115	2	20
Calcium	21.0	21.1		mg/L		100	85 - 115	0	20

Lab Sample ID: 550-11300	7-1 MS					Client	t Sam	ple ID:	FC-CCR-MW66-11218
Matrix: Water									Prep Type: Total/NA
Analysis Batch: 161972									<b>Prep Batch: 161450</b>
_	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Calcium	470	M3	21.0	462	M3	mg/L		-45	70 - 130

Lab Sample ID: 550-11300	7-1 MS					Client	t Sam	ple ID:	FC-CCR-MW66-11218
Matrix: Water									Prep Type: Total/NA
Analysis Batch: 162061									<b>Prep Batch: 161450</b>
_	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	140	M3 D2	1.00	134	M3	ma/l		-514	70 - 130

Lab Sample ID: 550-11300	7-1 MSD					Clien	t Sam	ple ID:	FC-CCR-I	<b>viW66-</b> 1	11218
Matrix: Water									Prep Ty	pe: Tot	al/NA
Analysis Batch: 161972									Prep Ba	atch: 16	31450
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Calcium	470	M3	21.0	475	M3	mg/L		15	70 - 130	3	20

Lab Sample ID: 550-113007-1	MSD					Client	t Sam	ple ID:	FC-CCR-N	<b>NW66-</b> 1	11218
Matrix: Water									Prep Typ	e: Tot	al/NA
Analysis Batch: 162061									Prep Ba	itch: 16	61450
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	140	M3 D2	1.00	142	M3	mg/L		282	70 - 130	6	20

# Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-16139 Matrix: Water Analysis Batch: 161396	6/1						ple ID: Method Prep Type: To	
7 maryolo Batom 101000	МВ	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			11/08/18 12:33	1

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Client: Arizona Public Service Company

Project/Site: CCR

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 550-161396/2 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161396** 

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit D %Rec Limits **Total Dissolved Solids** 1000 974 mg/L 97 90 - 110

Lab Sample ID: LCSD 550-161396/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161396** 

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits Analyte **RPD** Limit Unit %Rec Total Dissolved Solids 1000 974 mg/L 97 90 - 110

Lab Sample ID: 550-113007-1 DU Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161396

Sample Sample DU DU **RPD** Result Qualifier Result Qualifier RPD Limit Analyte Unit Total Dissolved Solids 20000 D2 19000 D2 mg/L

Lab Sample ID: 550-113026-A-4 DU **Client Sample ID: Duplicate** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 161396** 

Sample Sample DU DU RPD Result Qualifier Result Qualifier Unit **RPD** Limit **Total Dissolved Solids** 6200 D2 6210 D2 0.5 mg/L 10

Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-161550/1 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161550** 

Spike LCSSRM LCSSRM %Rec. Analyte Added Result Qualifier Unit %Rec Limits 7.00 SU pН 7.0 99.6 98.5 - 101. 5

Lab Sample ID: LCSSRM 550-161550/12 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161550** 

Spike LCSSRM LCSSRM %Rec. **Analyte** Added Result Qualifier Unit %Rec Limits pH 7.00 7.0 SU 100.1 98.5 - 101. 5

Lab Sample ID: LCSSRM 550-161550/24 Client Sample ID: Lab Control Sample Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 161550** 

Spike LCSSRM LCSSRM %Rec. Added Result Qualifier Unit %Rec Limits Analyte SU рН 7.00 7.0 100.1 98.5 - 101. 5

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**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA

Client: Arizona Public Service Company

Project/Site: CCR

Method: SM 4500 H+ B - pH (Continued)

Lab Sample ID: 550-113007-1 DU Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 161550

	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
рН	7.3	H5	 7.3	H5	SU		 0.1	5
Temperature	9.6	H5	10.7	H5	Degrees C		11	

Lab Sample ID: 550-113007-11 DU Client Sample ID: FC-CCR-MW72-11318 **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 161550** 

	Sample	Sample	DU	DU				RPD	
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit	
рН	7.0	H5	 7.1	H5	SU	_	 0.7	5	
Temperature	14.8	H5	15.7	H5	Degrees C		6		

Lab Sample ID: LCSSRM 550-161638/1 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161638** 

LCSSRM LCSSRM Spike %Rec. Analyte Added Result Qualifier D %Rec Limits Unit pH 7.00 7.0 SU 100.3 98.5 - 101

Lab Sample ID: LCSSRM 550-161638/12

**Matrix: Water** 

**Analysis Batch: 161638** 

		Spike	LCSSRM	LCSSRM				%Rec.	
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	
рН	 	7.00	7.0		SU		100.3	98.5 - 101.	
								5	

**Client Sample ID: Duplicate** Lab Sample ID: 550-113012-A-1 DU Prep Type: Total/NA

**Matrix: Water** 

Analysis Ratch: 161638

Analysis Datch. 101030									
	Sample	Sample	DU	DU				RPD	
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit	
рН	9.7	H5	9.6	H5	SU		 0.4	5	
Temperature	10.2	H5	9.9	H5	Degrees C		3		

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Client: Arizona Public Service Company Project/Site: CCR

# HPLC/IC

**Analysis Batch: 161850** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	300.0	_
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	300.0	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	300.0	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	300.0	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	300.0	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	300.0	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	300.0	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	300.0	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	300.0	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	300.0	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	300.0	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	300.0	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	300.0	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	300.0	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	300.0	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	300.0	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	300.0	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	300.0	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	300.0	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	300.0	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	300.0	
MB 550-161850/2	Method Blank	Total/NA	Water	300.0	
LCS 550-161850/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-161850/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	300.0	

#### **Analysis Batch: 161852**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	300.0	<del>-</del>
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	300.0	
MB 550-161852/1042	Method Blank	Total/NA	Water	300.0	
LCS 550-161852/73	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-161852/74	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113012-A-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-113012-A-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-113012-A-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113012-A-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113026-B-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-113026-B-1 MS ^5	Matrix Spike	Total/NA	Water	300.0	
550-113026-B-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113026-B-1 MSD ^5	Matrix Spike Duplicate	Total/NA	Water	300.0	

Page 22 of 47

Client: Arizona Public Service Company Project/Site: CCR

**Metals** 

**Prep Batch: 161450** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	200.7	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	200.7	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	200.7	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	200.7	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.7	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.7	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.7	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.7	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.7	
MB 550-161450/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-161450/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-161450/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7	

**Analysis Batch: 161972** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.7 Rev 4.4	161450
MB 550-161450/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	161450
LCS 550-161450/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	161450
LCSD 550-161450/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450

**Analysis Batch: 162061** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

# **General Chemistry**

#### Analysis Batch: 161396

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	SM 2540C	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	SM 2540C	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	SM 2540C	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	SM 2540C	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	SM 2540C	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	SM 2540C	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	SM 2540C	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	SM 2540C	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	SM 2540C	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	SM 2540C	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	SM 2540C	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	SM 2540C	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	SM 2540C	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	SM 2540C	
MB 550-161396/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-161396/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-161396/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-113007-1 DU	FC-CCR-MW66-11218	Total/NA	Water	SM 2540C	
550-113026-A-4 DU	Duplicate	Total/NA	Water	SM 2540C	

#### Analysis Batch: 161550

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	SM 4500 H+ B	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161550/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161550/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161550/24	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-113007-1 DU	FC-CCR-MW66-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-11 DU	FC-CCR-MW72-11318	Total/NA	Water	SM 4500 H+ B	

#### **Analysis Batch: 161638**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161638/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161638/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-113012-A-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	

Page 24 of 47

Client: Arizona Public Service Company

Project/Site: CCR

Lab Sample ID: 550-113007-1

Client Sample ID: FC-CCR-MW66-11218 Date Collected: 11/02/18 13:28 Date Received: 11/07/18 13:00

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 19:33	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 19:51	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:27	ARE	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	162061	11/16/18 04:05	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396		YET	TAL PHX
					(Start) 1	1/08/18 12:33		
					(End) 1	1/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Lab Sample ID: 550-113007-2 Client Sample ID: FC-CCR-MW67-11318

Date Collected: 11/03/18 09:57 Date Received: 11/07/18 13:00

**Matrix: Water** 

Dran Tura	Batch	Batch Method	Dum	Dilution	Batch	Prepared	Amelyet	l ab
Prep Type Total/NA	Type Analysis	- <del>Metriod</del> - 300.0	Run	_	Number 161850	or Analyzed 11/13/18 21:23	Analyst NEL	Lab TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 21:42	NEL	TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	161450 161972	11/09/18 07:19 11/14/18 21:33		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		4	161450 162061	11/09/18 07:19 11/16/18 04:11		TAL PHX TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW68-11318 Lab Sample ID: 550-113007-3

Date Collected: 11/03/18 11:01 Date Received: 11/07/18 13:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 22:00	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 22:18	NEL	TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1		11/09/18 07:19 11/14/18 21:39		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		4	161450 162061	11/09/18 07:19 11/16/18 04:17		TAL PHX TAL PHX
Total/NA	Analysis	SM 2540C		1	()	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

TestAmerica Phoenix

11/26/2018

Page 25 of 47

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW69-11318

Lab Sample ID: 550-113007-4 Date Collected: 11/03/18 08:49 Matrix: Water

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 23:14	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 23:32	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:45	ARE	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	162061	11/16/18 04:22	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396 (Start) 1	4/00/40 40:22	YET	TAL PHX
					` ,	1/08/18 12:33 1/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW70-11218

Lab Sample ID: 550-113007-5 Date Collected: 11/02/18 15:32

**Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 23:50	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 00:09	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:51	ARE	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	162061	11/16/18 04:28	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396		YET	TAL PHX
					(Start) 1	1/08/18 12:33		
					(End) 1	1/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW62-11218

Lab Sample ID: 550-113007-6 Date Collected: 11/02/18 14:10 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 00:27	NEL	TAL PHX
Total/NA	Analysis	300.0		50	161850	11/14/18 00:46	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:57	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Page 26 of 47

Dilution

**Factor** 

50

1

1

Run

Batch

161396

(Start) 11/08/18 12:33 (End) 11/09/18 11:15

161550 11/09/18 16:54 MRR

Client: Arizona Public Service Company

Batch

Туре

Analysis

Analysis

Analysis

Analysis

Analysis

Prep

Client Sample ID: FC-CCR-MW63-112818

Batch

300.0

300.0

200.7

200.7 Rev 4.4

SM 4500 H+ B

SM 2540C

Method

Project/Site: CCR

**Prep Type** 

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

Lab Sample ID: 550-113007-7

Date Collected: 11/02/18 14:49 Date Received: 11/07/18 13:00

**Matrix: Water** 

**Prepared** Number or Analyzed Analyst Lab 161850 11/14/18 01:04 NEL TAL PHX 161850 11/14/18 01:22 NEL TAL PHX 161450 11/09/18 07:19 SGO TAL PHX 161972 11/14/18 22:02 ARE TAL PHX TAL PHX YET

TAL PHX

Client Sample ID: FC-CCR-MW64-11218

Lab Sample ID: 550-113007-8

**Matrix: Water** 

**Matrix: Water** 

Date Collected: 11/02/18 12:52 Date Received: 11/07/18 13:00

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 01:41	NEL	TAL PHX
Total/NA	Analysis	300.0		50	161850	11/14/18 01:59	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:08	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	(/	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW65-11218

Lab Sample ID: 550-113007-9 Date Collected: 11/02/18 12:08

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 02:54	NEL	TAL PHX
Total/NA	Analysis	300.0		20	161850	11/14/18 03:13	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:11	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

TestAmerica Phoenix

Project/Site: CCR

Client Sample ID: FC-CCR-MW71-11318 Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

Client: Arizona Public Service Company

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/14/18 03:31	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 03:50	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:14	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	(/	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Lab Sample ID: 550-113007-11 Client Sample ID: FC-CCR-MW72-11318

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:08	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 04:26	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:25	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	(/	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW73-11318

Lab Sample ID: 550-113007-12 Date Collected: 11/03/18 13:24 Matrix: Water

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:45	NEL	TAL PHX
Total/NA	Analysis	300.0		100	161850	11/14/18 05:03	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:31	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

#### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-13

Client Sample ID: FC-CCR-FD01-11318 Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	161850	11/14/18 05:22	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 05:40	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:37	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396		YET	TAL PHX
					(Start) 1	1/08/18 12:33		
					(End) 1	1/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

Client Sample ID: FC-CCR-FD02-11318 Lab Sample ID: 550-113007-14

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161852	11/14/18 06:35	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161852	11/14/18 06:54	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:43	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	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: 550-113007-1

#### **Laboratory: TestAmerica Phoenix**

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

Authority	Program	<b>EPA</b> Region	Identification Number	<b>Expiration Date</b>
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: 550-113007-1

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	рН	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

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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: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW66-11218 (550-113007-1)	2.0 ± 0.3	$0.9 \pm 0.3$	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



3245 N. WASHINGTON ST. \* CHANDLER, ARIZONA 85225-1121 Website: www.redsafe.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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW67-11318 (550-113007-2)	$0.8 \pm 0.2$	$0.8 \pm 0.3$	1.6 ± 0.4

		1	
Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Jeremy Russell, BSE

11/21/2018 Date



3245 N. WASHINGTON ST. \* CHANDLER, ARIZONA 85225-1121 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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

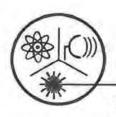
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW68-11318 (550-113007-3)	$0.6 \pm 0.2$	$1.3 \pm 0.3$	1.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date

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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW69-11318 (550-113007-4)	1.7 ± 0.2	1.3 ± 0.3	3.0 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW70-11218 (550-113007-5)	$0.7 \pm 0.2$	< 0.7	$0.7 \pm 0.2$

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date

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Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW71-11318 (550-113007-10)	1.2 ± 0.2	< 0.7	$1.2 \pm 0.2$

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Date of Ana	lysis	11/9/2018	11/9/2018	11/9/2018
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11/21/2018

Jeremy Russell, BSE

Date

(480) 897-9459 FAX (480) 892-5446

# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

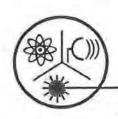
Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW72-11318 (550-113007-11)	0.7 ± 0.2	$1.0 \pm 0.3$	1.7 ± 0.4

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Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW73-11318 (550-113007-12)	1.5 ± 0.2	1.4 ± 0.3	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD01-11318 (550-113007-13)	1.8 ± 0.2	< 0.7	1.8 ± 0.2

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.redsafe.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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD02-11318 (550-113007-14)	0.5 ± 0.2	1.5 ± 0.3	2.0 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date

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The control of the	Company. Radiation Safety Eng., Inc.					Accreditations Re	ericaino Com	Anzona		Page 1 of 2 Job #.	
10   10   10   10   10   10   10   10	Address: 3245 North Washington Street,	Due Data Request	:pe			State Program	n - Arizona			550-113007-1 Preservation Code	
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Sample Dire Service   Sample Dire Service	ojeci Name. CR.	Project #. 55009706			T	N 10 1				J - DI Water K - EDTA	V-MCAA W-pH4-5
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V73-11318 (550-113007-11) ★ U D Lo 7 11/3/18 V73-11318 (550-113007-12) ★ U D Lo 8 11/3/18 O1-11318 (550-113007-13) ★ U D Lo 9 11/3/18 O1-11318 (550-113007-13) ★ U D Lo 9 11/3/18 O1-11318 (550-113007-13) ★ U D Lo 9 11/3/18 O1-11318 (550-113007-13) ★ U D Lo 9 11/3/18 Catentian immediately if all requested accreditations are current to date, return to take, return to take the properties of			11:45		Water	×				_	
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Client Contact: Shipping/Receiving	Phone:			E-Mail	9	The second second	State of Origin:	Sinc	550-22780.2 Page	
Company. Radiation Safety Eng., Inc.					Accreditations Chate Depart	Accreditations Required (See note):	Anzona		Page 2 of 2 Job #:	
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# TestAmerica Phoenix

Phoenix, AZ 8: 4645 E Cotton

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3340 fax 623 445.6192	110001			TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway Site Contact: Doug Lavarnway	Site Contact: Doug Lavarnway	Date: 11/7/2018	COC No:
orners	Tel/Fax: 928-288-1394	Lab Contact: Ken Baker	Carrier:	1 of1 COCs
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# TestAmerica Phoenix

4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

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phone 602 437 3340 fax 623 445 6192													TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway	ager: Dou	ıg Lavarı	nway	S	00	ntac	2	5	Site Contact: Doug Lavarnway	Date:	11/7/2018	COC No.
APS Four Corners	Tel/Fax: 928-587-0319	87-0319	¢		E	Lab Contact: Ken Baker	ntac	# K	n Ba				
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E-Mail Address:		2 days	VS.			MSC	_	Co,	228				
		1 day	Α.		mple	AS/I	_	Ba,	-	(6)	-		
Sample Identification	Sample S Date	Sample S Time	Sample Type N	# of Matrix Cont.	Filtered Sa	Perform M	EPA 200.7	200.8 (As	Radium 2	EPA 300.0			Sample Specific Notes:
FC-CCR-MW66-11218 - 01	11/2/2018	1328	ရ	¥ 4	z		×	×	×				
FC-CCR-MW67-11318 - 02	11/3/2018	957	G	¥ 4	z		×	×	×				
FC-CCR-MW68-11318 -03	11/3/2018	1101	G	W 4	z	L	×	×	×				
FC-CCR-MW69-11318 - 54	11/3/18	849	G	W 4	z		×	×	×				
FC-CCR-MW70-11218 ~OS	11/2/18	1532	G	W 4	z		×	×	×				
FC-CCR-MW71-11318 -10	11/3/18	1145	G	W 4	z	100	×	×	×				
FC-CCR-MW72-11318 - (1	11/3/18	1231	G	W 4	z		×	×	×				
FC-CCR-MW73-11318 - (2)	11/3/18	1324	G	W 4	z	×	×	×	×				
FC-CCR-FD01-11318 -13	11/3/18	1145	G	W 4	z		×	×	×				
FC-CCR-FD02-11318 -(Y	11/3/18	1231	G	¥	z		×	×	×				
Preservation	NO3: S=NaOH: 6=	Other			$\vdash$				1				
Possible Hazard Identification  Non-Hazard Flammable Skin	Skin Irritant Po	PolsmiB	Unknown	nown		San	□ <sub>R</sub>	Dis	oosa 7 To	le Disposal ( A fee may be a	isposa	assessed if samples are reta  Disposal By Lab  Arc	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client Disposal By Lab Archive For Months
tions/QC Requirements & vith collision cell ed by Radiation Safety						1				5	100	28	9
Relinquished by Lavaran	Company	50	20	Date/Time	20	Rec	Received by	/A	0	Connes		Company Post	Date/Inne/18 8:05 a
Relinquished by	Company		d	Date/Time:	\	Rec	Received by	)v.		0		Company	Date/Time
Relinquished by:	Company,		A	Date/Time		Rec	Received by	N	0			Company HHX	Days/Time 130>

Client: Arizona Public Service Company

Job Number: 550-113007-1

Login Number: 113007 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.</td <td>True</td> <td>Common</td>	True	Common
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.



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: 550-113007-2

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 11/27/2018 7:47:31 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	9
QC Sample Results	13
QC Association Summary	16
Lab Chronicle	18
Certification Summary	21
Method Summary	22
Subcontract Data	23
Chain of Custody	35
Receipt Checklists	38

11

14

14

15

#### **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

#### **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.
Motolo	

#### Metals

Metals	
Qualifier	Qualifier Description
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
V1	CCV recovery was above method acceptance limits. This target analyte was not detected in the sample.

#### Glossary

RER

RPD TEF

**TEQ** 

RL

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

Abbreviation	These commonly used abbreviations may or may not be present in this report.
a	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

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#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

Job ID: 550-113007-2

Laboratory: TestAmerica Phoenix

**Narrative** 

Job Narrative 550-113007-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.9° C, 3.0° C and 3.8° C.

#### **Receipt Exceptions**

Received 3 pages of COCs from the courier.

Samples #6 - #9 only request Appendix I.

All of the other samples request Appendix I and II.

Client did provide sample containers if Appendix II is needed.

 $FC-CCR-MW62-11218 \ (550-113007-6), \ FC-CCR-MW63-112818 \ (550-113007-7), \ FC-CCR-MW64-11218 \ (550-113007-8) \ and \ FC-CCR-MW65-11218 \ (550-113007-9)$ 

#### 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: FC-CCR-MW71-11318 (550-113007-10), FC-CCR-MW72-11318 (550-113007-11), FC-CCR-MW73-11318 (550-113007-12) and FC-CCR-FD01-11318 (550-113007-13). This analyte was not detected in the diluted samples. 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: FC-CCR-FD02-11318 (550-113007-14). This analyte was not detected in the diluted samples. 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.

#### 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.

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IR

TestAmerica Phoenix 11/27/2018

# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-113007-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-113007-1	FC-CCR-MW66-11218	Water	11/02/18 13:28	11/07/18 13:00
550-113007-2	FC-CCR-MW67-11318	Water	11/03/18 09:57	11/07/18 13:00
550-113007-3	FC-CCR-MW68-11318	Water	11/03/18 11:01	11/07/18 13:00
550-113007-4	FC-CCR-MW69-11318	Water	11/03/18 08:49	11/07/18 13:00
550-113007-5	FC-CCR-MW70-11218	Water	11/02/18 15:32	11/07/18 13:00
550-113007-10	FC-CCR-MW71-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-11	FC-CCR-MW72-11318	Water	11/03/18 12:31	11/07/18 13:00
550-113007-12	FC-CCR-MW73-11318	Water	11/03/18 13:24	11/07/18 13:00
550-113007-13	FC-CCR-FD01-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-14	FC-CCR-FD02-11318	Water	11/03/18 12:31	11/07/18 13:00

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218 Lab Sample ID: 550-113007-1

Analyte	Result C	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	25 [	D1 -	2.0	mg/L		300.0	Total/NA
Lithium	0.38		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0015		0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.023		0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.012		0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.019		0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0020 N	M1	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.0011		0.00010	mg/L	1	200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW67-11318

Lab Sample ID: 550-113007-2

Analyte	Result C	Qualifier RL	. Unit	Dil Fac	D	Method	Prep Type
Fluoride	16	01 2.0	mg/L	5	_	300.0	Total/NA
Lithium	0.39	0.20	) mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0016	0.00050	) mg/L	1		200.8 LL	Total/NA
Barium	0.017	0.00050	) mg/L	1		200.8 LL	Total/NA
Cobalt	0.0061	0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.037	0.00050	) mg/L	1		200.8 LL	Total/NA
Selenium	0.0043	0.00050	) mg/L	1		200.8 LL	Total/NA
Thallium	0.00078	0.00010	) mg/L	1		200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW68-11318

Lab Sample ID: 550-113007-3

Analyte	Result Qua	alifier RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	12 D1	2.0	mg/L		300.0	Total/NA
Lithium	0.42	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0030	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0081	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0038	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.0078	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.11	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.0016	0.00010	ma/L	1	200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW69-11318

Analyte Result Qualifier RL Unit Dil Fac D Method **Prep Type** Total/NA Fluoride 11 D1 2.0 mg/L 5 300.0 Lithium 0.35 0.20 mg/L 1 200.7 Rev 4.4 Total/NA Arsenic 0.0042 0.00050 mg/L 1 200.8 LL Total/NA Barium 0.012 0.00050 mg/L 200.8 LL Total/NA Cobalt 0.0041 0.00050 mg/L 200.8 LL Total/NA Molybdenum 0.012 0.00050 mg/L 200.8 LL Total/NA Selenium 0.025 0.00050 mg/L 200.8 LL Total/NA Thallium 200.8 LL 0.00024 0.00010 mg/L Total/NA

Client Sample ID: FC-CCR-MW70-11218

Analyte	Result	Qualifier RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	2.7	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

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

11/27/2018

Lab Sample ID: 550-113007-4

Lab Sample ID: 550-113007-5

Page 6 of 38

TestAmerica Job ID: 550-113007-2

Lab Sample ID: 550-113007-10

200.8 LL

Lab Sample ID: 550-113007-11

Lab Sample ID: 550-113007-12

Lab Sample ID: 550-113007-13

Client: Arizona Public Service Company

Project/Site: CCR

Thallium

Client Sample ID: FC-CCR-MW70-11218 (Continued) Lab Sample ID: 550-113007-5

Analyte	Result Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Arsenic	0.0043	0.00050	mg/L		200.8 LL	Total/NA
Barium	0.010	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0041	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.0064	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.19	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00029	0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW71-11318

Analyte	Result Q	ualifier RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.35	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0046	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0098	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.00079	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.27	0.00050	ma/l	1	200 8 1 1	Total/NA

0.00010

mg/L

#### Client Sample ID: FC-CCR-MW72-11318

0.00031

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.37	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0031	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0075	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0020	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.00078	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.13	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00088	0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW73-11318

Analyte	Result (	Qualifier	RL	Unit	Dil Fac I	O Method	Prep Type
Lithium	0.31		0.20	mg/L		200.7 Rev 4.4	Total/NA
Barium	0.022		0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0078		0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.0026		0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0062		0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00020		0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-FD01-11318

Analyte	Result Qualifie	r RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.34	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0068	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0095	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.00065	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.31	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00030	0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-FD02-11318

Lab Sample ID: 550-113007-14

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

11/27/2018

Page 7 of 38

Total/NA

#### **Detection Summary**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-FD02-11318 (Continued)

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

#### Lab Sample ID: 550-113007-14

Analyte	Result Qualifie	r RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.37	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0026	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0075	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0020	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.00078	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.15	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00087	0.00010	mg/L	1	200.8 LL	Total/NA

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This Detection Summary does not include radiochemical test results.

**Matrix: Water** 

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218 Lab Sample ID: 550-113007-1

Date Collected: 11/02/18 13:28 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Cl	hromatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

**Fluoride** 2.0 mg/L 11/13/18 19:33 25 D1

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium 0.20 mg/L 11/09/18 07:19 11/14/18 21:27 0.38

Method: 200.8 LL - Metals (ICP/MS)

Mictilod. 200.0 LL - Micti							
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0015	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Barium	0.023	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Cobalt	0.012	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Molybdenum	0.019	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Selenium	0.0020 M1	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Thallium	0.0011	0.00010	mg/L		11/11/18 11:26	11/12/18 20:39	1
_							

Client Sample ID: FC-CCR-MW67-11318 Lab Sample ID: 550-113007-2 Matrix: Water

Date Collected: 11/03/18 09:57 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography									
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
Fluoride	16	D1	2.0	mg/L			11/13/18 21:23	5	

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium 0.39 0.20 mg/L 11/09/18 07:19 11/14/18 21:33

Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0016	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Barium	0.017	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Cobalt	0.0061	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Molybdenum	0.037	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Selenium	0.0043	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Thallium	0.00078	0.00010	mg/L		11/11/18 11:26	11/12/18 20:48	1

Lab Sample ID: 550-113007-3 Client Sample ID: FC-CCR-MW68-11318 Date Collected: 11/03/18 11:01 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anio Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	12	D1 -	2.0	mg/L			11/13/18 22:00	- 5
Method: 200.7 Rev 4	.4 - Metals (ICP)							
Analyte	• • • • • • • • • • • • • • • • • • • •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.42		0.20	mg/L		11/00/110 07 10	11/14/18 21:39	

Method: 200.8 LL - Metals (ICP/MS) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac **Arsenic** 0.0030 0.00050 mg/L 11/11/18 11:26 11/12/18 20:50

TestAmerica Phoenix

Page 9 of 38

11/27/2018

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW68-11318 Lab Sample ID: 550-113007-3

Date Collected: 11/03/18 11:01 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 200.8 LL - Meta	ils (ICP/MS) (Continued)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0081	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Cobalt	0.0038	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Molybdenum	0.0078	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Selenium	0.11	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Thallium	0.0016	0.00010	mg/L		11/11/18 11:26	11/12/18 20:50	1

Client Sample ID: FC-CCR-MW69-11318 Lab Sample ID: 550-113007-4 Date Collected: 11/03/18 08:49 **Matrix: Water** 

Date	Conected.	11/03/10 00.43
<b>Date</b>	Received:	11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography									
	Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Fluoride	11	D1	2.0	mg/L			11/13/18 23:14	5

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		11/09/18 07:19	11/14/18 21:45	1

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0042	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Barium	0.012	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Cobalt	0.0041	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Molybdenum	0.012	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Selenium	0.025	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Thallium	0.00024	0.00010	mg/L		11/11/18 11:26	11/12/18 20:53	1

Lab Sample ID: 550-113007-5 Client Sample ID: FC-CCR-MW70-11218 **Matrix: Water** 

Date Collected: 11/02/18 15:32 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.7	D1	0.80	mg/L			11/13/18 23:50	2
<del>-</del>								

Method: 200.7 Rev 4.4 - Metals	(ICP)						
Analyte	Result Qual	alifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.32	0.20	mg/L		11/09/18 07:19	11/14/18 21:51	1

Method: 200.8 LL - Meta	nis (ICP/MS)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0043	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Barium	0.010	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Cobalt	0.0041	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Molybdenum	0.0064	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Selenium	0.19	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Thallium	0.00029	0.00010	mg/L		11/11/18 11:26	11/12/18 20:46	1

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW71-11318 Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

**Matrix: Water** 

**Matrix: Water** 

Method: 300.0 - Anions, Ion Ch	romatograp	hy						
Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND D	D1 D5	2.0	mg/L			11/14/18 03:31	5

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium 0.20 mg/L 11/09/18 07:19 11/14/18 22:14 0.35

Method: 200.8 LL - Metals (IC	P/MS)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0046	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Barium	0.0098	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Cobalt	ND	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Molybdenum	0.00079	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Selenium	0.27	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Thallium	0.00031	0.00010	mg/L		11/11/18 11:26	11/12/18 20:55	1

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

Date Collected: 11/03/18 12:31 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Cl	hromatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND D1 D5	2.0	mg/L			11/14/18 04:08	5

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		11/09/18 07:19	11/14/18 22:25	1

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0031	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Barium	0.0075	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Cobalt	0.0020	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Molybdenum	0.00078	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Selenium	0.13	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Thallium	0.00088	0.00010	mg/L		11/11/18 11:26	11/12/18 20:57	1

Client Sample ID: FC-CCR-MW73-11318 Lab Sample ID: 550-113007-12 **Matrix: Water** 

Date Collected: 11/03/18 13:24 Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 04:45	- /
-								
Method: 200.7 Rev 4	.4 - Metals (ICP)							
Method: 200.7 Rev 4. Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa

Method: 200.8 LL - Metals (ICP/	IVIS)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	V1	0.00050	mg/L	_	11/11/18 11:26	11/12/18 21:07	1

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW73-11318 Lab Sample ID: 550-113007-12

Date Collected: 11/03/18 13:24 Date Received: 11/07/18 13:00

**Matrix: Water** 

Method: 200.8 LL - Metals (	(ICP/MS) (Continued)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.022	0.00050	mg/L		11/11/18 11:26	11/12/18 21:07	1
Cobalt	0.0078	0.00050	mg/L		11/11/18 11:26	11/12/18 21:07	1
Molybdenum	0.0026	0.00050	mg/L		11/11/18 11:26	11/12/18 21:07	1
Selenium	0.0062	0.00050	mg/L		11/11/18 11:26	11/14/18 21:16	1
Thallium	0.00020	0.00010	mg/L		11/11/18 11:26	11/12/18 21:07	1

Client Sample ID: FC-CCR-FD01-11318 Lab Sample ID: 550-113007-13 **Matrix: Water** 

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chro	matogra	ıphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 05:22	2

Method: 200.7 Rev 4.4 - Metals (ICP)										
	Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac		
	Lithium	0.34	0.20	mg/L		11/09/18 07:19	11/14/18 22:37	1		

Analyte	Result Q	Qualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0068	0.00050	mg/L		11/11/18 11:26	11/14/18 21:18	1
Barium	0.0095	0.00050	mg/L		11/11/18 11:26	11/12/18 21:09	1
Cobalt	ND	0.00050	mg/L		11/11/18 11:26	11/12/18 21:09	1
Molybdenum	0.00065	0.00050	mg/L		11/11/18 11:26	11/12/18 21:09	1
Selenium	0.31	0.00050	mg/L		11/11/18 11:26	11/14/18 21:18	1
Thallium	0.00030	0.00010	mg/L		11/11/18 11:26	11/12/18 21:09	1

Lab Sample ID: 550-113007-14 Client Sample ID: FC-CCR-FD02-11318 Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography									
	Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
	Fluoride	ND D1 D5	2.0	mg/L			11/14/18 06:35	5	

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		11/09/18 07:19	11/14/18 22:43	1

Method: 200.8 LL - Me Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0026	0.00050	mg/L		11/11/18 11:26	11/14/18 21:20	1
Barium	0.0075	0.00050	mg/L		11/11/18 11:26	11/12/18 21:11	1
Cobalt	0.0020	0.00050	mg/L		11/11/18 11:26	11/12/18 21:11	1
Molybdenum	0.00078	0.00050	mg/L		11/11/18 11:26	11/12/18 21:11	1
Selenium	0.15	0.00050	mg/L		11/11/18 11:26	11/14/18 21:20	1
Thallium	0.00087	0.00010	mg/L		11/11/18 11:26	11/12/18 21:11	1

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161850** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits 20.0 Fluoride 25 45.9 D1 mg/L 102 80 - 120

Lab Sample ID: 550-113007-1 MSD Client Sample ID: FC-CCR-MW66-11218 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 161850

7 manyolo Zatom 101000	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	25		20.0	46.5	D1	mg/L		105	80 - 120	1	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161972 Prep Batch: 161450** Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit Limits Lithium 1.00 107 70 - 130 0.378 1.45 mg/L

Lab Sample ID: 550-113007-1 MSD Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161972 Prep Batch: 161450** 

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier Limits Limit Analyte Unit %Rec **RPD** Lithium 0.378 1.00 1.42 mg/L 105 70 - 130 20

Method: 200.8 LL - Metals (ICP/MS)

Lab Sample ID: MB 550-161588/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161708 Prep Batch: 161588** 

MB MB Analyte Result Qualifier RI Unit D Prepared Analyzed Dil Fac 11/11/18 11:26 11/12/18 20:32 Antimony ND 0.0010 mg/L Arsenic ND 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 Barium ND 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 Cadmium ND 0.00010 mg/L 11/11/18 11:26 11/12/18 20:32 Chromium ND 0.0010 11/11/18 11:26 11/12/18 20:32 mg/L 11/11/18 11:26 11/12/18 20:32 Cobalt ND 0.00050 mq/L ND Lead 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 ND 0.00050 11/11/18 11:26 11/12/18 20:32 Molybdenum mg/L ND Selenium 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 Thallium ND 0.00010 mg/L 11/11/18 11:26 11/12/18 20:32

Lab Sample ID: LCS 550-161588/2-A Client Sample ID: Lab Control Sample **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161708 Prep Batch: 161588** LCS LCS Spike %Rec.

Added Result Qualifier Limits Analyte Unit D %Rec Antimony 0.100 0.0999 mg/L 100 85 - 115

TestAmerica Phoenix

Page 13 of 38

11/27/2018

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company

Project/Site: CCR

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

Lab Sample ID: LCS 550-161588/2-A	Client Sample ID: Lab Control Sample							
Matrix: Water	latrix: Water						Prep Type: Total/NA	
Analysis Batch: 161708							<b>Prep Batch: 161588</b>	
	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Arsenic	0.100	0.0962		mg/L		96	85 - 115	
Barium	0.100	0.0076		ma/l		08	85 115	

	Spike	LUS	LUS				MREC.	
Analyte	Added	Result (	Qualifier	Unit	D	%Rec	Limits	
Arsenic	0.100	0.0962		mg/L		96	85 - 115	
Barium	0.100	0.0976		mg/L		98	85 <sub>-</sub> 115	
Cadmium	0.100	0.0974		mg/L		97	85 - 115	
Chromium	0.100	0.0960		mg/L		96	85 - 115	
Cobalt	0.100	0.0962		mg/L		96	85 <sub>-</sub> 115	
Lead	0.100	0.0971		mg/L		97	85 - 115	
Molybdenum	0.100	0.0970		mg/L		97	85 <sub>-</sub> 115	
Selenium	0.100	0.0975		mg/L		98	85 <sub>-</sub> 115	
Thallium	0.100	0.0974		mg/L		97	85 - 115	

Lab Sample ID: LCSD 550-161588/3-A **Client Sample ID: Lab Control Sample Dup Matrix: Water** Prep Type: Total/NA

Arsenic

Analysis Batch: 161708							Prep Ba	itch: 16	<b>61588</b>
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.0991		mg/L		99	85 - 115	1	20
Arsenic	0.100	0.0965		mg/L		96	85 - 115	0	20
Barium	0.100	0.0956		mg/L		96	85 - 115	2	20
Cadmium	0.100	0.0967		mg/L		97	85 - 115	1	20
Chromium	0.100	0.0963		mg/L		96	85 - 115	0	20
Cobalt	0.100	0.0964		mg/L		96	85 - 115	0	20
Lead	0.100	0.0971		mg/L		97	85 - 115	0	20
Molybdenum	0.100	0.0964		mg/L		96	85 - 115	1	20
Selenium	0.100	0.0981		mg/L		98	85 - 115	1	20
Thallium	0.100	0.0973		mg/L		97	85 - 115	0	20

Lab Sample ID: 550-11300	7-1 MS	Clie	nt Sample ID: FC-CCR-MW66-11218
Matrix: Water			Prep Type: Total/NA
Analysis Batch: 161708			Prep Batch: 161588

Alialysis Balcii. 101700	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	ND		0.100	0.0997		mg/L		99	70 - 130
Arsenic	0.0015		0.100	0.112		mg/L		110	70 - 130
Barium	0.023		0.100	0.122		mg/L		100	70 - 130
Cadmium	ND		0.100	0.0891		mg/L		89	70 - 130
Chromium	0.0017		0.100	0.103		mg/L		102	70 - 130
Cobalt	0.012		0.100	0.103		mg/L		91	70 - 130
Lead	ND		0.100	0.0860		mg/L		86	70 - 130
Molybdenum	0.019		0.100	0.120		mg/L		102	70 - 130
Selenium	0.0020	M1	0.100	0.139	M1	mg/L		137	70 - 130
Thallium	0.0011		0.100	0.0886		mg/L		87	70 <sub>-</sub> 130

Lab Sample ID: 550-113007-1 MSD  Matrix: Water  Client Sa									ple ID:	FC-CCR-I		
	Analysis Batch: 161708	Sample	Sample	Spike	MSD	MSD				Prep Ba %Rec.	itch: 16	61588 RPD
	Analyte Antimony	Result ND	Qualifier	Added 0.100	<b>Result</b> 0.0982	Qualifier	Unit mg/L	D	% <b>Rec</b> 98	70 - 130	<b>RPD</b> 1	Limit 20

0.100

0.0015

Page 14 of 38

0.108

mg/L

106

70 - 130

11/27/2018

20

#### **QC Sample Results**

MSD MSD

0.120

0.0866

0.100

0.101

0.0843

0.118

0.0867

0.139 M1

Result Qualifier

Unit

mg/L

mg/L

mg/L

mg/L

mg/L

mg/L

mg/L

mg/L

Spike

Added

0.100

0.100

0.100

0.100

0.100

0.100

0.100

0.100

Client: Arizona Public Service Company

Lab Sample ID: 550-113007-1 MSD

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

Sample Sample

0.023

0.0017

0.012

0.019

0.0011

ND

0.0020 M1

ND

Result Qualifier

Project/Site: CCR

**Matrix: Water** 

Analyte

Barium

Cobalt

Lead

Cadmium

Chromium

Molybdenum

Selenium

Thallium

**Analysis Batch: 161708** 

TestAmerica Job ID: 550-113007-2

# Client Sample ID: FC-CCR-MW66-11218

84

99

137

86

**Prep Type: Total/NA** 

		Prep Batch: 161588 %Rec. RPD			
D	%Rec	Limits	RPD	Limit	
	97	70 - 130	2	20	
	87	70 - 130	3	20	
	98	70 - 130	3	20	
	88	70 - 130	2	20	

70 - 130

70 - 130

70 - 130

70 - 130

2

2

0 2

20

20

20

20

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company

Project/Site: CCR

#### HPLC/IC

#### **Analysis Batch: 161850**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	300.0	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	300.0	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	300.0	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	300.0	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	300.0	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	300.0	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	300.0	

#### **Analysis Batch: 161852**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	300.0	

#### **Metals**

#### **Prep Batch: 161450**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.7	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.7	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.7	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.7	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.7	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7	

#### **Prep Batch: 161588**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.8	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.8	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.8	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.8	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.8	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.8	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.8	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.8	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.8	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.8	
MB 550-161588/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-161588/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-161588/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.8	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.8	

TestAmerica Phoenix

11/27/2018

Page 16 of 38

## **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

## **Metals (Continued)**

## **Analysis Batch: 161708**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.8 LL	161588
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.8 LL	161588
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.8 LL	161588
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.8 LL	161588
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.8 LL	161588
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.8 LL	161588
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.8 LL	161588
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.8 LL	161588
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.8 LL	161588
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.8 LL	161588
MB 550-161588/1-A	Method Blank	Total/NA	Water	200.8 LL	161588
LCS 550-161588/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	161588
LCSD 550-161588/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	161588
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.8 LL	161588
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.8 LL	161588

## **Analysis Batch: 161944**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.8 LL	161588
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.8 LL	161588
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.8 LL	161588

## **Analysis Batch: 161972**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450

Page 17 of 38

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218

Date Collected: 11/02/18 13:28 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113007-1

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 19:33	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:27	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:39	SLS	TAL PHX

Lab Sample ID: 550-113007-2 Client Sample ID: FC-CCR-MW67-11318

Date Collected: 11/03/18 09:57

Date Received: 11/07/18 13:00

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 21:23	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:33	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:48	SLS	TAL PHX

Client Sample ID: FC-CCR-MW68-11318

Date Collected: 11/03/18 11:01

Date Received: 11/07/18 13:00

ab	Sample	:טו	550-113007-3	
			Matrix: Water	

Matrix: Water

**Matrix: Water** 

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 22:00	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:39	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:50	SLS	TAL PHX

Client Sample ID: FC-CCR-MW69-11318 Lab Sample ID: 550-113007-4

Date Collected: 11/03/18 08:49

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 23:14	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:45	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:53	SLS	TAL PHX

TestAmerica Phoenix

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW70-11218

Date Collected: 11/02/18 15:32

Lab Sample ID: 550-113007-5 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 23:50	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:51	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:46	SLS	TAL PHX

Lab Sample ID: 550-113007-10 Client Sample ID: FC-CCR-MW71-11318

Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 03:31	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:14	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:55	SLS	TAL PHX

Client Sample ID: FC-CCR-MW72-11318

Lab Sample ID: 550-113007-11

Date Collected: 11/03/18 12:31 **Matrix: Water** Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:08	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:25	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:57	SLS	TAL PHX

Lab Sample ID: 550-113007-12 Client Sample ID: FC-CCR-MW73-11318

Date Collected: 11/03/18 13:24 **Matrix: Water** Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:45	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:31	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 21:07	SLS	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161944	11/14/18 21:16	TEK	TAL PHX

TestAmerica Phoenix

Page 19 of 38

## **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

Lab Sample ID: 550-113007-13

Client Sample ID: FC-CCR-FD01-11318 Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	161850	11/14/18 05:22	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:37	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 21:09	SLS	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161944	11/14/18 21:18	TEK	TAL PHX

Lab Sample ID: 550-113007-14 Client Sample ID: FC-CCR-FD02-11318

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161852	11/14/18 06:35	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:43	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 21:11	SLS	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161944	11/14/18 21:20	TEK	TAL PHX

## **Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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: 550-113007-2

## **Laboratory: TestAmerica Phoenix**

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

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

16

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9

11

12

14

## **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

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
Subcontract	Radium 226/228	None	Radiation
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.

None = None

## **Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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

TestAmerica Phoenix



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(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: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW66-11218 (550-113007-1)	2.0 ± 0.3	$0.9 \pm 0.3$	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW67-11318 (550-113007-2)	$0.8 \pm 0.2$	$0.8 \pm 0.3$	1.6 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date

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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW68-11318 (550-113007-3)	$0.6 \pm 0.2$	1.3 ± 0.3	1.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

11/21/2018

Jeremy Russell, BSE

Date

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(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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

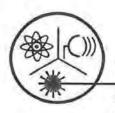
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW69-11318 (550-113007-4)	1.7 ± 0.2	1.3 ± 0.3	3.0 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

11/21/2018

Jeremy Russell, BSE

Date



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW70-11218 (550-113007-5)	$0.7 \pm 0.2$	< 0.7	$0.7 \pm 0.2$

Date of Analysis	2018 11/9/2018	11/9/2018
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11/21/2018

Jeremy Russell, BSE

Date



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW71-11318 (550-113007-10)	1.2 ± 0.2	< 0.7	$1.2 \pm 0.2$

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
Ed. (a) 21. over (*)046		The second section is a second section of the second section is a second section in the section is a section in the section in the section is a section in the section in the section is a section in the section in the section is a section in the section in the section is a section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the	20.000

Jeremy Russell, BSE

11/21/2018 Date



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## Radiochemical Activity in Water (pCi/L)

**TestAmerica** 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW72-11318 (550-113007-11)	$0.7 \pm 0.2$	$1.0 \pm 0.3$	$1.7 \pm 0.4$

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Jeremy Russell, BSE

11/21/2018 Date



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

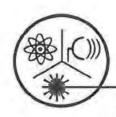
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW73-11318 (550-113007-12)	1.5 ± 0.2	$1.4 \pm 0.3$	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

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11/21/2018

Date



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD01-11318 (550-113007-13)	1.8 ± 0.2	< 0.7	1.8 ± 0.2

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Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Jeremy Russell, BSE

11/21/2018 Date

160



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD02-11318 (550-113007-14)	0.5 ± 0.2	1.5 ± 0.3	2.0 ± 0.4

Date of Analysis 11/9/20	018 11/9/2018	8 11/9/2013

11/21/2018

Jeremy Russell, BSE

Date

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Protection   Pro	State of Origin:	550-22780.1 Page:
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Property	Analysis Requested	
Final #   Fina	8 - Nac C - Zh	B - NaOH N - None C - Zn Acetste O - AsnaO2 D - Nitric And D - NaOAce
Project Name:   Project Name	E - Nah	
Sample   Identification - Client ID (Lab ID)   Sample   Date   Sample   Identification - Client ID (Lab ID)   Identification - Identification - Client ID (Lab ID)   Identification - Client ID (Lab ID)   Identification - Client ID (Lab ID)   Identificati	G - Am H - Aso	10
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Sample Identification - Client ID (Lab ID)   Sample Date   Time   Sample   Type   Visition   Type		A - other (specify)
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C-CCR-MW73-11318 (550-113007-12) #: U 2 L 2   11/3/18   13.24   Water   X    C-CCR-FD01-11318 (550-113007-12) #: U 2 L 2   11/3/18   Arizona   Arizona   Arizona   X    C-CCR-FD01-11318 (550-113007-13) #: U 2 L 2   11/3/18   Arizona   Arizona   X    Institution are subject to change. TestAnnerca Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. The profile of Country methods in the State of Origin listed above for analyte/set/stationaria being analyzed, the samples must be subped back to the featurence to TestAnnerca Laboratories, Inc. possible Hazard Identification  Sample Disposal (A fee may be as reconstituted in the Country Deliverable Rank: 2    Sample Disposal (A fee may be as returned in the Country Deliverable Rank: 2    Special Instructions/GC Requirement Date: A No. A	2 Job 3	
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I. III, IV, Other (specify) Primary Deliverable Rank; 2  Date; Tin	es, mc. 90 may be assessed if samples are ratained Irone	or then 4 months
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	DateTime	Company
	Date/Time	Company

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Shipping/Receiving	Phone:			E-Mail.	1.	E-Mail:	State of Origin	550-22780.2 Page	7.7
Company. Radiation Safety Eng., Inc.					Accreditations R	0).	Anzona	Page 2 of 2 Job #.	2
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Cky. Chandler	TAT Requested (days):	3):				Analysis Requested	sted	A-HOL	
State, Zip: AZ, 85225								G · Zn Acetate	
Phone	# Od		1					E - NaHSO4 F - MaOH	
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Project Name: CCR	Project #				ON 30			J. Di Water	V-MCAA
Sile: Arizona Public Service	SSOWE				80A) (				Z - other (specify)
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Possible Hazard Identification					Sample Dis	sposal ( A fee may be assess	ed if samples are	and record fordister	In demonstrate to
Deliverable Requested: 1, III, III, IV, Other (specify)	Primary Deliverable	verable Rank: 2			Retur	Return To Clent Disposal By Lab Archive For Mon	Disposal By Lab	Archive For	Months
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Relinquished by:	Date/Time:		Co	Сотрату	Received by.	by.	Date/Time		Company
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TestAmerica Phoeni

					Phone:
				Calendar ( C ) or Work Days (W)	Fruitland, NM 87416
_	Job No.			Analysis Turnaround Time	PO Box 355, MS 4915
	1 of1 COCs	Carrier:	Lab Contact: Ken Baker	Tel/Fax: 928-288-1394	APS Four Corners
_	COC No:	Date: 11/7/2018	Site Contact: Doug Lavarnway	Project Manager: Doug Lavarnway Site Contact: Doug Lavarnw	Client Contact
11/2	TestAmerica Laboratories, Inc.			[ ] 000	phone 602,437.3340 fax 623,445.6192
27/2	THE LEADER IN ENVIRONMENTAL TESTING	rd	Chain of Custody Reco	Chain	Phoenix, AZ 85040
018	lestAmerica			<u>.</u>	4645 E Cotton Ctr Blvd Bdg 3
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4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

Client Contact APS Four Corners PO Box 355, MS 4915	Project Manager: Doug Lavarnway Tel/Fax: 928-288-1394	nager: D	oug Lav	arnway		Site (	ont	act	3	a l quarriway	Date:	11/7/2018			COC No:
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Fax:		2 w	2 weeks		_	111		)				_			SDG No.
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		1 day	ау				_	(CI,	(TD	HB (p					
Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Perform I	EPA 200.	EPA 300.	SM 25400	SM 4500-					Sample Specific Notes:
FC-CCR-MW62-11218 _ & C	11/2/2018	1410	G	٧	2	Z	×	×	×	×					
FC-CCR-MW63-11218 -07	11/2/2018	1449	G	8	2	Z	×	×	×	×					
FC-CCR-MW64-11218 -08	11/2/2018	1252	G	8	2	Z	×	×	×	×					
FC-CCR-MW65-11218 -09	11/2/2018	1208	G	¥	2	Z	×	×	×	×					
FC-CCR-MW71-11318 -170	11/3/18	1145	G	×	2	Z	×	×	×	×					
FC-CCR-MW72-11318 -//	11/3/18	1231	G	×	2	Z	×	×	×	×			H		
FC-CCR-MW73-11318 - 12	11/3/18	1324	G	W	2	×	×	×	×	×					
FC-CCR-FD01-11318 -13	11/3/18	1145	G	×	2	×	×	×	×	×					
FC-CCR-FD02-11318 -/ 4	11/3/18	1231	G	8	N	×	×	×	×	×					
								- (							
Preservation Used: 1=1ce, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other Possible Hazard Identification	103; 5=NaOH; 6=	Other				Sa	mpl	e Di	spo	Sample Disposal ( A fee may b	e assess	d if samp	les are	retaine	ee may be assessed if samples are retained longer than 1 month)
Non-Hazard   Flammable   Skin		Poison	Unknown	SKII]		7.0		Retu	m 7	Return To Client	Disposal By Lab	By Lab		Archive For	re For Months
Special Instructions/QC Requirements & Comments:  Need Fluoride reporting limit ≤ 0.8 mg/L	ments:									3,0°C		3,80	1	3,5	, 2.5°C) pc
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## Chain of Custody Record

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phone 602 437 3340 fax 623 445 6192	1000	,													TestAmerica Laboratories Inc	restariac Inc
Client Contact	Project Manager: Doug Lavarnway	anager:	Doug Lav	rnway		Site	001	act:	Por	10	Site Contact: Doug Lavarnway	Date: 11	11/7/2018		COC No.	
APS Four Corners	Tel/Fax: 928-587-0319	-587-0319				Lab	Con	lact:	Ke	Lab Contact: Ken Baker					1 of 1	COCs
PO Box 355, MS 4915		\nalysis T	Analysis Turnaround Time	Time		-	$\dashv$	$\dashv$	$\dashv$	$\dashv$					Job No.	
Fruitland, NM 87416	Calendar	C) or Wo	Calendar ( C ) or Work Days (W)				_		_	_						
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Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sa Perform N	EPA 200.7	200.8 (As	Radium 2	EPA 300.0					Sample Specific Notes	ific Notes:
FC-CCR-MW66-11218 - 01	11/2/2018	1328	ရ	×	4	Z	×	×	×	×						
FC-CCR-MW67-11318 - 02	11/3/2018	957	G	8	4	Z	×	×	×	×						
FC-CCR-MW68-11318 -03	11/3/2018	1101	G	W	4	Z	×	×	×	×						
FC-CCR-MW69-11318 - 54	11/3/18	849	G	W	4	Z	×	×	×	×						
FC-CCR-MW70-11218 ~OS	11/2/18	1532	G	W	4	Z	×	×	×	×						
FC-CCR-MW71-11318 -10	11/3/18	1145	G	W	4	Z	×	×	×	×						
FC-CCR-MW72-11318 - ( )	11/3/18	1231	G	W	4	Z	×	×	×	×						
FC-CCR-MW73-11318 - ( )	11/3/18	1324	G	×	4	z	×	×	×	×						
FC-CCR-FD01-11318 -13	11/3/18	1145	G	×	4	Z	×	×	×	×						
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Non-Hazard Hammable Skin Irritant	ritant	Poison B	U)	Unknown		-	П	Ret	mu	700	Return To Client	Disposal By Lab	By Lab	Ara	Archive For N	Months
Special Instructions/QC Requirements & Comments:  Method 200.8 with collision cell	ents:						100	1.1			120	5	7,8	7	7,82,29°C) F	pc
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Client: Arizona Public Service Company

Job Number: 550-113007-2

Login Number: 113007 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.</td <td>True</td> <td></td>	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: 550-113007-3

Client Project/Site: CCR

## For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Authorized for release by: 11/30/2018 4:22:04 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

**Review your project** results through Total Access

**Have a Question?** 



Visit us at: 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.

## **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	7
QC Sample Results	8
QC Association Summary	9
Lab Chronicle	10
Certification Summary	11
Method Summary	12
Chain of Custody	13
Racaint Chacklists	16

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## **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

## **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

RL

RPD

TEF TEQ

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)

Reporting Limit or Requested Limit (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Relative Percent Difference, a measure of the relative difference between two points

## **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Job ID: 550-113007-3

**Laboratory: TestAmerica Phoenix** 

Narrative

Job Narrative 550-113007-3

## Comments

No additional comments.

## Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.9° C, 3.0° C and 3.8° C.

## **Receipt Exceptions**

Received 3 pages of COCs from the courier.

Samples #6 - #9 only request Appendix I.

All of the other samples request Appendix I and II.

Client did provide sample containers if Appendix II is needed.

FC-CCR-MW62-11218 (550-113007-6), FC-CCR-MW63-112818 (550-113007-7), FC-CCR-MW64-11218 (550-113007-8) and FC-CCR-MW65-11218 (550-113007-9)

## HPLC/IC

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

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## **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-113007-10	FC-CCR-MW71-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-11	FC-CCR-MW72-11318	Water	11/03/18 12:31	11/07/18 13:00

## **Detection Summary**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW71-11318

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID: 550-113007-10

No Detections.

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

No Detections.

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## **Client Sample Results**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW71-11318

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID: 550-113007-10

**Matrix: Water** 

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Result Qualifier Analyte RL Unit Analyzed Dil Fac D Prepared Fluoride ND D1 D5 0.80 11/28/18 01:23 mg/L

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit D Analyzed Prepared Dil Fac Fluoride ND D1 D5 0.80 mg/L 11/28/18 01:41

TestAmerica Job ID: 550-113007-3

**Client Sample ID: Lab Control Sample** 

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

**Client Sample ID: Matrix Spike Duplicate** 

Prep Type: Total/NA

Prep Type: Total/NA

**Prep Type: Total/NA** 

Prep Type: Total/NA

Prep Type: Total/NA

Client Sample ID: Matrix Spike

Client: Arizona Public Service Company

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography Lab Sample ID: MB 550-163090/2 Client Sample ID: Method Blank

**Matrix: Water** 

Analysis Batch: 163090

MB MB

Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac 0.40 Fluoride  $\overline{\mathsf{ND}}$ mg/L 11/27/18 20:10

Lab Sample ID: LCS 550-163090/5

**Matrix: Water** 

**Analysis Batch: 163090** 

Spike LCS LCS %Rec. Added Result Qualifier Limits Analyte Unit %Rec Fluoride 4.00 4.11 mg/L 103 90 - 110

Lab Sample ID: LCSD 550-163090/6

**Matrix: Water** 

Analysis Batch: 163090

Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Limits RPD Limit Unit D %Rec Fluoride 4.00 4.10 mg/L 102

Lab Sample ID: 550-113026-A-1 MS ^2

**Matrix: Water** 

Analysis Batch: 163090

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride ND D1 M2 D5 8.00 6.47 D1 M2 mg/L 80 - 120

Lab Sample ID: 550-113026-A-1 MSD ^2

**Matrix: Water** 

Analysis Batch: 163090

Spike MSD MSD %Rec. RPD Sample Sample Added Analyte Result Qualifier Result Qualifier Unit %Rec Limits RPD Limit Fluoride ND D1 M2 D5 8.00 6.80 D1 mg/L 81 80 - 120 20

TestAmerica Phoenix

11/30/2018

## **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

## HPLC/IC

## Analysis Batch: 163090

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
MB 550-163090/2	Method Blank	Total/NA	Water	300.0	
LCS 550-163090/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-163090/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113026-A-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-113026-A-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	

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## **Lab Chronicle**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW71-11318

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

Batch Batch Dilution Batch Prepared Method **Factor** Number or Analyzed **Prep Type** Type Run Analyst Lab TAL PHX Total/NA Analysis 300.0 2 163090 11/28/18 01:23 NEL

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

**Matrix: Water** 

Date Collected: 11/03/18 12:31 Date Received: 11/07/18 13:00

Dilution Batch **Batch** Batch Prepared or Analyzed **Prep Type** Туре Method Run Factor Number Analyst Lab TAL PHX Total/NA 300.0 163090 11/28/18 01:41 NEL Analysis 2

**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: 550-113007-3

## **Laboratory: TestAmerica Phoenix**

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

Authority	Program	<b>EPA Region</b>	Identification Number	<b>Expiration Date</b>
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: 550-113007-3

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX

## **Protocol References:**

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 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

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Custody Record		
THE LEADER IN ENVIRONMENTAL TESTING	<b>TestAmerica</b>	

ANS Four Contrains   Answer    Clinat Contact	I Droingt N	angrapr	7	MUSEUM		0110	1	-	2	- I minerally	7240.		COC NA.	
Sample   S	APS Four Corners	Tel/Fax: 92	8-288-139	4			Lab (	Cont	act:	Ken	Baker	Carrie		91
Sample identification   Sample   Samp	PO Box 355, MS 4915	A	nalysis T	urnaround	Time		٦	٦						
Sample   Genetification   Sample   Sa	Fruitland, NM 87416	Calendar (	C) or Wo	rk Days (W	5									
2 weeks   2 days	Phone:	TATIfo	ifferent from	Below 71	Days		1)							
Address:   1	Fax:		2				/ / N		)					SDG No.
2 days   1 day   1 d	Project Name: CCR		4	week			()	1	04					
Sample   S	E-Mail Address:		2	days					_	_	oH)			
Sample   S				day			_	_	-		HB (p			
## 1127   11/2/2018   1328   G   W   Z   N   X   X   X   X   X   X   W68-11318   -∆   11/3/2018   1101   G   W   Z   N   X   X   X   X   X   W68-11318   -∆   11/3/2018   1101   G   W   Z   N   X   X   X   X   X   W69-11318   -∆   11/3/2018   1101   G   W   Z   N   X   X   X   X   X   X   W70-11218   -∆   11/3/2018   1332   G   W   Z   N   X   X   X   X   X   X   X   X   X	Sample Identification	Sample Date	Sample Time	Sample Type	Matrix						SM 4500-			Sample Specific Notes
## 11/3/2018   957   G   W   2 N   X   X   X   X   X   X   W68-11318   -0.3   11/3/2018   1101   G   W   2 N   X   X   X   X   X   X   W69-11318   -0.4   11/3/18   849   G   W   2 N   X   X   X   X   X   X   X   X   X		11/2/2018	1328	G	8		2	×	×		×			
W68-11318	1	11/3/2018	957	G	8		Z	×	×		×			
W69-11318 % 11/3/18 849 G W 2 N X X X X X X X X X W70-11218 % 11/2/18 1532 G W 2 N X X X X X X X X X X X X X X X X X X	i	11/3/2018	1101	G	8		z	×	×	×	×			
W70-11218 S 11218 1532 G W 2 N X X X X X X X X X X X X X X X X X X		11/3/18	849	G	8		Z	×	×	-	×			
det: I=Ice, 2=IICI; 3=II2SO4; 4=IINO3; 5=NaOH; 6=Other    Identification	1	11/2/18	1532	G	W				×	×	×			
Company   Comp									05	50-1	13007 Chain	of Custody		
Company   Comp	Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=I	INO3; 5=NaOH;	= Other				+							
de reporting limit ≤ 0.8 mg/L  Company  Company  Company  Company  Company  Company  Company  Company  Company  Date/Time  Received by  Company  Company  Date/Time  Company  Company  Date/Time  Company  Company  Date/Time  Company  Company  Date/Time	©ossible Hazard Identification  Non-Hazard	treitant	Poison	u,	akhown		S	due	Retu	spo m T	sal (A fee m	Disposal By Lab	ples are retained	For Months
Company   Comp	Special Instructions/QC Requirements & Co	nments:					1	1	2	2	0	7,		R
Company Company Company Company Company Company Company Date/Time Received by Company Company Date/Time Received by Company Date/Time Company Date/Time Company Date/Time Company Date/Time Company Date/Time Company Date/Time Company	Need Fluoride reporting limit≤0.8 mg/L							V	1	~	1 2	100, 4	(),4	(
Company Date/Time Received by Company Date/	7	Company	3		Date/Tir	SO)	Re	ceive	ed by	8	Corper	Company	4	Date (Time) 8 '050 M
Company: Date/Time Received Company Date/		Company			Date/Tir	ne	Re	CCIV	ed by	1	0	Company		
	Relinquished by:	Company:		1	Date/Tir	#	R	Cery	1/2	)		Company	SAMO	Dale/filmo_1/8 1300

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Client Contact	Project Manager: Doug Lavarnway	nager: Do	oug Lavar	nway	S	te C	ont	ict:	Do	Site Contact: Doug Lavarnway		Date: 11/7/2018	1/7/20	18				0	COC No:	o.			П	П	П	П
APS Four Corners	Tel/Fax: 928-288-1394	288-1394			2	5 C	onta	Į.	E E	Lab Contact: Ken Baker		Carrier:						-			of			8	cocs	
O Box 355, MS 4915	Ar	Analysis Turnaround Time	around Tim	0	Н													٤	ob N	Job No.						
ruitland, NM 87416	Calendar (	Calendar ( C ) or Work Days (W)	Days (W)										-					_								
hone:	TAT If dif	TAT if different from Below	w 7 Days			()												_								
ax:		2 weeks	Ų,			/ N							_					rol.	SDG No.	No.						
roject Name: CCR		1 week	ek			( Y		04					_					_								
-Mail Address:		2 days	VS				Ca)	F, 5	S)	H)	_		_					_								
		1 day	y		ample	-	7 (B,	0 (CI,	(TD	нв (р			_													
Sample Identification	Sample Date	Sample Time	Sample Type M	# of	Filtered S	Perform	EPA 200.	EPA 300.	SM 25400	SM 4500-										Sa	Sample Specific Notes	Spe	cific	Note	N.	
FC-CCR-MW62-11218 _ & C	11/2/2018	1410	G	W 2	z		×	×	×	×																
FC-CCR-MW63-11218 -07	11/2/2018	1449	G	¥ 2	z		×	×	×	×																- 1
FC-CCR-MW64-11218 -08	11/2/2018	1252	G	W 2	z	0	×	×	×	×																
FC-CCR-MW65-11218 - 09	11/2/2018	1208	G	W 2	z		×	×	×	×																
FC-CCR-MW71-11318 -17	11/3/18	1145	G	W 2	z		×	×	×	×												1		1		
FC-CCR-MW72-11318 -//	11/3/18	1231	G	W 2	z		×	×	×	×																
FC-CCR-MW73-11318 -/ 1	11/3/18	1324	G	W 2	z	×	×	×	×	×																
FC-CCR-FD01-11318 -13	11/3/18	1145	G	W 2	Z	×	×	×	×	×																
FC-CCR-FD02-11318 -14	11/3/18	1231	G	¥ 2	z	×	×	×	×	×																
									1 41 16																	
reservation Used: 1= fce, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	)3; 5=NaOH; 6=	Other											H					H								
**Dossible Hazard Identification   Skin Irricant   Skin Irricant		Poison	Unknown	41		Sa	TIP.	Retu	m 7	Sample Disposal ( A fee	e may be	may be assessed if samples are retained longer than 1 month)  Disposal By Lab Archive For Month	ByLa	amp	les	□are	Archive For	ned	For	er th	an 1	no n	Months	hs		
tions/QC Requirement reporting limit ≤ 0.8									$\sim$		3,000		3.85,250	0	( )	11	10	2)	(,)			2				
Conquished by	Company 7	APS	U)	Date/Time	1	Rec	Received by	A.	2	Con Con	S		Company	100 E	>	A			ate/	7 me	Date/Time		RO	8	8:1841	7
telinquished by:	Company		\ <u>p</u>	Date/Time:		Rec	Received by	SQ.		1			Company	ny.					Date/Time	ime						
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TestAmerica Phoenix

# Chain of Custody Record

4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040		Chain of Custody Recor	ord	THE LEADER IN ENVIRONMENTAL TESTING	/30/20
phone 602 437 3340 fax 623 445 6192	10001			Test∆merica Laboratories, Inc.	11/
Client Contact	Project Manager: Doug Lavarnway	Site Contact: Doug Lavarnway	Date: 11/7/2018	COC No.	
APS Four Corners	Tel/Fax: 928-587-0319	Lab Contact: Ken Baker	Carrier:	l of 1 COCs	
PO Box 355, MS 4915	Analysis Turnaround Time			Job No.	
Fruitland, NM 87416	Calendar ( C ) or Work Days (W)				
Phone:	TAT if different from Below 7 Days				
Fax:	2 weeks	/ N Se,		SDG No.	

phone 602 437 3340 fax 623 445.6192	1100	,										Tes	TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway	anager:	Doug Lav	arnway		Site	Con	tact:	Don	Site Contact: Doug Lavarnway	Date: 11/7/2018	coo	COC No.
APS Four Comers	Tel/Fax: 928-587-0319	-587-0319	0			Lab	Con	tact:	Ker	Lab Contact: Ken Baker			l of l cocs
PO Box 355, MS 4915	,	nalysis Ti	Analysis Turnaround Time	Time		-	$\dashv$	$\dashv$	$\dashv$			dor	Job No.
Fruitland, NM 87416	Calendar	C) or Wo	Calendar ( C ) or Work Days (W)				_						
Phone:	P.IVI.	TAT if different from Below	7	Days		11	9	TI		led			
Fax:		2	2 weeks				/ N	So	_	nom		SDO	SDG No.
Project Name: CCR		-	week				()	Mo	_				
E-Mail Address:		ka -	2 days			_	_	_	_	220			
		_	1 day				_			1.00			
Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sa	Perform I EPA 200.	200.8 (As	Radium 2	EPA 300.0			Sample Specific Notes:
FC-CCR-MW66-11218 - 01	11/2/2018	1328	ရ	×	4	Z	×	×	×	×			
FC-CCR-MW67-11318 - 02	11/3/2018	957	9	8	4	Z	×	×	×	×			
FC-CCR-MW68-11318 -03	11/3/2018	1101	G	٧	4	Z	×	×	×	100			
FC-CCR-MW69-11318 - 64	11/3/18	849	G	W	4	Z	×	×	×	×			
FC-CCR-MW70-11218 ~OS	11/2/18	1532	G	٧	4	Z	×	×	×	×			
FC-CCR-MW71-11318 -10	11/3/18	1145	G	*	4	Z	×	×	×	×			
FC-CCR-MW72-11318 - (1	11/3/18	1231	G	٧	4	Z	×	×	×	×			
FC-CCR-MW73-11318 - (3)	11/3/18	1324	G	8	4	z	×	×	×	×			
FC-CCR-FD01-11318 -/3	11/3/18	1145	G	٧	4	Z	×	×	×	×			
FC-CCR-FD02-11318 -(Y	11/3/18	1231	G	×	4	Z	×	×	×	×			
						$\vdash$	$\vdash$	-	-				
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	03; S=NaOH; 0	= Other				$\vdash$			$\vdash$				
Possible Hazard Identification  Non-Hazard Flammable Skin irritant	rritant	Poiston B	U)	Unknown		0	m	Re	dsic	Return To Client	may be assessed it samples are retained longer than 1 month)  Disposal By Lab Archive For Month	Archive For	ger than 1 month)  Months
Special Instructions/QC Requirements & Comments:	ments:									2	8 £ 20	2066 2 b	/
Radium analyzed by Radiation Safety										-	/	)	
Relinguished by Lavary	Company	50H		Date/Time	me 305		ecei	Received by	N. N. S.	Mone	Company Pal	9	Date/Jime/ 11/7/18 8:05 a
Relinquished by	Company			Date/Time:	/ "	12	ccei	Received by	1	10	Company	Date	Date/Time
Relinquished by:	Company			Date/Time	9	22	ecei	Received by	13		Company		Days/Time 130>
					1	1	1	1	١		, 4		

# **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-113007-3

Login Number: 113007 List Source: TestAmerica Phoenix

List Number: 1

Creator: Gravlin, Andrea

Answer	Comment
True	
False	Check done at department level as required.
	True True True True True True True True

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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: 550-99693-1

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 3/28/2018 11:12:49 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

## 

Tabl	1	<b>_£</b>	0-	1-	1-
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Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	12
QC Association Summary	17
Lab Chronicle	20
Certification Summary	22
Method Summary	23
Chain of Custody	24
Receipt Checklists	25

# **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

#### **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.
Matala	

#### Metals

Wetais	
Qualifier	Qualifier Description
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
D1	Sample required dilution due to matrix.

# Classon

QC

RL

RER

**RPD** TEF

**TEQ** 

**Quality Control** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

Glossary	
Abbreviation	These commonly used abbreviations may or may not be present in this report.
a	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

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

Job ID: 550-99693-1

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-99693-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 3/19/2018 6:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.5° C, 2.8° C and 3.8° 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.

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# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99693-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-99693-1	FC-CCR-MW49A-31718	Water	03/17/18 14:01	03/19/18 06:55
550-99693-2	FC-CCR-MW61-31718	Water	03/17/18 11:46	03/19/18 06:55
550-99693-3	FC-CCR-MW74-31718	Water	03/17/18 10:52	03/19/18 06:55
550-99693-4	FC-CCR-MW75-31718	Water	03/17/18 12:27	03/19/18 06:55
550-99693-5	FC-CCR-MW7-31718	Water	03/17/18 13:10	03/19/18 06:55
550-99693-6	FC-CCR-FD02-31718	Water	03/17/18 11:46	03/19/18 06:55

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

I ah S	Sample	ID.	55N_Q	0603_1

Lab Sample ID: 550-99693-2

Lab Sample ID: 550-99693-3

Lab Sample ID: 550-99693-4

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	1.1	0.20	mg/L		200.7 Rev 4.4	Total/NA
Barium	0.021	0.0020	mg/L	4	200.8 LL	Total/NA
Cobalt	0.0023	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.021	0.0020	mg/L	4	200.8 LL	Total/NA
Thallium	0.0015	0.00040	mg/L	4	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW61-31718

Client Sample ID: FC-CCR-MW49A-31718

Analyte	Result	Qualifier	RL	Unit	Dil Fac I	D Method	Prep Type
Fluoride	1.6	D1	1.6	mg/L	4	300.0	Total/NA
Lithium	0.38		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.014	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cadmium	0.0011	D1	0.00040	mg/L	4	200.8 LL	Total/NA
Cobalt	0.016	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.079	D1	0.0020	mg/L	4	200.8 LL	Total/NA

## Client Sample ID: FC-CCR-MW74-31718

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	3.2	D1	2.0	mg/L	5	300.0	Total/NA
Lithium	0.47		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0034	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.020	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.016	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.085	D1	0.0020	mg/L	4	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW75-31718

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	1.7	D1	1.6	mg/L	4	300.0	Total/NA
Lithium	0.43		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.018	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cadmium	0.0020	D1	0.00040	mg/L	4	200.8 LL	Total/NA
Cobalt	0.044	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Lead	0.0030	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.16	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.0023	D1	0.0020	mg/L	4	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW7-31718

Analyte	Result Qua	lifier RL	Unit	Dil Fac	D Method	Prep Type
Lithium	0.92	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.014 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.0043 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.0047 D1	0.0020	mg/L	4	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-FD02-31718

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

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 25

Lab Sample ID: 550-99693-5

3/28/2018

# **Detection Summary**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-FD02-31718 (Continued)

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

# Lab Sample ID: 550-99693-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Barium	0.014	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cadmium	0.0010	D1	0.00040	mg/L	4	200.8 LL	Total/NA
Cobalt	0.016	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.079	D1	0.0020	mg/L	4	200.8 LL	Total/NA

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Project/Site: CCR

TestAmerica Job ID: 550-99693-1

Lab Sample ID: 550-99693-1

**Matrix: Water** 

Client Sample ID: FC-CCR-MW49A-31718 Date Collected: 03/17/18 14:01

Date Received: 03/19/18 06:55

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	4.0	mg/L			03/20/18 00:08	10
Method: 200.7 Rev 4.4 - Metals (IC	CP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		03/21/18 05:58	03/22/18 00:22	1
Lithium	1.1		0.20	mg/L		03/21/18 05:58	03/22/18 23:12	1
Mothed: 200 O.L. Motele (ICD/M	<b>C</b> )							
Method: 200.8 LL - Metals (ICP/M- Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0040	mg/L		03/21/18 08:54	03/26/18 18:23	4
Arsenic	ND		0.0020	mg/L		03/21/18 08:54	03/26/18 18:23	4
Barium	0.021		0.0020	mg/L		03/21/18 08:54	03/26/18 18:23	4
Cadmium	ND		0.00040	mg/L		03/21/18 08:54	03/26/18 18:23	4
Chromium	ND		0.0040	mg/L		03/21/18 08:54	03/26/18 18:23	4
Cobalt	0.0023		0.0020	mg/L		03/21/18 08:54	03/26/18 18:23	4
Lead	ND		0.0020	mg/L		03/21/18 08:54	03/26/18 18:23	4
Molybdenum	0.021		0.0020	mg/L		03/21/18 08:54	03/26/18 18:23	4
Selenium	ND	M1	0.0020	mg/L		03/21/18 08:54	03/26/18 18:23	4
Thallium	0.0015		0.00040	mg/L		03/21/18 08:54	03/26/18 18:23	4
Method: 245.1 - Mercury (CVAA)								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

Client Sample ID: FC-CCR-MW61-31718 Lab Sample ID: 550-99693-2

0.00020

mg/L

Unit

ND

**Result Qualifier** 

Date Collected: 03/17/18 11:46

Hg

Analyte

Date Collected. 03/17/10 11.40	Matrix. Water
Date Received: 03/19/18 06:55	
Date Neceived. 05/15/10 00:55	
Method: 300.0 - Anions, Ion Chromatography	

RL

Fluoride	1.6 D1	1.6	mg/L			03/20/18 21:27	4
Method: 200.7 Rev 4.4 - Metals	s (ICP)						
Analyte	Result Qu	ualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	0.0010	mg/L		03/21/18 05:58	03/22/18 00:28	1
Lithium	0.38	0.20	ma/L		03/21/18 05:58	03/22/18 23:18	1

Lithium	0.38		0.20	mg/L		03/21/18 05:58	03/22/18 23:18	1
	tals (ICP/MS)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:31	4
Arsenic	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:31	4
Barium	0.014	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:31	4
Cadmium	0.0011	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:31	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:31	4
Cobalt	0.016	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:31	4
Lead	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:31	4
Molybdenum	0.079	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:31	4
Selenium	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:31	4
Thallium	ND	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:31	4

Page 8 of 25

Matrix: Water

Analyzed

03/23/18 16:44 03/24/18 18:29

Prepared

3/28/2018

Project/Site: CCR

Client Sample ID: FC-CCR-MW61-31718 Lab Sample I

Date Collected: 03/17/18 11:46 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99693-2

Matrix: Water

Method: 245.1 - Mercury (CVAA)	•		DI II-2		Duamanad	A a l a al	Dil Faa
Analyte	Result Q	····	RL Uni	ַ ע	Prepared	Analyzed	Dil Fac
_Hg	ND	0.000	)20 mg/	_	03/23/18 16:44	03/24/18 18:30	1

Client Sample ID: FC-CCR-MW74-31718

Lab Sample ID: 550-99693-3

Date Collected: 03/17/18 10:52

Matrix: Water

Date Collected: 03/17/18 10:52 Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion Ch	romatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	3.2 D1	2.0	mg/L			03/20/18 21:45	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	_	03/21/18 05:58	03/22/18 00:34	1
	Lithium	0.47		0.20	mg/L		03/21/18 05:58	03/22/18 23:23	1

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:34	4
Arsenic	0.0034	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:34	4
Barium	0.020	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:34	4
Cadmium	ND	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:34	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:34	4
Cobalt	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:34	4
Lead	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:34	4
Molybdenum	0.016	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:34	4
Selenium	0.085	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:34	4

Method: 245.1 - Mercury (CVAA)								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/23/18 16:44	03/24/18 18:32	1

0.00040

mg/L

ND D1

Client Sample ID: FC-CCR-MW75-31718 Lab Sample ID: 550-99693-4

Date Collected: 03/17/18 12:27 Date Received: 03/19/18 06:55

Thallium

Method: 300.0 - Anic Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Allalyte	Nesuit	Qualifie	IXL	Offic	D	riepaieu	Allalyzeu	Diriac
Fluoride	1.7	D1	1.6	mg/L			03/20/18 22:04	4
Method: 200 7 Rev	I.4 - Motale (ICP)							
Method: 200.7 Rev 4	• • •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	• • •	Qualifier	RL 0.0010	Unit mg/L	D		Analyzed 03/22/18 00:40	Dil Fac

Method: 200.8 LL - Me	etals (ICP/MS)							
Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND D	01	0.0040	mg/L		03/21/18 08:54	03/27/18 09:36	4
Arsenic	ND D	01	0.0020	mg/L		03/21/18 08:54	03/27/18 09:36	4
Barium	0.018	01	0.0020	mg/L		03/21/18 08:54	03/27/18 09:36	4
Cadmium	0.0020 D	<b>)1</b>	0.00040	mg/L		03/21/18 08:54	03/27/18 09:36	4

TestAmerica Phoenix

Page 9 of 25

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Matrix: Water

03/21/18 08:54 03/27/18 09:34

3/28/2018

**Matrix: Water** 

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW75-31718 Lab Sample ID: 550-99693-4

Date Collected: 03/17/18 12:27 **Matrix: Water** 

Date Received: 03/19/18 06:55

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:36	4
Cobalt	0.044	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:36	4
Lead	0.0030	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:36	4
Molybdenum	0.16	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:36	4
Selenium	0.0023	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:36	4
Thallium	ND	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:36	4

Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac 03/23/18 16:44 03/24/18 18:34 Hg ND 0.00020 mg/L

Client Sample ID: FC-CCR-MW7-31718 Lab Sample ID: 550-99693-5

Date Collected: 03/17/18 13:10 Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion Chromatography								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	4.0	mg/L			03/20/18 02:53	10

Method: 200.7 Rev 4.4 - Metals	(ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	0.0010	mg/L		03/21/18 05:58	03/22/18 00:45	1
Lithium	0.92	0.20	mg/L		03/21/18 05:58	03/22/18 23:35	1

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:38	4
Arsenic	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:38	4
Barium	0.014	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:38	4
Cadmium	ND	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:38	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:38	4
Cobalt	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:38	4
Lead	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:38	4
Molybdenum	0.0043	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:38	4
Selenium	0.0047	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:38	4
Thallium	ND	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:38	4

Method: 245.1 - Mercury (CVAA	<b>(</b> )							
Analyte	Result Q	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/23/18 16:44	03/24/18 18:35	1

Client Sample ID: FC-CCR-FD02-31718 Lab Sample ID: 550-99693-6 Date Collected: 03/17/18 11:46 **Matrix: Water** 

Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion C	hromatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND D1 D5	1.6	mg/L			03/20/18 22:22	4

# **Client Sample Results**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-FD02-31718

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

Lab Sample ID: 550-99693-6

Matrix: Water

Date Collected: 03/17/18 11:46
Date Received: 03/19/18 06:55

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND ND	0.0010	mg/L		03/21/18 05:58	03/22/18 01:00	1
Lithium	0.39	0.20	mg/L		03/21/18 05:58	03/22/18 23:41	1

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:41	4
Arsenic	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:41	4
Barium	0.014	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:41	4
Cadmium	0.0010	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:41	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 08:54	03/27/18 09:41	4
Cobalt	0.016	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:41	4
Lead	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:41	4
Molybdenum	0.079	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:41	4
Selenium	ND	D1	0.0020	mg/L		03/21/18 08:54	03/27/18 09:41	4
Thallium	ND	D1	0.00040	mg/L		03/21/18 08:54	03/27/18 09:41	4

Method: 245.1 - Mercury (CVAA	<b>(</b> )							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/23/18 16:44	03/24/18 18:37	1

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Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-142195/30 Client Sample ID: Method Blank Prep Type: Total/NA **Matrix: Water** 

**Analysis Batch: 142195** 

MB MB Analyte Result Qualifier RL Unit Analyzed Dil Fac D Prepared 0.40 Fluoride ND mg/L 03/19/18 21:59

Lab Sample ID: LCS 550-142195/31 Client Sample ID: Lab Control Sample **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 142195** 

Spike LCS LCS %Rec. Added Limits Analyte Result Qualifier Unit %Rec Fluoride 4.00 4.30 mg/L 108 90 - 110

Lab Sample ID: LCSD 550-142195/32 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142195** 

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit Analyte Unit D %Rec Fluoride 4.00 4.29 mg/L 107

Client Sample ID: FC-CCR-MW49A-31718 Lab Sample ID: 550-99693-1 MS **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142195** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec

Limits Fluoride ND D1 D5 40.0 47.7 D1 116 80 - 120 mg/L

Lab Sample ID: 550-99693-1 MSD Client Sample ID: FC-CCR-MW49A-31718 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142195** 

Spike MSD MSD %Rec. RPD Sample Sample Added Analyte Result Qualifier Result Qualifier Unit %Rec Limits RPD Limit Fluoride ND D1 D5 40.0 41.8 D1 mg/L 101 80 - 120

Lab Sample ID: MB 550-142283/2 **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142283** 

MB MB Analyte Result Qualifier RL Unit Prepared D Analyzed Dil Fac Fluoride 0.40 ND mg/L 03/20/18 15:19

Lab Sample ID: LCS 550-142283/5 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 142283** 

Spike LCS LCS %Rec. Added Result Qualifier **Analyte** Unit %Rec Limits Fluoride 4.00 4.27 107 90 - 110

Lab Sample ID: LCSD 550-142283/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142283** 

LCSD LCSD RPD Spike %Rec. Added Limits Analyte Result Qualifier Unit D %Rec RPD Limit Fluoride 4.00 4.28 107 mg/L

Lab Sample ID: 550-99663-A-5 MS

Lab Sample ID: 550-99663-A-5 MSD

Project/Site: CCR

**Client Sample ID: Matrix Spike** 

Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 142283** 

	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	77		4 00	11 4		ma/l		93	80 - 120	

**Client Sample ID: Matrix Spike Duplicate** 

85 - 115

85 - 115

98

96

Prep Type: Total/NA

**Matrix: Water** 

Beryllium

Beryllium

Analysis Batch: 142283

, <b>,</b>	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	7.7		4.00	11.5		mg/L		95	80 - 120	0	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-142359/1-A **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA Prep Batch: 142359 Analysis Batch: 142508** MB MB

Unit Analyte Result Qualifier RL Prepared Analyzed Dil Fac 03/21/18 05:58 03/22/18 00:02 Beryllium  $\overline{\mathsf{ND}}$ 0.0010 mg/L

Lab Sample ID: MB 550-142359/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142637** Prep Batch: 142359 MR MR

Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium  $\overline{\mathsf{ND}}$ 0.20 mg/L 03/21/18 05:58 03/22/18 22:40

Lab Sample ID: LCS 550-142359/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA Analysis Batch: 142508 Prep Batch: 142359 Spike LCS LCS %Rec. Added Analyte Result Qualifier Unit D %Rec Limits

0.985

0.958

mg/L

mg/L

Lab Sample ID: LCS 550-142359/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 142637 Prep Batch: 142359** 

1.00

LCS LCS Spike %Rec. Analyte Added Result Qualifier Limits Unit D %Rec Lithium 1 00 0.987 85 - 115 mg/L 99

Lab Sample ID: LCSD 550-142359/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 142508** Prep Batch: 142359 Spike LCSD LCSD %Rec. RPD Added Result Qualifier Analyte Limits RPD Limit Unit D %Rec

1.00

Client: Arizona Public Service Company Project/Site: CCR

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

Lab Sample ID: LCSD 550-142359/3-A	Client Sample ID: Lab Control Sample Dup								
Matrix: Water						Prep Ty	pe: Tot	al/NA	
Analysis Batch: 142637				Prep Ba	atch: 14	<b>42359</b>			
•	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	1.00	0.989		mg/L		99	85 - 115	0	20

Lab Sample ID: 550-99693-1 MS							Client Sample ID: FC-CCR							
	Matrix: Water									Prep Type: To	tal/NA			
	Analysis Batch: 142508									Prep Batch:	142359			
	_	Sample	Sample	Spike	MS	MS				%Rec.				
	Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits				
	Beryllium	ND		1.00	0.874		mg/L		87	70 - 130				
	,						0							

Lab Sample ID: 550-99693			Client	Sampl	e ID: F	C-CCR-M	W49A-31718			
Matrix: Water									Prep Ty	pe: Total/NA
Analysis Batch: 142637									Prep Ba	atch: 142359
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Lithium	1.1		1.00	2.08		mg/L		93	70 - 130	

Lab Sample ID: 550-99693-1 MSD							Client Sample ID: FC-CCR-MW49A-31718						
Matrix: Water									<b>Prep Ty</b>	pe: Tot	al/NA		
Analysis Batch: 142508									Prep Ba	atch: 14	<b>42359</b>		
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit		
Beryllium	ND		1.00	0.907		mg/L		91	70 - 130	4	20		

Lab Sample ID: 550-99693-1 MSD							Client Sample ID: FC-CCR-MW49A-31718						
Matrix: Water									Prep Ty	e: Tot	al/NA		
Analysis Batch: 142637									Prep Ba	itch: 14	12359		
_	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit		
Lithium	1.1		1.00	2.14		mg/L		100	70 - 130	3	20		

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

Lab Sample ID: MB 550-142369/1-A

Matrix: Water Analysis Batch: 142931							Prep Type: To Prep Batch:	
_	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		03/21/18 08:54	03/27/18 09:25	1
Arsenic	ND		0.00050	mg/L		03/21/18 08:54	03/27/18 09:25	1
Barium	ND		0.00050	mg/L		03/21/18 08:54	03/27/18 09:25	1
Cadmium	ND		0.00010	mg/L		03/21/18 08:54	03/27/18 09:25	1
Chromium	ND		0.0010	mg/L		03/21/18 08:54	03/27/18 09:25	1
Cobalt	ND		0.00050	mg/L		03/21/18 08:54	03/27/18 09:25	1
Lead	ND		0.00050	mg/L		03/21/18 08:54	03/27/18 09:25	1
Molybdenum	ND		0.00050	mg/L		03/21/18 08:54	03/27/18 09:25	1
Selenium	ND		0.00050	mg/L		03/21/18 08:54	03/27/18 09:25	1
Thallium	ND		0.00010	mg/L		03/21/18 08:54	03/27/18 09:25	1

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**Client Sample ID: Method Blank** 

Page 14 of 25

Client: Arizona Public Service Company

Project/Site: CCR

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

Lab Sample ID: LCS 550-142369/2-A				Cli	ent Sa	mple ID	: Lab Control Sample
Matrix: Water							Prep Type: Total/NA
Analysis Batch: 142931							<b>Prep Batch: 142369</b>
	Spike	LCS	LCS				%Rec.
Δnalvto	habbΔ	Regult	Qualifier	Unit	D	%Rec	l imite

/ maryoro Datom : 1200 :	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.0958		mg/L		96	85 - 115
Arsenic	0.100	0.0963		mg/L		96	85 - 115
Barium	0.100	0.0956		mg/L		96	85 - 115
Cadmium	0.100	0.0956		mg/L		96	85 - 115
Chromium	0.100	0.0964		mg/L		96	85 - 115
Cobalt	0.100	0.0955		mg/L		95	85 - 115
Lead	0.100	0.0951		mg/L		95	85 - 115
Molybdenum	0.100	0.0947		mg/L		95	85 - 115
Selenium	0.100	0.0952		mg/L		95	85 - 115
Thallium	0.100	0.0943		mg/L		94	85 - 115

Lab Sample ID: LCSD 550-142369/3-A **Client Sample ID: Lab Control Sample Dup** Matrix: Water Prep Type: Total/NA **Analysis Batch: 142931 Prep Batch: 142369** ICSD ICSD

	<b>Spike</b>	LCSD	LCSD				%Rec.		KPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.0956		mg/L		96	85 - 115	0	20
Arsenic	0.100	0.0968		mg/L		97	85 - 115	1	20
Barium	0.100	0.0961		mg/L		96	85 - 115	1	20
Cadmium	0.100	0.0952		mg/L		95	85 - 115	0	20
Chromium	0.100	0.0963		mg/L		96	85 - 115	0	20
Cobalt	0.100	0.0957		mg/L		96	85 - 115	0	20
Lead	0.100	0.0948		mg/L		95	85 - 115	0	20
Molybdenum	0.100	0.0939		mg/L		94	85 - 115	1	20
Selenium	0.100	0.0949		mg/L		95	85 - 115	0	20
Thallium	0.100	0.0949		ma/l		95	85 115	1	20

Lab Sample ID: 550-99693-1 MS Client Sample ID: FC-CCR-MW49A-31718 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 142907 Prep Batch: 142369

Analysis Daten. 142307	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	ND		0.100	0.0985		mg/L		98	70 - 130
Arsenic	ND		0.100	0.108		mg/L		108	70 - 130
Barium	0.021		0.100	0.118		mg/L		98	70 - 130
Cadmium	ND		0.100	0.0882		mg/L		88	70 - 130
Chromium	ND		0.100	0.0964		mg/L		96	70 - 130
Cobalt	0.0023		0.100	0.0916		mg/L		89	70 - 130
Lead	ND		0.100	0.0840		mg/L		84	70 - 130
Molybdenum	0.021		0.100	0.115		mg/L		94	70 - 130
Selenium	ND	M1	0.100	0.132	M1	mg/L		131	70 - 130
Thallium	0.0015		0.100	0.0855		mg/L		84	70 - 130

Lab Sample ID: 550-99693-	-1 MSD					Client	Sampl	e ID: F	C-CCR-M	N49A-	31718
Matrix: Water									Prep Ty	e: Tot	al/NA
Analysis Batch: 142907									Prep Ba	itch: 14	42369
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	ND		0.100	0.0999		mg/L		100	70 - 130	1	20

TestAmerica Phoenix

3/28/2018

Page 15 of 25

Client: Arizona Public Service Company Project/Site: CCR

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

Lab Sample ID: 550-99693- Matrix: Water	1 MSD					Client	Samp	le ID: F	C-CCR-M\ Prep Ty <sub>l</sub>	oe: Tot	al/NA
Analysis Batch: 142907	Sample	Sample	Spike	MSD	MSD				Prep Ba %Rec.	itch: 14	42369 RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	ND		0.100	0.110		mg/L		110	70 - 130	2	20
Barium	0.021		0.100	0.119		mg/L		98	70 - 130	0	20
Cadmium	ND		0.100	0.0890		mg/L		89	70 - 130	1	20
Chromium	ND		0.100	0.0967		mg/L		97	70 - 130	0	20
Cobalt	0.0023		0.100	0.0919		mg/L		90	70 - 130	0	20
Lead	ND		0.100	0.0850		mg/L		85	70 - 130	1	20
Molybdenum	0.021		0.100	0.116		mg/L		95	70 - 130	1	20
Selenium	ND	M1	0.100	0.133	M1	mg/L		132	70 - 130	1	20
Thallium	0.0015		0.100	0.0862		mg/L		85	70 - 130	1	20

# Method: 245.1 - Mercury (CVAA)

Lab Sample ID: MB 550-14271 Matrix: Water Analysis Batch: 142776	9/1-A MB M	IB				i	ole ID: Method Prep Type: To Prep Batch:	otal/NA
Analyte	Result Q	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L	:	03/23/18 16:44	03/24/18 18:21	1

Lab Sample ID: LCS 550-142719/2-A				Clie	nt Saı	nple ID	: Lab Control Sample
Matrix: Water							Prep Type: Total/NA
Analysis Batch: 142776							Prep Batch: 142719
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Hg	0.0100	0.0105		mg/L		105	85 - 115

Lab Sample ID: LCSD 550-142719/3-A Matrix: Water			C	Client S	Sample	ID: Lab	Control Prep Ty		•
Analysis Batch: 142776							Prep Ba	atch: 14	2719
•	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.0100	0.0104		mg/L		104	85 - 115	1	20

Lab Sample ID: 550-99693-	1 MS					Client S	Sampl	e ID: F	C-CCR-MW49A-	31718
Matrix: Water									Prep Type: To	tal/NA
Analysis Batch: 142776									Prep Batch: 1	42719
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Hg	ND		0.0100	0.00964		mg/L		96	70 - 130	

Lab Sample ID: 550-99693-	1 MSD					Client	Sampl	e ID: F	C-CCR-M\	N49A-3	31718
Matrix: Water									Prep Typ	e: Tot	al/NA
Analysis Batch: 142776									Prep Ba	itch: 14	12719
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.0100	0.00932		mg/L		93	70 - 130	3	20

Client: Arizona Public Service Company Project/Site: CCR

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### **Analysis Batch: 142195**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	300.0	
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	300.0	
MB 550-142195/30	Method Blank	Total/NA	Water	300.0	
LCS 550-142195/31	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-142195/32	Lab Control Sample Dup	Total/NA	Water	300.0	
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	300.0	
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	300.0	

#### **Analysis Batch: 142283**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	300.0	
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	300.0	
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	300.0	
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	300.0	
MB 550-142283/2	Method Blank	Total/NA	Water	300.0	
LCS 550-142283/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-142283/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-99663-A-5 MS	Matrix Spike	Total/NA	Water	300.0	
550-99663-A-5 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

#### Metals

#### **Prep Batch: 142359**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	200.7	<del>-</del>
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	200.7	
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	200.7	
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	200.7	
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	200.7	
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	200.7	
MB 550-142359/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-142359/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-142359/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	200.7	
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	200.7	

#### **Prep Batch: 142369**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	200.8	
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	200.8	
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	200.8	
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	200.8	
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	200.8	
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	200.8	
MB 550-142369/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-142369/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-142369/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	200.8	
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	200.8	

TestAmerica Phoenix

3/28/2018

Page 17 of 25

Client: Arizona Public Service Company Project/Site: CCR

# **Metals (Continued)**

#### **Analysis Batch: 142508**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	200.7 Rev 4.4	142359
MB 550-142359/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	142359
LCS 550-142359/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	142359
LCSD 550-142359/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	200.7 Rev 4.4	142359

#### **Analysis Batch: 142637**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-2 FC-CCR-MW61-31718		Total/NA	Water	200.7 Rev 4.4	142359
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	200.7 Rev 4.4	142359
MB 550-142359/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	142359
LCS 550-142359/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	142359
LCSD 550-142359/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	200.7 Rev 4.4	142359
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	200.7 Rev 4.4	142359

#### **Prep Batch: 142719**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	245.1	
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	245.1	
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	245.1	
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	245.1	
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	245.1	
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	245.1	
MB 550-142719/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-142719/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-142719/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	245.1	
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	245.1	

#### **Analysis Batch: 142776**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	245.1	142719
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	245.1	142719
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	245.1	142719
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	245.1	142719
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	245.1	142719
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	245.1	142719
MB 550-142719/1-A	Method Blank	Total/NA	Water	245.1	142719
LCS 550-142719/2-A	Lab Control Sample	Total/NA	Water	245.1	142719
LCSD 550-142719/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	142719

# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

# **Metals (Continued)**

### **Analysis Batch: 142776 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	245.1	142719
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	245.1	142719

#### **Analysis Batch: 142907**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	200.8 LL	142369
550-99693-1 MS	FC-CCR-MW49A-31718	Total/NA	Water	200.8 LL	142369
550-99693-1 MSD	FC-CCR-MW49A-31718	Total/NA	Water	200.8 LL	142369

#### **Analysis Batch: 142931**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	200.8 LL	142369
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	200.8 LL	142369
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	200.8 LL	142369
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	200.8 LL	142369
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	200.8 LL	142369
MB 550-142369/1-A	Method Blank	Total/NA	Water	200.8 LL	142369
LCS 550-142369/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	142369
LCSD 550-142369/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	142369

Client: Arizona Public Service Company Project/Site: CCR

Lab Sample ID: 550-99693-1

Lab Sample ID: 550-99693-2

TAL PHX

TAL PHX

TAL PHX

Lab Sample ID: 550-99693-3

**Matrix: Water** 

**Matrix: Water** 

**Matrix: Water** 

Client Sample ID: FC-CCR-MW49A-31718

Date Collected: 03/17/18 14:01 Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	142195	03/20/18 00:08	NBL	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142508	03/22/18 00:22	ARE	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142637	03/22/18 23:12	ARE	TAL PHX
Total/NA	Prep	200.8			142369	03/21/18 08:54	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142907	03/26/18 18:23	TEK	TAL PHX
Total/NA	Prep	245.1			142719	03/23/18 16:44	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142776	03/24/18 18:29	EXZ	TAL PHX

Client Sample ID: FC-CCR-MW61-31718

Date Collected: 03/17/18 11:46

Date Received: 03/19/18 06:55

Date Receive	ate Received: 03/19/18 06:55							
_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		4	142283	03/20/18 21:27	NBL	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142508	03/22/18 00:28	ARE	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142637	03/22/18 23:18	ARE	TAL PHX
Total/NA	Prep	200.8			142369	03/21/18 08:54	SGO	TAL PHX

142931 03/27/18 09:31 TEK

142719 03/23/18 16:44 EXZ

142776 03/24/18 18:30 EXZ

Client Sample ID: FC-CCR-MW74-31718

200.8 LL

245.1

245.1

Analysis

Analysis

Prep

Date Collected: 03/17/18 10:52

Total/NA

Total/NA

Total/NA

Date Received: 03/19/18 06:55

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			142283	03/20/18 21:45	NBL	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142508	03/22/18 00:34	ARE	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142637	03/22/18 23:23	ARE	TAL PHX
Total/NA	Prep	200.8			142369	03/21/18 08:54	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142931	03/27/18 09:34	TEK	TAL PHX
Total/NA	Prep	245.1			142719	03/23/18 16:44	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142776	03/24/18 18:32	EXZ	TAL PHX

TestAmerica Phoenix

Page 20 of 25

Project/Site: CCR

Client Sample ID: FC-CCR-MW75-31718

Date Collected: 03/17/18 12:27 Date Received: 03/19/18 06:55

Client: Arizona Public Service Company

Lab Sample ID: 550-99693-4

Lab Sample ID: 550-99693-5

**Matrix: Water** 

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		4	142283	03/20/18 22:04	NBL	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142508	03/22/18 00:40	ARE	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142637	03/22/18 23:29	ARE	TAL PHX
Total/NA	Prep	200.8			142369	03/21/18 08:54	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142931	03/27/18 09:36	TEK	TAL PHX
Total/NA	Prep	245.1			142719	03/23/18 16:44	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142776	03/24/18 18:34	EXZ	TAL PHX

Client Sample ID: FC-CCR-MW7-31718

Date Collected: 03/17/18 13:10

Date Received	l: 03/19/18 0	6:55						
_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0	<del></del>	10	142195	03/20/18 02:53	NBL	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX

Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	142195	03/20/18 02:53	NBL	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142508	03/22/18 00:45	ARE	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142637	03/22/18 23:35	ARE	TAL PHX
Total/NA	Prep	200.8			142369	03/21/18 08:54	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142931	03/27/18 09:38	TEK	TAL PHX
Total/NA	Prep	245.1			142719	03/23/18 16:44	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142776	03/24/18 18:35	EXZ	TAL PHX

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Date Received: 03/19/18 06:55

ent Sample ID: FC-CCR-FD02-31718	Lab Sample ID: 550-99693-6
Collected: 03/17/18 11:46	Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		4	142283	03/20/18 22:22	NBL	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142508	03/22/18 01:00	ARE	TAL PHX
Total/NA	Prep	200.7			142359	03/21/18 05:58	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142637	03/22/18 23:41	ARE	TAL PHX
Total/NA	Prep	200.8			142369	03/21/18 08:54	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142931	03/27/18 09:41	TEK	TAL PHX
Total/NA	Prep	245.1			142719	03/23/18 16:44	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142776	03/24/18 18:37	EXZ	TAL PHX

**Laboratory References:** 

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

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Page 21 of 25

# **Accreditation/Certification Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

# **Laboratory: TestAmerica Phoenix**

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

Authority	Program	<b>EPA Region</b>	Identification Number	<b>Expiration Date</b>
Arizona	State Program	9	AZ0728	06-09-18

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# **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-1

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

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TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3

Phoenix, AZ 85040

estAmerica Phoenix 545 E Cotton Ctr Blvd Bdg 3 hoenix, AZ 85040			$\Omega$	Chain of Custody Record MO LO 2	of	$\stackrel{\cdot}{\cap}$	<b>=</b>	St	<b>0</b> d	₹	ス	e	<u>ë</u>	<u>a</u>	_	<u>را</u>	$\mathbb{Q}$	<del></del>		<u>(</u>	$\mathcal{Y}$	-		THE LEADER IN ENVIRONMENTAL TESTING		i e NV		MEN.			ລ <b>⊠ 🔽</b>
hone 602.437.3340 fax 623.445.6192					1	l	1	ł		l				1	Ι.	-{	_		16	_	0	] [	Test	TestAmerica Laboratories, Inc.	rica	Lal	ora	tori	es, Iı	ŗ	1
Client Contact	Project Manager: Doug Lavarnway	nager: Doug	Lavarnw	ay	Site	5	Itac	Site Contact: Doug Lavarnway	l gu	avai	S.W.D.	٦		丄				1	<b> </b> .	سِ	18/2	018	ζ	3/18/2018 COC No:	1						ㅗ
Po Four Corners	Tel/Fax: 928-587-0319	387-0319	1		<u> </u>	3اـ	18	Lab Contact: Ken Baker	<u>ال</u> ةِ	1	1	1	]	Ļ	Carrier:	કૈ	┨	┨	1	1	7	l	<del>,</del>	;   -	2			COCS	<u>بر</u>		丄
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C-CCR-MW61-31718	3/17/2018	1146	G \	W 4	z	x :	x :	X	×	×	×						-														
C-CCR-MW74-031718	3/17/2018	1052	G 1	W 4	Z	×	×	×	×	×	×																				
C-CCR-MW75-031718	3/17/18	1227	G 1	W 4	z	×	×	×	×	×	×																				
C-CCR-MW7-31718	3/17/18	1310	G 1	W 4	Z	×	×	×	×	×	×						<u> </u>														
C-CCR-FD02-31718	3/17/18	1146	G	<b>W</b>	Z	×	×	×	×	×	× .			<u> </u>		<u> </u>	_	_	-	-								ĺ			
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recognition listed: 1= Ica 2= HCl: 3= HCSO4: 4=HNO3: 5=NaOH: 6= Other	3: 5=NaOH: 6=	Other							+ -		1-						-		+	1											
ossible Hazard Identification  Non-Hazard Flammable Skin Irritant	tant P	Poison B	Unknown	3   		⊓an	교	<b>ple Disposal ( A f</b> Return To Client	70 70	₽ <b>!</b>	<sup>≈</sup> ਨੂੰ	ma	_ §	g∐gg Isg	assessed if san	id if	san Lab	p/e:	are		chiv	retained long	nger	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client  Return To Client  Archive For  Mont	7 7 7	Mo	onth) Months				
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# **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-99693-1

Login Number: 99693 List Source: TestAmerica Phoenix

List Number: 1

Creator: Vilaboy, Monica

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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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: 550-99693-2

Client Project/Site: CCR

Revision: 1

For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Saken

Authorized for release by: 4/18/2018 2:46:43 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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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Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	7
Tracer Carrier Summary	11
QC Sample Results	12
QC Association Summary	15
Lab Chronicle	16
Certification Summary	18
Method Summary	19
Chain of Custody	20
Receipt Checklists	22

# **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-2

#### **Qualifiers**

#### **HPLC/IC**

Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
E4	Concentration estimated. Analyte was detected below laboratory minimum reporting level (MRL) but above MDL.
H1	Sample analysis performed past holding time.
E8	Analyte reported to MDL per project specification. Target analyte was not detected in the sample.
Rad	
Qualifier	Qualifier Description

-

# Glossary

QC

RER RL

RPD

TEF

TEQ

**Quality Control** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)
Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

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)
Oil Fac	Dilution Factor
)L	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
)LC	Decision Level Concentration (Radiochemistry)
DL	Estimated Detection Limit (Dioxin)
OD	Limit of Detection (DoD/DOE)
.OQ	Limit of Quantitation (DoD/DOE)
/IDA	Minimum Detectable Activity (Radiochemistry)
ИDC	Minimum Detectable Concentration (Radiochemistry)
ИDL	Method Detection Limit
1L	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-2

Job ID: 550-99693-2

Laboratory: TestAmerica Phoenix

Narrative

Job Narrative 550-99693-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 3/19/2018 6:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.5° C, 2.8° C and 3.8° C.

#### HPLC/IC

Method(s) 300.0: Reanalysis of the following sample was performed outside of the 28 day analytical holding time for Fluoride by method EPA 300.0 due to client requesting reanalysis at a lower dilution: FC-CCR-MW7-31718 (550-99693-5). As such, the data have been reported and qualified with D1 and H1 flags.

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

#### **RAD**

Method(s) 903.0: Radium-226 Prep Batch 160-357651

The following samples have barium carrier above the 110% QC limit; (490-148546-6; 111%, 490-148546-8; 123%, 490-148546-11; 156%, 490-148546-11 MS; 149%, and 490-148546-11 MSD; 157%). There are high Total Dissolved Solid concentrations that could potentially interfere with the method chemistry (i.e. calcium, sodium, etc.). The LCS/LCSD (laboratory control sample/laboratory control sample duplicate) have acceptable spike recoveries demonstrating acceptable sample preparation and instrument performance. The samples have been truncated to 100% to reduce any potential bias a high carrier recovery may have. The data have been reported with this narrative.

(490-148546-K-11-A) and (490-148546-K-11-B MS)

Method(s) 904.0: Radium-228 Prep Batch 160-357654

The following samples have barium carrier above the 110% QC limit; (490-148546-6; 111%, 490-148546-8; 123%, 490-148546-11; 156%, 490-148546-11 MS; 149%, and 490-148546-11 MSD; 157%). There are high Total Dissolved Solid concentrations that could potentially interfere with the method chemistry (i.e. calcium, sodium, etc.). The LCS/LCSD (laboratory control sample/laboratory control sample duplicate) have acceptable spike recoveries demonstrating acceptable sample preparation and instrument performance. The samples have been truncated to 100% to reduce any potential bias a high carrier recovery may have. The data have been reported with this narrative.

(490-148546-K-11-C), (490-148546-K-11-D MS) and (490-148546-I-11-B MS)

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

TestAmerica Phoenix 4/18/2018 (Rev. 1)

# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99693-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-99693-1	FC-CCR-MW49A-31718	Water	03/17/18 14:01	03/19/18 06:55
550-99693-2	FC-CCR-MW61-31718	Water	03/17/18 11:46	03/19/18 06:55
550-99693-3	FC-CCR-MW74-31718	Water	03/17/18 10:52	03/19/18 06:55
550-99693-4	FC-CCR-MW75-31718	Water	03/17/18 12:27	03/19/18 06:55
550-99693-5	FC-CCR-MW7-31718	Water	03/17/18 13:10	03/19/18 06:55
550-99693-6	FC-CCR-FD02-31718	Water	03/17/18 11:46	03/19/18 06:55

# **Detection Summary**

Client Sample ID: FC-0	CCR-FD02-31718			Lab Sample ID:	550-99693-6
Fluoride	0.49 D1 E4 H1	0.80	0.093 mg/L	2 300.0	Total/NA
Analyte	Result Qualifier	RL	Unit	Dil Fac D Method	Prep Type
Client Sample ID: FC-	CCR-MW7-31718			Lab Sample ID:	550-99693-5
No Detections.					
Client Sample ID: FC-	CCR-MW75-31718			Lab Sample ID:	550-99693-4
No Detections.					
Client Sample ID: FC-	CCR-MW74-31718			Lab Sample ID:	550-99693-3
No Detections.					
Client Sample ID: FC-	CCR-MW61-31718			Lab Sample ID:	550-99693-2
No Detections.					
Client Sample ID: FC-	CCR-MW49A-31718			Lab Sample ID:	550-99693-1
Project/Site: CCR	, ,				

No Detections.

Client: Arizona Public Service Company

This Detection Summary does not include radiochemical test results.

TestAmerica Job ID: 550-99693-2

Project/Site: CCR

Client Sample ID: FC-CCR-MW49A-31718

Date Collected: 03/17/18 14:01 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99693-1

Matrix: Water

Method: 903.0 - I	Radium-226	(GFPC)	Count	Total						
Analyte	Rosult	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analvzed	Dil Fac
Radium-226	0.335	- Guainiei	0.101	0.106	1.00	0.0831			04/17/18 08:02	1
<b>Carrier</b> Ba Carrier		Qualifier	Limits 40 - 110					<b>Prepared</b> 03/26/18 10:43	Analyzed 04/17/18 08:02	Dil Fac

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.88		0.334	0.376	1.00	0.350	pCi/L	03/26/18 11:04	04/04/18 18:01	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/26/18 11:04	04/04/18 18:01	1
Y Carrier	88.6		40 - 110					03/26/18 11:04	04/04/18 18:01	1

Method: Ra226_Ra	228 Pos -	Combine	d Radium-2	226 and Ra	idium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	2.21		0.349	0.391	5.00	0.350	pCi/L		04/18/18 12:22	1

Client Sample ID: FC-CCR-MW61-31718

Lab Sample ID: 550-99693-2

Date Collected: 03/17/18 11:46

Matrix: Water

Date Received: 03/19/18 06:55

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.358		0.101	0.106	1.00	0.0685	pCi/L	03/26/18 10:43	04/17/18 08:02	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	106		40 - 110					03/26/18 10:43	04/17/18 08:02	1

Method: 904.0 -	Radium-228	(GFPC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.839		0.262	0.273	1.00	0.341	pCi/L	03/26/18 11:04	04/04/18 18:01	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier			40 - 110					03/26/18 11:04	04/04/18 18:01	1
Y Carrier	85.2		40 - 110					03/26/18 11:04	04/04/18 18:01	1

Method: Ra226_Ra	228 Pos -	Combine	d Radium-2	26 and Ra	dium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	1.20		0.281	0.293	5.00	0.341	pCi/L		04/18/18 12:22	1

Project/Site: CCR

Client Sample ID: FC-CCR-MW74-31718

Date Collected: 03/17/18 10:52 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99693-3

Matrix: Water

Method: 903.0 -		( - ,	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.200		0.0854	0.0872	1.00	0.0906	pCi/L	03/26/18 10:43	04/17/18 08:02	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/26/18 10:43	04/17/18 08:02	1

Method: 904.0 -	Radium-228	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.643		0.251	0.258	1.00	0.349	pCi/L	03/26/18 11:04	04/04/18 18:01	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/26/18 11:04	04/04/18 18:01	1
Y Carrier	86.7		40 - 110					03/26/18 11:04	04/04/18 18:01	1

Method: Ra226_Ra	228 Pos -	Combine	d Radium-2	226 and Ra	dium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	0.843		0.265	0.272	5.00	0.349	pCi/L	_	04/18/18 12:22	1

Client Sample ID: FC-CCR-MW75-31718 Lab Sample ID: 550-99693-4
Date Collected: 03/17/18 12:27

Matrix: Water

Date Received: 03/19/18 06:55

Method: 903.0 -	Radium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Radium-226	0.413		0.103	0.110	1.00	0.0686	pCi/L	03/26/18 10:43	04/17/18 09:15	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	107		40 - 110					03/26/18 10:43	04/17/18 09:15	

Method: 904.0 - I	Radium-228	(GFPC)								
Aurahaa	Danul 4	0	Count Uncert.	Total Uncert.	DI.	MDG	11-4	Dunamanad	Anahanad	D:: F
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.817		0.258	0.268	1.00	0.337	pCi/L	03/26/18 11:04	04/04/18 18:01	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	107		40 - 110					03/26/18 11:04	04/04/18 18:01	1
Y Carrier	86.0		40 - 110					03/26/18 11:04	04/04/18 18:01	1

Method: Ra226_Ra2	228 Pos -	Combined	d Radium-2	226 and Ra	dium-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	1.23		0.278	0.290	5.00	0.337	pCi/L		04/18/18 12:22	1

Project/Site: CCR

Client Sample ID: FC-CCR-MW7-31718

Date Collected: 03/17/18 13:10 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99693-5

Matrix: Water

Method: 300.0 - Anions, Ion Ch	romatography						
Analyte	Result Qualifi	er RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.49 D1 E4	H1 0.80	0.093 mg/L			04/16/18 17:41	2

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.221		0.0813	0.0837	1.00	0.0764	pCi/L	03/26/18 10:43	04/17/18 09:15	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	108		40 - 110					03/26/18 10:43	04/17/18 09:15	

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.12		0.290	0.308	1.00	0.371	pCi/L	03/26/18 11:04	04/04/18 18:01	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	108		40 - 110					03/26/18 11:04	04/04/18 18:01	1
Y Carrier	90.8		40 - 110					03/26/18 11:04	04/04/18 18:01	1

Method: Ra226_Ra2	228 Pos -	Combine	d Radium-2	226 and Ra	dium-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	1.34		0.301	0.319	5.00	0.371	pCi/L		04/18/18 12:22	1

Client Sample ID: FC-CCR-FD02-31718

Lab Sample ID: 550-99693-6

Date Collected: 03/17/18 11:46

Matrix: Water

Date Received: 03/19/18 06:55

Method: 903.0 -	Radium-226	(GFPC)	01	<b>T</b> .4.1						
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.305		0.0887	0.0929	1.00	0.0618	pCi/L	03/26/18 10:43	04/17/18 09:15	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110					03/26/18 10:43	04/17/18 09:15	1

Method: 904.0 - I	Radium-228 (	(GFPC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.712		0.225	0.234	1.00	0.289	pCi/L	03/26/18 11:04	04/04/18 17:57	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110					03/26/18 11:04	04/04/18 17:57	1
Y Carrier	88.6		40 - 110					03/26/18 11:04	04/04/18 17:57	1

## **Client Sample Results**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-FD02-31718

Project/Site: CCR

TestAmerica Job ID: 550-99693-2

Lab Sample ID: 550-99693-6

. Matrix: Water

Date Collected: 03/17/18 11:46 Date Received: 03/19/18 06:55

Method: Ra226\_Ra228 Pos - Combined Radium-226 and Radium-228

Count	Total
Uncert.	Uncert.

Analyte	Result Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	1.02	0.242	0.252	5.00	0.289 pCi/L		04/18/18 12:22	1

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Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-2

Method: 903.0 - Radium-226 (GFPC)

**Matrix: Water** Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ba Carrier	
₋ab Sample ID	Client Sample ID	(40-110)	
90-148546-I-11-A MSD	Matrix Spike Duplicate	157 X	
90-148546-K-11-B MS	Matrix Spike	149 X	
50-99693-1	FC-CCR-MW49A-31718	104	
50-99693-2	FC-CCR-MW61-31718	106	
50-99693-3	FC-CCR-MW74-31718	104	
50-99693-4	FC-CCR-MW75-31718	107	
0-99693-5	FC-CCR-MW7-31718	108	
0-99693-6	FC-CCR-FD02-31718	109	
CS 160-357651/1-A	Lab Control Sample	94.4	
/IB 160-357651/18-A	Method Blank	102	

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water Prep Type: Total/NA

Water				Tiep Type. Totality
				Percent Yield (Acceptance Limits)
		Ba Carrier	Y Carrier	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
490-148546-I-11-B MSD	Matrix Spike Duplicate	157 X	89.7	
490-148546-K-11-D MS	Matrix Spike	149 X	90.1	
550-99693-1	FC-CCR-MW49A-31718	104	88.6	
550-99693-2	FC-CCR-MW61-31718	106	85.2	
550-99693-3	FC-CCR-MW74-31718	104	86.7	
550-99693-4	FC-CCR-MW75-31718	107	86.0	
550-99693-5	FC-CCR-MW7-31718	108	90.8	
550-99693-6	FC-CCR-FD02-31718	109	88.6	
LCS 160-357654/1-A	Lab Control Sample	94.4	91.2	
MB 160-357654/18-A	Method Blank	102	93.8	
T				

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

TestAmerica Job ID: 550-99693-2

Client: Arizona Public Service Company

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-144647/2 Client Sample ID: Method Blank **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 144647** 

MB MB Analyte Result Qualifier RL Unit Analyzed Dil Fac D Prepared 0.40 Fluoride ND E8 0.046 mg/L 04/16/18 16:09

Lab Sample ID: LCS 550-144647/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 144647** 

Spike LCS LCS %Rec. Added Limits Analyte Result Qualifier Unit %Rec Fluoride 4.00 4.04 mg/L 101 90 - 110

Lab Sample ID: LCSD 550-144647/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 144647

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit Analyte Unit D %Rec Fluoride 4.00 4.03 mg/L 101

Lab Sample ID: 550-101139-H-1 MS **Client Sample ID: Matrix Spike Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 144647** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride 0.57 4.00 4.86 107 80 - 120 mg/L

Lab Sample ID: 550-101139-H-1 MSD **Client Sample ID: Matrix Spike Duplicate Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 144647** 

Spike MSD MSD %Rec. RPD Sample Sample Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits RPD Limit Fluoride 4.00 0.57 4.89 mg/L 108 80 - 120 20

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-357651/18-A **Client Sample ID: Method Blank** Prep Type: Total/NA **Matrix: Water Analysis Batch: 361425 Prep Batch: 357651** 

Count Total MB MB Uncert. Uncert. Analyte Result Qualifier  $(2\sigma + / -)$  $(2\sigma + / -)$ RL **MDC** Unit Prepared Analyzed Dil Fac Radium-226 0.009950 E8 0.0307 0.0307 1.00 0.0627 pCi/L 03/26/18 10:43 04/17/18 09:16

MB MB **%Yield Qualifier** Carrier Limits 102 40 - 110 Ba Carrier

Prepared Dil Fac Analyzed 

TestAmerica Phoenix

TestAmerica Job ID: 550-99693-2

Client: Arizona Public Service Company

Project/Site: CCR

Method: 903.0 - Radium-226 (GFPC) (Continued)

Lab Sample ID: LCS 160-357651/1-A

**Matrix: Water** 

**Analysis Batch: 361460** 

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

**Prep Batch: 357651** 

Total Spike LCS LCS Uncert. %Rec. Added **Analyte** Result Qual  $(2\sigma + / -)$ RL MDC Unit %Rec Limits Radium-226 11.8 12.69 1.29 1.00 0.0943 pCi/L 107 68 - 137

LCS LCS

%Yield Qualifier Carrier I imits Ba Carrier 94.4 40 - 110

Lab Sample ID: 490-148546-I-11-A MSD

**Client Sample ID: Matrix Spike Duplicate** 

**Matrix: Water** 

Analysis Batch: 361460

Prep Type: Total/NA

**Prep Batch: 357651** 

Total MSD MSD %Rec. **RER** Sample Sample **Spike** Uncert. Analyte Result Qual Added Result Qual  $(2\sigma + / -)$ RL**MDC** Unit %Rec Limits RER Limit Radium-226 27.2 11.8 42.30 4.00 1.00 0.111 pCi/L 128 75 - 138 0.15

MSD MSD

Carrier %Yield Qualifier Limits Ba Carrier 157 X 40 - 110

Lab Sample ID: 490-148546-K-11-B MS **Client Sample ID: Matrix Spike** 

**Matrix: Water** 

**Analysis Batch: 361460** 

Prep Type: Total/NA **Prep Batch: 357651** 

Total

Spike MS MS Uncert.

Count

0.175

Sample Sample %Rec. Analyte Result Qual Added Result Qual  $(2\sigma + / -)$ RL **MDC** Unit %Rec Limits

Radium-226 27.2 3.90 1.00 0.118 pCi/L 75 - 138 11.8 41.13 118

MS MS

Carrier %Yield Qualifier Limits Ba Carrier 149 X 40 - 110

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-357654/18-A

**Matrix: Water** 

Radium-228

**Analysis Batch: 358771** 

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

03/26/18 11:04 04/04/18 17:58

**Prep Batch: 357654** 

MB MB Uncert. Uncert. Analyte Result Qualifier  $(2\sigma + / -)$  $(2\sigma + / -)$ RL **MDC** Unit Prepared Analyzed Dil Fac

1.00

0.322 pCi/L

Total

0.175

MB MB

-0.04034 E8

Carrier **%Yield Qualifier** Limits Prepared Dil Fac Analyzed Ba Carrier 102 40 - 110 03/26/18 11:04 04/04/18 17:58 93.8 40 - 110 03/26/18 11:04 04/04/18 17:58 Y Carrier

TestAmerica Job ID: 550-99693-2

Client: Arizona Public Service Company

Project/Site: CCR

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-357654/1-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 358770 Prep Batch: 357654** 

Total Spike LCS LCS Uncert. %Rec. **Analyte** Added Result Qual  $(2\sigma + / -)$ RL **MDC** Unit %Rec Limits Radium-228 8.42 8.845 1.04 1.00 0.440 pCi/L 105 56 - 140

LCS LCS Carrier %Yield Qualifier I imits Ba Carrier 94.4 40 - 110 Y Carrier 91.2 40 - 110

Lab Sample ID: 490-148546-I-11-B MSD **Client Sample ID: Matrix Spike Duplicate Matrix: Water** 

Prep Type: Total/NA **Prep Batch: 357654 Analysis Batch: 358770** 

Total Sample Sample **Spike** MSD MSD Uncert. %Rec. **RER** Analyte Result Qual Added Result Qual  $(2\sigma + / -)$ RL **MDC** Unit %Rec Limits RER Limit Radium-228 26.5 8.43 36.60 3.58 1.00 0.353 pCi/L 119 45 - 150 0.29

MSD MSD Carrier %Yield Qualifier Limits Ba Carrier 157 X 40 - 110 Y Carrier 89.7 40 - 110

Lab Sample ID: 490-148546-K-11-D MS **Client Sample ID: Matrix Spike** 

**Matrix: Water** Prep Type: Total/NA

**Prep Batch: 357654 Analysis Batch: 358770** Total

MS MS %Rec. Sample Sample Spike Uncert. **MDC** Unit Analyte Result Qual Added Result Qual  $(2\sigma + / -)$ RL %Rec Limits Radium-228 26.5 8.42 38.72 3.78 1.00 0.402 pCi/L 145 45 - 150

MS MS %Yield Qualifier Carrier Limits 149 X 40 - 110 Ba Carrier 40 - 110 Y Carrier 90.1

TestAmerica Phoenix

4/18/2018 (Rev. 1)

# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-2

## HPLC/IC

## Analysis Batch: 144647

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	300.0	
MB 550-144647/2	Method Blank	Total/NA	Water	300.0	
LCS 550-144647/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-144647/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-101139-H-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-101139-H-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

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## **Prep Batch: 357651**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	PrecSep-21	
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	PrecSep-21	
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	PrecSep-21	
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	PrecSep-21	
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	PrecSep-21	
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	PrecSep-21	
MB 160-357651/18-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-357651/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
490-148546-I-11-A MSD	Matrix Spike Duplicate	Total/NA	Water	PrecSep-21	
490-148546-K-11-B MS	Matrix Spike	Total/NA	Water	PrecSep-21	

## **Prep Batch: 357654**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99693-1	FC-CCR-MW49A-31718	Total/NA	Water	PrecSep_0	-
550-99693-2	FC-CCR-MW61-31718	Total/NA	Water	PrecSep_0	
550-99693-3	FC-CCR-MW74-31718	Total/NA	Water	PrecSep_0	
550-99693-4	FC-CCR-MW75-31718	Total/NA	Water	PrecSep_0	
550-99693-5	FC-CCR-MW7-31718	Total/NA	Water	PrecSep_0	
550-99693-6	FC-CCR-FD02-31718	Total/NA	Water	PrecSep_0	
MB 160-357654/18-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-357654/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
490-148546-I-11-B MSD	Matrix Spike Duplicate	Total/NA	Water	PrecSep_0	
490-148546-K-11-D MS	Matrix Spike	Total/NA	Water	PrecSep 0	

Project/Site: CCR

Client Sample ID: FC-CCR-MW49A-31718 Lab Sample ID: 550-99693-1

Date Collected: 03/17/18 14:01 **Matrix: Water** 

Date Received: 03/19/18 06:55

Client: Arizona Public Service Company

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357651	03/26/18 10:43	TJT	TAL SL
Total/NA	Analysis	903.0		1	361460	04/17/18 08:02	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357654	03/26/18 11:04	TJT	TAL SL
Total/NA	Analysis	904.0		1	358770	04/04/18 18:01	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-MW61-31718

Lab Sample ID: 550-99693-2 Date Collected: 03/17/18 11:46

**Matrix: Water** 

Date Received: 03/19/18 06:55

Dilution Batch Batch **Batch** Prepared Method Number or Analyzed **Prep Type** Type Run **Factor** Analyst Lab Total/NA PrecSep-21 357651 03/26/18 10:43 TJT TAL SL Prep Total/NA Analysis 903.0 361460 04/17/18 08:02 RTM TAL SL 1 TAL SL Total/NA Prep PrecSep 0 357654 03/26/18 11:04 TJT Total/NA 904.0 358770 04/04/18 18:01 RTM TAL SL Analysis 1 Analysis TAL SL Total/NA Ra226\_Ra228 Pos 1 361565 04/18/18 12:22 RTM

Client Sample ID: FC-CCR-MW74-31718

Lab Sample ID: 550-99693-3 Date Collected: 03/17/18 10:52 **Matrix: Water** 

Date Received: 03/19/18 06:55

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357651	03/26/18 10:43	TJT	TAL SL
Total/NA	Analysis	903.0		1	361460	04/17/18 08:02	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357654	03/26/18 11:04	TJT	TAL SL
Total/NA	Analysis	904.0		1	358770	04/04/18 18:01	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-MW75-31718

Lab Sample ID: 550-99693-4 Date Collected: 03/17/18 12:27 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21	=		357651	03/26/18 10:43	TJT	TAL SL
Total/NA	Analysis	903.0		1	361425	04/17/18 09:15	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357654	03/26/18 11:04	TJT	TAL SL
Total/NA	Analysis	904.0		1	358770	04/04/18 18:01	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

TestAmerica Phoenix

Page 16 of 23

Client: Arizona Public Service Company

Date Received: 03/19/18 06:55

Lab Sample ID: 550-99693-5

Client Sample ID: FC-CCR-MW7-31718 Date Collected: 03/17/18 13:10 **Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			144647	04/16/18 17:41	NBL	TAL PHX
Total/NA	Prep	PrecSep-21			357651	03/26/18 10:43	TJT	TAL SL
Total/NA	Analysis	903.0		1	361425	04/17/18 09:15	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357654	03/26/18 11:04	TJT	TAL SL
Total/NA	Analysis	904.0		1	358770	04/04/18 18:01	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-FD02-31718 Lab Sample ID: 550-99693-6

Date Collected: 03/17/18 11:46 **Matrix: Water** 

Date Received: 03/19/18 06:55

Batch		Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21	=		357651	03/26/18 10:43	TJT	TAL SL
Total/NA	Analysis	903.0		1	361425	04/17/18 09:15	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357654	03/26/18 11:04	TJT	TAL SL
Total/NA	Analysis	904.0		1	358771	04/04/18 17:57	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

## **Laboratory References:**

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

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

## **Accreditation/Certification Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-2

## **Laboratory: TestAmerica Phoenix**

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

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
Arizona	State Program	9	AZ0728	06-09-18

## Laboratory: TestAmerica St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
Alaska	State Program	10	MO00054	06-30-18 *
Arizona	State Program	9	AZ0813	12-08-18
California	State Program	9	2886	06-30-18 *
Connecticut	State Program	1	PH-0241	03-31-19
Florida	NELAP	4	E87689	06-30-18 *
Illinois	NELAP	5	200023	11-30-18
lowa	State Program	7	373	12-01-18
Kansas	NELAP	7	E-10236	10-31-18
Kentucky (DW)	State Program	4	90125	12-31-18
L-A-B	DoD ELAP		L2305	04-06-19
Louisiana	NELAP	6	04080	06-30-18
Louisiana (DW)	NELAP	6	LA180017	12-31-18
Maryland	State Program	3	310	09-30-18
Michigan	State Program	5	9005	06-30-18
Missouri	State Program	7	780	06-30-18
Nevada	State Program	9	MO000542018-1	07-31-18
New Jersey	NELAP	2	MO002	06-30-18 *
New York	NELAP	2	11616	03-31-19
North Dakota	State Program	8	R207	06-30-18
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-18
Pennsylvania	NELAP	3	68-00540	02-28-19
South Carolina	State Program	4	85002001	06-30-18
Texas	NELAP	6	T104704193-17-11	07-31-18
US Fish & Wildlife	Federal		058448	08-31-18
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542016-8	07-31-18
Virginia	NELAP	3	460230	06-14-18 *
Washington	State Program	10	C592	08-30-18
West Virginia DEP	State Program	3	381	08-31-18 *

TestAmerica Phoenix

4/18/2018 (Rev. 1)

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<sup>\*</sup> Accreditation/Certification renewal pending - accreditation/certification considered valid.

## **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-2

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228 Pos	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep 0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

#### **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.

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

### **Laboratory References:**

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340 TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3

Phoenix, AZ 85040

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W49A-331718	Sample Identification	Sample Date	Sample Time			A	Perform	EPA 200.				EPA 300.															S.	mle ·	Spe	cific	Z	Ž.		
NW1-31718   317/2018   1146   G   W   4   N   X   X   X   X   X   X   X   X   X	°C -CCR-MW49A-31718	3/17/2018	1401	G		Z	Х	×				_																i						
NW74-031718   1072   G   W   4   N   X   X   X   X   X   X   X   X   X	C-CCR-MW61-31718	3/17/2018	1146	G	_	N	X	х																										
IN75-031718   31/18   1227   G   W   4   N   X   X   X   X   X   X   X   X   X	C-CCR-MW74-031718	3/17/2018	1052	G		Z	×	×																								!		
INV7-31718  3/17/18  3/17/18  1310  G  W  4 N X X X X X X X X X X X X X X X X X X	C-CCR-MW75-031718	3/17/18	1227	G		Z	×	x				`																						
D02-31718  3/17/18  11/46  G  W  4 N X X X X X X X X X X X X X X X X X X	C-CCR-MW7-31718	3/17/18	1310	G		z	×	×						ļ				ļ																
ed: 1= ket, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other  Identification    Filammable	C-CCR-FD02-31718	3/17/18	1146	G		Z	×	×										i	_	_	<u> </u>										ĺ			
Company:   Company:																	<u>                                   </u>														1 1			
ed: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other						_					_						] ]	5 ₹	99	83	운를	₹ 📑	င္တံ 🗮	sto 🗮	ě 📑						, ,			
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TactAmerica		THE PERSON IN PRESENTANTANEMENT TO SERVICE THE		- Page 1000
				The state of the s
	Chain of Custody Record			
TestAmerica Phoenix	4625 East Cotton Ctr Blvd Suite 189	Phoenix, AZ 85040	Phone (602) 437-3340 Fax (602) 454-9303	

Client Contact Shipping/Receiving Company: TestAmerica Laboratories, Inc.													
ceiving a Laboratories, Inc.	Phone			E-Mail	4				State of Origin	hin	Page:	di	
y herica Laboratories, Inc.				ken.	yaker@te	stameri	ken.baker@testamericainc.com		Arizona		Pag	Page 1 of 1	
30 Table 4					Accreditations Required (See State Program - Arizona	ons Requ	Accreditations Required (See note) State Program - Arizona	(e):			Job # 550-9	Job #: 550-99693-1	
	Due Date Requested: 3/28/2018	d:					Ana	lysis F	Analysis Requested		Pre	ation Code	
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State, Zlp. MO, 63045					"性機						, iii ii	E-NaHSO4 Q-	P - Na2C04S Q - Na2SO3 R - Na2S2O3
66(Tel) 314-298-8757(Fax)	PO#,				10						ΰÍ	or ic Acid	S - H2SO4 T - TSP Dodecahydrate
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Sample Identification - Client ID (Lab ID)	Sample Date	Sample	Sample Type (C=comp, G=grab)	Matrix (w=water, S=solid, O=wastefoli, BT=Tissue, A=Alr)	Perefliq Filtered	903.01919c5ep_					edmuN IstoT	Special Instructions/Note:	actions/Note:
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FC-CCR-MW49A-31718 (550-99693-1)	3/17/18	14:01 Arizona		Water		×					2		
FC-CCR-MW61-31718 (550-99693-2)	3/17/18	11:46 Arizona		Water		×					2		
FC-CCR-MW74-31718 (550-99693-3)	3/17/18	10:52 Arizona		Water		×					2		
FC-CCR-MW75-31718 (550-99693-4)	3/17/18	12:27 Arizona		Water		×	7				2		
FC-CCR-MW7-31718 (550-99693-5)	3/17/18	13:10 Arizona		Water		×					2		
FC-CCR-FD02-31718 (550-99693-6)	3/17/18	11:46 Arizona		Water		×					7		
						+							

Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Return To Client Disposal By Lab Archive For Month Possible Hazard Identification

Deliverable Requested: I, II, III, IV, Other (specify)   Primary Deliverable Rank: 2   Special Instructions/QC Requirements:   Fimply Kit Relinquished by:   Pater	Unconfirmed			Neinin 10 Oilein	Dispusal by Lab	None of	10 10	CIDION	
Empty Kit Relinquished by:  Reinquished by:  Received by:  Coult Time:  Date/Time:  Date/Time:  Company  Received by:  Coult Temperature(s)*C and Other Remarks:		Deliverable Requested: I, II, III, IV, Other (specify)	Primary Deliverable Rank: 2		Special Instructions/QC Requ	irements.			
Reinquished by Cooler Tempers A Yes $\Delta$ No of the remarks:		Empty Kit Relinquished by:	Date:		Time:	Method	of Shipment.		
Relinquished by:  Relinquished by:  Relinquished by:  Received by:  Custody Seals Intact: Custody Seal No.:  Custody Seals Intact: Custody Seal No.:  A Yes A No.	4/18	1	M September S C M	Company	Received by	Town Gu	Date/Time:	0900	Company
Relinquished by:  Custody Seals Infact: Custody Seal No.:  Custody Seals Infact: Custody Seal No.:  Custody Seals Infact: Custody Seal No.:  Cooler Temperature(s) *C and Other Remarks:	3/20	Relinquished by.	Date/Time:	Company	Received by:	1	Date/Time:		Company
Custody Seals Infact: Custody Seal No.:  A Yes A No	)18 (	Relinquished by:	Date/Time.	Company	Received by:	)	Date/Time:		Company
	(Rev.	Custody Seals Intact: Custody Seal No.: A Yes A No			Cooler Temperature(s)°C and	Other Remarks:			

Client: Arizona Public Service Company

Job Number: 550-99693-2

Login Number: 99693 List Source: TestAmerica Phoenix

List Number: 1

Creator: Vilaboy, Monica

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

Client: Arizona Public Service Company

Job Number: 550-99693-2

Login Number: 99693
List Source: TestAmerica St. Louis
List Number: 2
List Creation: 03/20/18 05:14 PM

Creator: Taylor, Kristene N

oreator. Taylor, Misterie N		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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	3.3,21.0
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?	False	
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").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

**TestAmerica Phoenix** 



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: 550-99693-3

Client Project/Site: CCR

## For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 7/12/2018 7:32:31 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99693-3

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	
Sample Summary	5
Certification Summary	
Method Summary	7
Subcontract Data	
Chain of Custody	
Receipt Checklists	17

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4

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## **Definitions/Glossary**

Client: Arizona Public Service Company

Method Detection Limit Minimum Level (Dioxin)

**Practical Quantitation Limit** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)
Toxicity Equivalent Quotient (Dioxin)

Not Detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Not Calculated

**Quality Control** 

Project/Site: CCR

TestAmerica Job ID: 550-99693-3

## Glossary

MDL

ML NC

ND

**PQL** 

QC

RER

RL RPD

TEF

TEQ

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)

## **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-3

Job ID: 550-99693-3

**Laboratory: TestAmerica Phoenix** 

Narrative

Job Narrative 550-99693-3

#### Comments

No additional comments.

#### Receipt

The samples were received on 3/19/2018 6:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.5° C, 2.8° C and 3.8° C.

#### 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.

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# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99693-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-99693-2	FC-CCR-MW61-31718	Water	03/17/18 11:46	03/19/18 06:55
550-99693-5	FC-CCR-MW7-31718	Water	03/17/18 13:10	03/19/18 06:55

## **Accreditation/Certification Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99693-3

## **Laboratory: TestAmerica Phoenix**

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

Authority	Program	<b>EPA</b> Region	Identification Number	<b>Expiration Date</b>
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: 550-99693-3

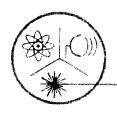
Method	Method Description	Protocol	Laboratory
Subcontract	Radium 226/228	None	Radiation

**Protocol References:** 

None = None

**Laboratory References:** 

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225



3245 N. WASHINGTON ST. + CHANDLER, ARIZONA 85225-1121 Websits: www.radsafe.com

(480) 897-9459 FAX (480) 892-5445

# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: March 17, 2018 Sample Received: June 04, 2018 Analysis Completed: June 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW49A-31718 (550-99693-1)	< 0.8	< 0.8	< 0.8

		***	
Date of Analysis	6/6/2018	6/6/2018	6/6/2018
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Pohert I Metzger Dh.D. C.H.

6/19/2018

Robert L. Metzger, Ph.D., C.H.P.

Date

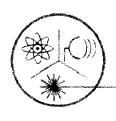
Laboratory License Number AZ0462

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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: March 17, 2018 Sample Received: June 04, 2018 Analysis Completed: June 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW61-31718 (550-99693-2)	< 0.9	< 0.8	< 0.9

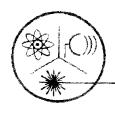
Date of Analysis	6/6/2018	6/6/2018	6/6/2018

6/21/2018

Robert L. Metzger, Ph.D., C.H.P.

Date

Laboratory License Number AZ0462



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: March 17, 2018 Sample Received: June 04, 2018 Analysis Completed: June 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW74-31718 (550-99693-3)	< 0.9	< 0.8	< 0.9

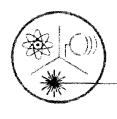
	Date of Analysis	6/7/2018	6/7/2018	6/7/2018
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Robert L. Metzger, Ph.D., C.H.P.

6/19/2018 Date

Laboratory License Number AZ0462

Laboratory Electise Number AZ0462



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: March 17, 2018 Sample Received: June 04, 2018 Analysis Completed: June 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW75-31718 (550-99693-4)	< 0.8	< 0.8	< 0.8

Date of Analysis	6/7/2018	6/7/2018	6/7/2018

6/19/2018

Robert L. Metzger, Ph.D., C.H.P.

Date

Laboratory License Number AZ0462

Page 11 of 17

7/12/2018

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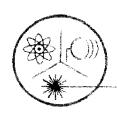
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(480) 897-9458

FAX (480) 892-5446



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: March 17, 2018 Sample Received: June 04, 2018 Analysis Completed: June 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW7-31718 (550-99693-5)	< 0.9	< 0.8	< 0.9

Date of Analysis	6/7/2018	6/7/2018	6/7/2018

6/21/2018

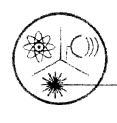
Robert L. Metzger, Ph.D., C.H.P.

Date

Laboratory License Number AZ0462

(480) 897-9459

FAX (480) 892-5446



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. \* CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: March 17, 2018 Sample Received: June 04, 2018 Analysis Completed: June 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD02-31718 (550-99693-6)	< 0.9	< 0.8	< 0.9

			<u> </u>
Date of Analysis	6/7/2018	6/7/2018	6/7/2018

Robert L. Metzger, Ph.D., C.H.P.

6/19/2018 Date

Laboratory License Number AZ0462

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Project Name APS - Four Corners CCR	Project # 5500970G		s or No			
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Sample Identification - Client ID (Lab ID)	Sample Date Time	1	Benesita blei MizM mohe 22 mulbsA) au		o rodinski jezi	
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FC-CCR-MW74-31718 (550-99693-3)	3/17/18 10:52	Water	×		, , , , , , , , , , , , , , , , , , ,	
FC-CCR-MW75-31718 (550-99693-4)	3/17/18 12:27	Water	: ×		Job 3	
FC-CCR-FD02-31718 (550-99693-6)	3/17/18 11:46	Water	×		E doll	
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Chain of Custody Record

4625 East Cotton Ctr Blvd Suite 189 Phoenix. AZ 85040 Phone (602) 437-3346 Fax (602) 454 9303

TestAmerica Phoenix

4625 East Cotton Cir Blvd Swite 189		£		
Phoenix, AZ 85040 Phone (602) 437-3340 Fax (602) 464-9303	Chain of Cu	Chain of Custody Record		
Client Information (Sub Contract Lab)	Samp. or.	เอ <i>ม Pti</i> Baker, Ken	Center Tracking No.st	CCC No 550-21270
Client Contact Shipping/Receiving	Phene:	F Mail ken baker@testamericainc.com	State of Original Arizone	Page 1 of 1
Conneamy Radiculion Safety Eng., Inc.		Accreditations Required (See note) State Program - Arizona	e):	100 H FRALLIGE S. 2
Address 3245 North Washington Street,	Due Dale Roquested: 5/16/2018		Analysis Rennested	Preservation Codes;
Civ. Chardler Stat. 2 p. AZ 8525.	TAT Requested (days):			
Phone.	F.O.4			E - Narison O - Mazson C - MeOh R - Nazson G - smidner S - H2SO4
Email	WC #.	(0		
Project Name: APS - Four Comers CCR	Project #. 55009706	N 10 St		h-ED). L-ED).
Sie Arizona Public Service	#MOSS	sD (Ye		o con
Sample Identification - Client ID (Lab ID)	Sample Time Garante Caramate Time Garante	Matrix  Watrix	odmul isto	
	X	ation Code		Special Instructions/Note:
FC-CCR-MW61 31718 (550-99693-2)	<del>)</del> —	Water		106.3
FC-CCR-MW7-31718 (550-99693-5)	3/17/18 Arizoca	Water		Job 3
Note Since Barrany acceptations are subject to change. Test/mence Laborations, his present method, provide a conception comment of processing the provided provided to the commence of provided and provided provided from the sample of provided the samples must be shipped assist to the configuration of the provided for an analysis less than the signed thought be samples and complete the sample of provided to see that the support of the provided for the provided fo	oxisiones, like phries the expression of method, and destributes the expression to samples must be ordered to be samples must be ordered to date, return the signest Chain of Custoay a	hype 8 accrediction compaints again outsitics ships shipped suck to the Tastamenca lateratory or stillesting to seid complicance to test-merica Lab	instructions. The sought step entries was aid the instructions will be provided. Any dialogue to so references line.	d metro chance cuckedy. This belief any does her retholore helps should be brought to Lesdynaers. J
Possible Hazard Identification		Sample Disposal (	Sample Disposal ( A fee may be assessed it samples are retained longer than 1 mouth)	famed longer than 1 month)
Uncontinued Deliverable Requested: 1 II, III, IV. Other (specify)	Primary Deliverable Rank: 2	Return To Client   Disp	ant Lab By Lab Consequence of Requirements	Archive For
Empty Kit Relinguished by.	Date:	ime:	Welsey of Sherent	AND BRITISH MANAGORNOONING CALIFORNING OF THE PARTICULAR CHARGE CONTRACT CO
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Refriquished by		Concerny Received by:	() () () () () () () () () () () () () (	CONTRACTOR AND AND AND AND AND AND AND AND AND AND
Relinguished by	Dale/Time,	Сопуалу Кесегиед Бу	Selecting.	$(M(0) \otimes V)$
Custody Seals Intact. Custody Seal No:		Cooler ferenerature	Cooler Fairpershire(s) "C and Other Render s.	The state of the s

TestAmerica Phoenix

# TestAmerica Phoenix

Client: Arizona Public Service Company

Job Number: 550-99693-3

Login Number: 99693 List Source: TestAmerica Phoenix

List Number: 1

Creator: Vilaboy, Monica

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td>Comment</td>	True	Comment
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.



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: 550-103742-1

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 6/28/2018 9:05:56 AM

Ken Baker, Project Manager II (602)659-7624

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.

# SDG: Cholla

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	9
QC Sample Results	13
QC Association Summary	20
Lab Chronicle	23
Certification Summary	26
Method Summary	27
Subcontract Data	28
Chain of Custody	36
Receipt Checklists	37

## **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

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.

## **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.
n	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 repo

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)

TestAmerica Phoenix

Page 3 of 37

2

3

6

9

11

12

14

## **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Job ID: 550-103742-1

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-103742-1

## Comments

No additional comments.

#### Receipt

The samples were received on 6/4/2018 1:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.8° C, 1.8° C, 2.0° 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 nature of the sample matrix: FC-CCR-MW-7-6118 (550-103742-1) and FC-CCR-MW-49A-6118 (550-103742-3). The analyte was not detected in the diluted samples. 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: CCR TestAmerica Job ID: 550-103742-1

Lab Sample ID	Client Sample ID	Matrix	Collected Received
550-103742-1	FC-CCR-MW-7-6118	Water	06/01/18 12:07 06/04/18 13:2
550-103742-2	FC-CCR-MW-8-6118	Water	06/01/18 11:19 06/04/18 13:2
550-103742-3	FC-CCR-MW-49A-6118	Water	06/01/18 12:49 06/04/18 13:2
550-103742-4	FC-CCR-MW-61-6118	Water	06/01/18 09:26 06/04/18 13:2
550-103742-5	FC-CCR-FD01-6118	Water	06/01/18 09:26 06/04/18 13:2
550-103742-6	FC-CCR-MW-74-6118	Water	06/01/18 08:20 06/04/18 13:2
550-103742-7	FC-CCR-MW-75-6118	Water	06/01/18 10:38 06/04/18 13:2

SDG: Cholla

RL

Unit

Degrees C

Client: Arizona Public Service Company Project/Site: CCR

Analyte

Temperature

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Total/NA

## Client Sample ID: FC-CCR-MW-7-6118

Lab Sample ID: 550-103742-1									
Dil Fac	D	Method	Prep Type						
 200	_	300.0	Total/NA						
200		300.0	Total/NA						
1		200.7 Rev 4.4	Total/NA						
1		200 7 Rev 4 4	Total/NA						

Chloride	580	D2	400	mg/L	200	300.0	Total/NA
Sulfate	6400	D2	400	mg/L	200	300.0	Total/NA
Boron	7.6	M3	0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	360	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	34		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	1700	M3	0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	510		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	510		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	10000	D2	100	mg/L	1	SM 2540C	Total/NA
pН	7.4	H5	1.7	SU	1	SM 4500 H+ B	Total/NA

0.1

Result Qualifier

20.5 H5

# Client Sample ID: FC-CCR-MW-8-6118

## Lab Sample ID: 550-103742-2

SM 4500 H+ B

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	1100	D2	400	mg/L	200	300.0	Total/NA
Fluoride	0.91	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	9800	D2	400	mg/L	200	300.0	Total/NA
Boron	15		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	420		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	750		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	37		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	1300	D2	1.0	mg/L	2	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	510		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	510		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	15000	D2	200	mg/L	1	SM 2540C	Total/NA
рН	7.3	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.4	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

# Client Sample ID: FC-CCR-MW-49A-6118

# Lab Sample ID: 550-103742-3

Lab Sample ID: 550-103742-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	560	D2	400	mg/L	200	300.0	Total/NA
Sulfate	18000	D2	400	mg/L	200	300.0	Total/NA
Boron	2.5		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
Magnesium	2800	D2	10	mg/L	5	200.7 Rev 4.4	Total/NA
Potassium	70		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	6400	D2	5.0	mg/L	10	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	750		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	750		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	26000	D2	200	mg/L	1	SM 2540C	Total/NA
pH	7.4	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.4	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

### Client Sample ID: FC-CCR-MW-61-6118

		DI			
Analyte	Result Qualifier	RL	Unit	Dil Fac D Method	Prep Type
Chloride	330 D1	4.0	mg/L	2 300.0	Total/NA

mg/L

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 37

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

Lab Sample ID: 550-103742-4

Lab Sample ID: 550-103742-5

Lab Sample ID: 550-103742-6

SDG: Cholla

## Client Sample ID: FC-CCR-MW-61-6118 (Continued)

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	1.3	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	3500	D2	400	mg/L	200	300.0	Total/NA
Boron	38		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
Magnesium	120		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	19		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	980		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	5600	D2	100	mg/L	1	SM 2540C	Total/NA
рН	8.5	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.4	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

# Client Sample ID: FC-CCR-FD01-6118

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	330	D1	4.0	mg/L	2	_	300.0	Total/NA
Fluoride	1.3	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	3500	D2	400	mg/L	200		300.0	Total/NA
Boron	39		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
Magnesium	120		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	20		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	980		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	89		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	5400	D2	100	mg/L	1		SM 2540C	Total/NA
pH	8.5	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	20.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

### Client Sample ID: FC-CCR-MW-74-6118

					•					
Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type			
Chloride	460	D2	400	mg/L	200	300.0	Total/NA			
Fluoride	2.1	D1	0.80	mg/L	2	300.0	Total/NA			
Sulfate	11000	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	400		2.0	mg/L	1	200.7 Rev 4.4	Total/NA			
Magnesium	870		2.0	mg/L	1	200.7 Rev 4.4	Total/NA			
Potassium	22		0.50	mg/L	1	200.7 Rev 4.4	Total/NA			
Sodium	3100	D2	1.0	mg/L	2	200.7 Rev 4.4	Total/NA			
Alkalinity as CaCO3	450		6.0	mg/L	1	SM 2320B	Total/NA			
Bicarbonate Alkalinity as CaCO3	450		6.0	mg/L	1	SM 2320B	Total/NA			
Total Dissolved Solids	17000	D2	100	mg/L	1	SM 2540C	Total/NA			
рН	7.7	H5	1.7	SU	1	SM 4500 H+ B	Total/NA			
Temperature	20.5	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA			

## Client Sample ID: FC-CCR-MW-75-6118

Lab Sample ID: 550-103742-7

This Detection Summary does not include radiochemical test results.

Page 7 of 37

# **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

Lab Sample ID: 550-103742-7

SDG: Cholla

## Client Sample ID: FC-CCR-MW-75-6118 (Continued)

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	290	D1	4.0	mg/L		300.0	Total/NA
Fluoride	1.2	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	4300	D2	400	mg/L	200	300.0	Total/NA
Boron	24		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
Magnesium	210		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	21		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	98		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	98		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	6400	D2	100	mg/L	1	SM 2540C	Total/NA
pН	8.2	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.5	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

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# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Client Sample ID: FC-CCR-MW-7-6118

Date Collected: 06/01/18 12:07 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103742-1

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	580	D2	400	mg/L			06/05/18 01:31	200
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 01:04	2
Sulfate	6400	D2	400	mg/L			06/05/18 01:31	200
Method: 200.7 Rev 4.4 - Metals (	(ICP)							
Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	7.6	M3	0.050	mg/L		06/05/18 11:56	06/07/18 20:08	1
Calcium	360	M3	2.0	mg/L		06/05/18 11:56	06/06/18 20:15	1
Magnesium	470	M3	2.0	mg/L		06/05/18 11:56	06/06/18 20:15	1
Potassium	34		0.50	mg/L		06/05/18 11:56	06/07/18 20:08	1
Sodium	1700	M3	0.50	mg/L		06/05/18 11:56	06/07/18 20:08	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	510		6.0	mg/L			06/06/18 16:17	1
Bicarbonate Alkalinity as CaCO3	510		6.0	mg/L			06/06/18 16:17	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 16:17	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 16:17	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 16:17	1
Total Dissolved Solids	10000	D2	100	mg/L			06/05/18 08:44	1
pH	7.4	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.5	H5	0.1	Degrees C			06/05/18 11:50	1

Date Received: 06/04/18 13:25

Client Sample ID: FC-CCR-WW-8-6118	Lab Sample ID: 550-103/42-2
Date Collected: 06/01/18 11:19	Matrix: Water

Method: 300.0 - Anions, Ion Chromatography											
	Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac		
	Chloride	1100	D2	400	mg/L			06/05/18 04:15	200		
	Fluoride	0.91	D1	0.80	mg/L			06/05/18 03:48	2		
	Sulfate	9800	D2	400	mg/L			06/05/18 04:15	200		
	_										

Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	15		0.050	mg/L		06/05/18 11:56	06/07/18 21:59	1
Calcium	420		2.0	mg/L		06/05/18 11:56	06/06/18 21:14	1
Magnesium	750		2.0	mg/L		06/05/18 11:56	06/06/18 21:14	1
Potassium	37		0.50	mg/L		06/05/18 11:56	06/07/18 21:59	1
Sodium	1300 🗅	02	1.0	mg/L		06/05/18 11:56	06/07/18 21:53	2

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	510		6.0	mg/L			06/06/18 17:25	1
Bicarbonate Alkalinity as CaCO3	510		6.0	mg/L			06/06/18 17:25	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 17:25	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 17:25	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 17:25	1
Total Dissolved Solids	15000	D2	200	mg/L			06/05/18 08:44	1
Н	7.3	H5	1.7	SU			06/05/18 11:50	1

TestAmerica Phoenix

Page 9 of 37

# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Client Sample ID: FC-CCR-MW-8-6118 Lab Sample ID: 550-103742-2 Date Collected: 06/01/18 11:19

**Matrix: Water** 

**General Chemistry (Continued)** 

Date Received: 06/04/18 13:25

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Temperature	20.4 H5	0.1	Degrees C	_		06/05/18 11:50	1

Lab Sample ID: 550-103742-3 Client Sample ID: FC-CCR-MW-49A-6118

Date Collected: 06/01/18 12:49 **Matrix: Water** 

Date Received: 06/04/18 13:25

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	560	D2	400	mg/L			06/05/18 05:10	200
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 04:43	2
Sulfate	18000	D2	400	mg/L			06/05/18 05:10	200

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.5		0.050	mg/L		06/05/18 11:56	06/07/18 22:11	1
Calcium	380		2.0	mg/L		06/05/18 11:56	06/06/18 21:20	1
Magnesium	2800	D2	10	mg/L		06/05/18 11:56	06/07/18 22:05	5
Potassium	70		0.50	mg/L		06/05/18 11:56	06/07/18 22:11	1
Sodium	6400	D2	5.0	mg/L		06/05/18 11:56	06/12/18 12:43	10

Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
750		6.0	mg/L			06/10/18 12:30	1
750		6.0	mg/L			06/10/18 12:30	1
ND		6.0	mg/L			06/10/18 12:30	1
ND		6.0	mg/L			06/10/18 12:30	1
ND		6.0	mg/L			06/10/18 12:30	1
26000	D2	200	mg/L			06/05/18 08:44	1
7.4	H5	1.7	SU			06/05/18 11:50	1
20.4	H5	0.1	Degrees C			06/05/18 11:50	1
	750 750 ND ND ND 26000 7.4	<b>750</b> ND ND	750 6.0 750 6.0 ND 6.0 ND 6.0 ND 6.0 26000 D2 200 7.4 H5 1.7	750       6.0       mg/L         750       6.0       mg/L         ND       6.0       mg/L         ND       6.0       mg/L         ND       6.0       mg/L         26000       D2       200       mg/L         7.4       H5       1.7       SU	750 6.0 mg/L 750 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L 26000 D2 200 mg/L 7.4 H5 1.7 SU	750 6.0 mg/L 750 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L 26000 D2 200 mg/L 7.4 H5 1.7 SU	750         6.0         mg/L         06/10/18 12:30           750         6.0         mg/L         06/10/18 12:30           ND         6.0         mg/L         06/10/18 12:30           26000         D2         200         mg/L         06/05/18 08:44           7.4         H5         1.7         SU         06/05/18 11:50

Client Sample ID: FC-CCR-MW-61-6118 Lab Sample ID: 550-103742-4

Date Collected: 06/01/18 09:26 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Chromatography								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	330	D1	4.0	mg/L			06/05/18 05:38	2
Fluoride	1.3	D1	0.80	mg/L			06/05/18 05:38	2
Sulfate	3500	D2	400	mg/L			06/05/18 06:05	200

Analyte	Result Qua	lifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	38	0.050	mg/L		06/05/18 11:56	06/07/18 22:17	1
Calcium	470	2.0	mg/L		06/05/18 11:56	06/06/18 21:26	1
Magnesium	120	2.0	mg/L		06/05/18 11:56	06/06/18 21:26	1
Potassium	19	0.50	mg/L		06/05/18 11:56	06/07/18 22:17	1
Sodium	980	0.50	mg/L		06/05/18 11:56	06/07/18 22:17	1

**Matrix: Water** 

SDG: Cholla

**Matrix: Water** 

Project/Site: CCR Client Sample ID: FC-CCR-MW-61-6118

Lab Sample ID: 550-103742-4

TestAmerica Job ID: 550-103742-1

Date Collected: 06/01/18 09:26 Date Received: 06/04/18 13:25

**Matrix: Water** 

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	91		6.0	mg/L			06/06/18 17:45	1
Bicarbonate Alkalinity as CaCO3	91		6.0	mg/L			06/06/18 17:45	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 17:45	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 17:45	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 17:45	1
Total Dissolved Solids	5600	D2	100	mg/L			06/05/18 08:44	1
pH	8.5	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.4	H5	0.1	Degrees C			06/05/18 11:50	1

Client Sample ID: FC-CCR-FD01-6118 Lab Sample ID: 550-103742-5

Date Collected: 06/01/18 09:26 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac 4.0 Chloride 330 D1 mg/L 06/05/18 06:32 **Fluoride** 1.3 D1 0.80 mg/L 06/05/18 06:32 2 Sulfate 3500 D2 400 mg/L 06/05/18 07:00 200

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac 0.050 06/05/18 11:56 06/07/18 22:23 Boron 39 mg/L **Calcium** 480 2.0 mg/L 06/05/18 11:56 06/06/18 21:32 **Magnesium** 120 2.0 mg/L 06/05/18 11:56 06/06/18 21:32 0.50 mg/L 06/05/18 11:56 06/07/18 22:23 **Potassium** 20 0.50 mg/L 06/05/18 11:56 06/07/18 22:23 **Sodium** 980

Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
91		6.0	mg/L			06/06/18 17:53	1
89		6.0	mg/L			06/06/18 17:53	1
ND		6.0	mg/L			06/06/18 17:53	1
ND		6.0	mg/L			06/06/18 17:53	1
ND		6.0	mg/L			06/06/18 17:53	1
5400	D2	100	mg/L			06/05/18 08:44	1
8.5	H5	1.7	SU			06/05/18 11:50	1
20.7	H5	0.1	Degrees C			06/05/18 11:50	1
	91 89 ND ND ND 5400	89 ND ND	91 6.0 89 6.0 ND 6.0 ND 6.0 ND 6.0 5400 D2 100 8.5 H5 1.7	91     6.0     mg/L       89     6.0     mg/L       ND     6.0     mg/L       ND     6.0     mg/L       ND     6.0     mg/L       5400     D2     100     mg/L       8.5     H5     1.7     SU	91 6.0 mg/L 89 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L S400 D2 100 mg/L 8.5 H5 1.7 SU	91 6.0 mg/L 89 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L ND 6.0 mg/L S400 D2 100 mg/L 8.5 H5 1.7 SU	91       6.0       mg/L       06/06/18 17:53         89       6.0       mg/L       06/06/18 17:53         ND       6.0       mg/L       06/06/18 17:53         ND       6.0       mg/L       06/06/18 17:53         ND       6.0       mg/L       06/06/18 17:53         5400       D2       100       mg/L       06/05/18 08:44         8.5       H5       1.7       SU       06/05/18 11:50

Lab Sample ID: 550-103742-6 Client Sample ID: FC-CCR-MW-74-6118

Date Collected: 06/01/18 08:20 Date Received: 06/04/18 13:25

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	460	D2	400	mg/L			06/05/18 07:55	200
Fluoride	2.1	D1	0.80	mg/L			06/05/18 07:27	2
Sulfate	11000	D2	400	mg/L			06/05/18 07:55	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		06/05/18 11:56	06/07/18 22:34	1

TestAmerica Phoenix

**Matrix: Water** 

## **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Client Sample ID: FC-CCR-MW-74-6118

Date Collected: 06/01/18 08:20 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103742-6

**Matrix: Water** 

Method: 200.7 Rev 4.4 - Metals	(ICP) (Cor	ntinued)						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	400		2.0	mg/L		06/05/18 11:56	06/06/18 21:38	1
Magnesium	870		2.0	mg/L		06/05/18 11:56	06/06/18 21:38	1
Potassium	22		0.50	mg/L		06/05/18 11:56	06/07/18 22:34	1
Sodium	3100	D2	1.0	mg/L		06/05/18 11:56	06/07/18 22:28	2
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	450		6.0	mg/L			06/06/18 18:04	1
Bicarbonate Alkalinity as CaCO3	450		6.0	mg/L			06/06/18 18:04	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 18:04	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 18:04	1

6.0

100

1.7

0.1

mg/L

mg/L

mg/L

Degrees C

SU

Client Sample ID: FC-CCR-MW-75-6118

ND

17000 D2

7.7 H5

20.5 H5

4300 D2

Date Collected: 06/01/18 10:38 Date Received: 06/04/18 13:25

Hydroxide Alkalinity as CaCO3

**Total Dissolved Solids** 

pН

**Sulfate** 

**Temperature** 

Lab Sample ID: 550-103742-7 **Matrix: Water** 

06/06/18 18:04

06/05/18 08:44

06/05/18 11:50

06/05/18 11:50

06/05/18 09:44

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier Dil Fac RL Unit D Prepared Analyzed Chloride 290 D1 4.0 mg/L 06/05/18 09:17 2 **Fluoride** 1.2 D1 0.80 mg/L 06/05/18 09:17 2

400

Method: 200.7 Rev 4.4	- Metals (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	24	0.050	mg/L		06/05/18 11:56	06/07/18 22:40	1
Calcium	430	2.0	mg/L		06/05/18 11:56	06/06/18 21:44	1
Magnesium	210	2.0	mg/L		06/05/18 11:56	06/06/18 21:44	1
Potassium	21	0.50	mg/L		06/05/18 11:56	06/07/18 22:40	1
Sodium	1100	0.50	mg/L		06/05/18 11:56	06/07/18 22:40	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analvzed	Dil Fac
Alkalinity as CaCO3	98		6.0	<del></del>	_ <b>-</b> -	Trepared	06/06/18 18:46	1
Bicarbonate Alkalinity as CaCO3	98		6.0	mg/L			06/06/18 18:46	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 18:46	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 18:46	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 18:46	1
Total Dissolved Solids	6400	D2	100	mg/L			06/05/18 08:44	1
pH	8.2	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.5	H5	0.1	Degrees C			06/05/18 11:50	1

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

### Method: 300.0 - Anions, Ion Chromatography

MD MD

Lab Sample ID: MB 550-148810/2

**Matrix: Water** 

Analysis Batch: 148810

Client Sam	ple ID: Method Blank
	Prep Type: Total/NA

	IVID	IAID						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			06/04/18 14:33	1
Fluoride	ND		0.40	mg/L			06/04/18 14:33	1
Sulfate	ND		2.0	mg/L			06/04/18 14:33	1

LCS LCS

Spike

Added

20.0

4.00

20.0

Lab Sample ID: LCS 550-148810/5

**Matrix: Water** 

Analyte

Chloride

Fluoride

Sulfate

**Analysis Batch: 148810** 

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

%Rec.

Result	Qualifier	Unit	D	%Rec	Limits	
20.4		mg/L	_	102	90 - 110	
4.18		mg/L		104	90 - 110	
20.8		mg/L		104	90 - 110	

Lab Sample ID: LCSD 550-148810/6

**Matrix: Water** 

**Analysis Batch: 148810** 

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

Client Sample ID: FC-CCR-MW-7-6118

Client Sample ID: FC-CCR-MW-7-6118

	Spike	LCSD	LCSD			%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit D	%Rec	Limits	RPD	Limit
Chloride	20.0	20.4		mg/L	102	90 - 110	0	20
Fluoride	4.00	4.18		mg/L	105	90 - 110	0	20
Sulfate	20.0	20.8		mg/L	104	90 - 110	0	20

Lab Sample ID: 550-103742-1 MS

Ma

An

latrix: Water									Prep Type: Total/NA
nalysis Batch: 148810									
•	Sample	Sample	Spike	MS	MS				%Rec.
nalyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits

			-						,	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	580	D2	4000	4920	D2	mg/L	_	108	80 - 120	
Fluoride	ND	D1	800	873	D1	mg/L		109	80 - 120	
Sulfate	6400	D2	4000	10700	D2	mg/L		108	80 - 120	

Lab Sample ID: 550-103742-1 MSD

**Matrix: Water** 

Analysis Batch: 148810

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	580	D2	4000	4910	D2	mg/L		108	80 - 120	0	20
Fluoride	ND	D1	800	865	D1	mg/L		108	80 - 120	1	20
Sulfate	6400	D2	4000	10700	D2	mg/L		109	80 - 120	0	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-148863/1-A

**Matrix: Water** 

Analysis Batch: 149071

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

**Prep Batch: 148863** 

**Prep Type: Total/NA** 

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Boron ND 0.050 mg/L 06/05/18 11:56 06/06/18 19:37 ND 06/05/18 11:56 06/06/18 19:37 Calcium 2.0 mg/L

TestAmerica Phoenix

6/28/2018

Page 13 of 37

Project/Site: CCR

TestAmerica Job ID: 550-103742-1 SDG: Cholla

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

Lab Sample ID: MB 550-148863/1-A

**Matrix: Water** 

**Analysis Batch: 149071** 

Client Sample ID: Method Blank Prep Type: Total/NA **Prep Batch: 148863** 

MR MR

MB MB

Result Qualifier Analyte RL Unit Prepared Analyzed Dil Fac 06/05/18 11:56 06/06/18 19:37 Magnesium  $\overline{\mathsf{ND}}$ 2.0 mg/L

Lab Sample ID: MB 550-148863/1-A

**Matrix: Water** 

**Analysis Batch: 149141** 

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

**Prep Batch: 148863** 

2 1
2 1
2 1
2 1
12

Lab Sample ID: LCS 550-148863/2-A

**Matrix: Water** 

**Analysis Batch: 149071** 

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA

**Prep Batch: 148863** %Rec.

Limits

Spike LCS LCS Added Analyte Result Qualifier Unit %Rec 1.00 0.906 Boron mg/L 91 85 - 115 21.0 20.2 Calcium mg/L 96 85 - 115 Magnesium 21.0 19.7 mg/L 94 85 - 115

Lab Sample ID: LCS 550-148863/2-A

**Matrix: Water** 

**Analysis Batch: 149141** 

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA **Prep Batch: 148863** 

%Rec.

Analyte Added Result Qualifier Unit D %Rec Limits Boron 1.00 0.935 mg/L 94 85 - 115 Magnesium 21.0 20.1 mg/L 96 85 - 115 Potassium 20.0 18.8 mg/L 94 85 - 115 20.0 18.6 93 85 - 115 Sodium mg/L

Spike

Spike

Added

1.00

21.0

21.0

LCS LCS

LCSD LCSD

0.927

20.4

20.0

Result Qualifier

Unit

mg/L

mg/L

mg/L

D

Lab Sample ID: LCSD 550-148863/3-A

**Matrix: Water** 

**Analyte** 

Calcium

Magnesium

Boron

**Analysis Batch: 149071** 

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

**Prep Batch: 148863** 

%Rec. **RPD** %Rec Limits **RPD** Limit 93 85 - 115 2 20 97 85 - 115 20

Lab Sample ID: LCSD 550-148863/3-A

**Matrix: Water** 

**Analysis Batch: 149141** 

Client Sample ID: Lab Control Sample Dup

85 - 115

95

Prep Type: Total/NA **Prep Batch: 148863** 

20

LCSD LCSD Spike %Rec. **RPD** Added Analyte Result Qualifier Unit Limits RPD Limit D %Rec Boron 1.00 0.957 96 85 - 115 20 mg/L 85 - 115 21.0 20.5 97 Magnesium mg/L 2 20 Potassium 20.0 19.1 mg/L 96 85 - 11520 Sodium 20.0 18.7 mg/L 93 85 - 115 20

Project/Site: CCR

Sodium

TestAmerica Job ID: 550-103742-1

70 - 130

-21

SDG: Cholla

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

630 M3

Lab Sample ID: 550-10374	1-D-1-A MS						CI	lient Sa	mple ID: Matrix Spi	ke
Matrix: Water									Prep Type: Total/N	NΑ
Analysis Batch: 149141									Prep Batch: 1488	63
_	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Calcium	430	M3	21.0	426	M3	mg/L		-14	70 - 130	

622 M3

mg/L

20.0

Lab Sample ID: 550-103741 Matrix: Water Analysis Batch: 149141	I-D-1-A MS	^5					CI	lient Sa	mple ID: Matrix Prep Type: To Prep Batch: 1	tai/NA
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Boron	150	M3 D2	1.00	141	M3	mg/L		-916	70 - 130	
Magnesium	2800	M3 D2	21.0	2630	M3	mg/L		-730	70 - 130	

Lab Sample ID: 550-103741 Matrix: Water Analysis Batch: 149141			Client	Samp	le ID: M	latrix Spil Prep Ty <sub>l</sub> Prep Ba	pe: Tot	al/NA			
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Potassium	39		20.0	58.2		mg/L		95	70 - 130	1	20
Sodium	630	M3	20.0	618	M3	mg/L		-40	70 - 130	1	20

Lab Sample ID: 550-103741-D-1-B MSD ^5 Matrix: Water Analysis Batch: 149141 Sample Sample Spike MSI						Client	: Samp	le ID: N	latrix Spik Prep Typ Prep Ba %Rec.	e: Tot	al/NA
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	150	M3 D2	1.00	150	M3	mg/L		-30	70 - 130	6	20
Magnesium	2800	M3 D2	21.0	2760	М3	mg/L		-127	70 - 130	5	20

Lab Sample ID: 550-10374	2-1 MS					Clie	Client Sample ID: FC-CCR-MW-7-61				
Matrix: Water									Prep Type: Total/NA		
Analysis Batch: 149071									<b>Prep Batch: 148863</b>		
	Sample	Sample	Spike	MS	MS				%Rec.		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Boron	7.7	M3	1.00	8.30	M3	mg/L		64	70 - 130		
Calcium	360	M3	21.0	361	M3	mg/L		19	70 - 130		
Magnesium	470	M3	21.0	472	M3	mg/L		26	70 - 130		

M	Lab Sample ID: 550-103742-1 MS Matrix: Water Analysis Batch: 149141 Sample Sample Spike					MS	Clie	nt Sai	mple ID	Prep Type: Total/NA Prep Batch: 148863 %Rec.
Αı	nalyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Po	otassium	34		20.0	53.2		mg/L		98	70 - 130
Sc	odium	1700	M3	20.0	1690	M3	mg/L		-263	70 - 130

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

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

Lab Sample ID: 550-103742-1 MSD Client Sample ID: FC-CCR-MW-7-6118 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149071** Prep Batch: 148863 Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit 1.00 Boron 8.39 M3 mg/L 73 70 - 130 20 7.7 M3 Calcium 21.0 363 M3 32 70 - 130 20 360 M3 mg/L 70 - 130 20 Magnesium 470 M3 21 0 474 M3 mg/L 35 O

Lab Sample ID: 550-103742-1 MSD Client Sample ID: FC-CCR-MW-7-6118 **Matrix: Water** Prep Type: Total/NA Analysis Batch: 149141 **Prep Batch: 148863** Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier %Rec l imits RPD Limit **Analyte** Unit 20.0 98 70 - 130 0 20 Potassium 34 53.1 mg/L Sodium 1700 M3 20.0 1720 M3 mg/L -119 70 - 130 2 20

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 550-149023/31 Client Sample ID: Method Blank Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 149023** 

MB MB Analyte Result Qualifier RL Unit D Prepared Dil Fac Analyzed 6.0 Alkalinity as CaCO3 ND mg/L 06/06/18 18:19 Bicarbonate Alkalinity as CaCO3 ND 6.0 06/06/18 18:19 mq/L ND 6.0 Carbonate Alkalinity as CaCO3 mg/L 06/06/18 18:19 Alkalinity, Phenolphthalein ND 6.0 mg/L 06/06/18 18:19 Hydroxide Alkalinity as CaCO3 ND 6.0 mg/L 06/06/18 18:19

Lab Sample ID: MB 550-149023/5 Client Sample ID: Method Blank Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 149023** 

	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 13:52	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1

Lab Sample ID: LCS 550-149023/30 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149023** 

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit D %Rec Limits 250 Alkalinity as CaCO3 257 mg/L 103 90 - 110

Lab Sample ID: LCS 550-149023/4 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 149023

7, 6 2	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Alkalinity as CaCO3	 250	256		mg/L		102	90 - 110	 

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

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

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

SDG: Cholla

**Prep Type: Total/NA** 

Lab Sample ID: LCSD 550-149023/17

**Matrix: Water** 

Analysis Batch: 149023

LCSD LCSD RPD Spike %Rec. Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit Alkalinity as CaCO3 250 258 103 90 - 110 mg/L

Lab Sample ID: LCSD 550-149023/35

**Matrix: Water** 

**Analysis Batch: 149023** 

-	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Alkalinity as CaCO3	250	258		mg/L		103	90 - 110	0	20

Lab Sample ID: 550-103742-1 DU

**Matrix: Water** 

Analysis Batch: 149023

Client Sample ID: FC-CCR-MW-7-6118

Prep Type: Total/NA

**Client Sample ID: Duplicate** 

Prep Type: Total/NA

NC

20

Prep Type: Total/NA

	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	510		514		mg/L		0.07	20
Bicarbonate Alkalinity as CaCO3	510		514		mg/L		0.07	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: 550-103743-E-1 DU

**Matrix: Water** 

Analysis Batch: 149023

Allalysis Datell. 143020								
	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	240		245		mg/L		 0	20
Bicarbonate Alkalinity as CaCO3	240		245		mg/L		0	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Alkalinity, Phenolphthalein	ND		ND		mg/L		NC	20

ND

Lab Sample ID: MB 550-149226/1

ND

**Matrix: Water** 

Analysis Batch: 149226

Hydroxide Alkalinity as CaCO3

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

mg/L

	MB MB						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	ND	6.0	mg/L			06/10/18 12:30	1
Bicarbonate Alkalinity as CaCO3	ND	6.0	mg/L			06/10/18 12:30	1
Carbonate Alkalinity as CaCO3	ND	6.0	mg/L			06/10/18 12:30	1
Alkalinity, Phenolphthalein	ND	6.0	mg/L			06/10/18 12:30	1
Hydroxide Alkalinity as CaCO3	ND	6.0	mg/L			06/10/18 12:30	1

Lab Sample ID: LCS 550-149226/2

**Matrix: Water** 

Analysis Batch: 149226

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Alkalinity as CaCO3	250	244		mg/L		98	90 - 110	

TestAmerica Phoenix

Prep Type: Total/NA

**Client Sample ID: Lab Control Sample** 

Page 17 of 37

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

### Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: LCSD 550-149226/5 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 149226

	эріке	LCSD	LCSD				%Rec.		KPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Alkalinity as CaCO3	250	250		mg/L		100	90 - 110	2	20	

Lab Sample ID: 550-103738-A-1 DU

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

Analysis Batch: 149227

Allalysis Datoll. 140EE1								
_	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	750		700		mg/L		7	20
Bicarbonate Alkalinity as CaCO3	750		700		mg/L		7	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 550-148821/1 Client Sample ID: Method Blank Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 148821** 

MB MB Result Qualifier RL Unit Analyte D Analyzed Dil Fac Prepared Total Dissolved Solids 20 ND mg/L 06/05/18 08:44

Lab Sample ID: LCS 550-148821/2 **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 148821** 

	<b>Spike</b>	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Total Dissolved Solids	1000	990		mg/L		99	90 - 110	

Lab Sample ID: LCSD 550-148821/3 Client Sample ID: Lab Control Sample Dup **Prep Type: Total/NA** 

**Matrix: Water** 

Analysis Batch: 148821

	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Total Dissolved Solids	1000	986		ma/l		99	90 - 110		10	

Lab Sample ID: 550-103742-1 DU Client Sample ID: FC-CCR-MW-7-6118 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 148821

/a. <b>,</b> c.c	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
Total Dissolved Solids	10000	D2	9960	D2	mg/L			5	10

TestAmerica Job ID: 550-103742-1

**Client Sample ID: Lab Control Sample** 

**Client Sample ID: Lab Control Sample** 

Client Sample ID: FC-CCR-MW-7-6118

Client Sample ID: FC-CCR-FD01-6118

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

SDG: Cholla

Method: SM 4500 H+ B - pH

Client: Arizona Public Service Company

Lab Sample ID: LCSSRM 550-148864/13

**Matrix: Water** 

Project/Site: CCR

Analysis Batch: 148864

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

Spike LCSSRM LCSSRM %Rec. Analyte Added Result Qualifier Unit D %Rec Limits 7.00 SU 100.7 98.5 - 101. рН 7.1

Lab Sample ID: LCSSRM 550-148864/25

**Matrix: Water** 

Analysis Batch: 148864

LCSSRM LCSSRM Spike %Rec. Analyte Added Result Qualifier Unit D %Rec Limits рН 7.00 SU 100.9 7.1 98.5 - 101.

Lab Sample ID: LCSSRM 550-148864/30

**Matrix: Water** 

**Analysis Batch: 148864** 

Spike LCSSRM LCSSRM %Rec. D %Rec Analyte Added Result Qualifier Unit Limits 7.00 7.1 SU 98.5 - 101. рН 101.0

Lab Sample ID: 550-103742-1 DU

**Matrix: Water** 

Analysis Batch: 148864

, maryone Datom 1 1000 1	Sample	Sample	DU	DU					RPD	
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit	
рН	7.4	H5	7.4	H5	SU		<del></del>	0	5	
Temperature	20.5	H5	20.5	H5	Degrees C			0		

Lab Sample ID: 550-103742-5 DU

**Matrix: Water** 

Analysis Batch: 149964

Alialysis Dalcii. 140004								
-	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
рН	8.5	H5	8.5	H5	SU		 0	5
Temperature	20.7	H5	20.7	H5	Degrees C		0	

QC ASSOCIATION Summina

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103742-1 SDG: Cholla

## HPLC/IC

### **Analysis Batch: 148810**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	300.0	
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	300.0	
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	300.0	
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	300.0	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	300.0	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	300.0	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	300.0	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	300.0	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	300.0	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	300.0	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	300.0	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	300.0	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	300.0	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	300.0	
MB 550-148810/2	Method Blank	Total/NA	Water	300.0	
LCS 550-148810/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-148810/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-103742-1 MS	FC-CCR-MW-7-6118	Total/NA	Water	300.0	
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	300.0	

#### **Metals**

#### **Prep Batch: 148863**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.7	
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.7	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.7	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.7	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.7	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.7	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.7	
MB 550-148863/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-148863/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-148863/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-103741-D-1-A MS	Matrix Spike	Total/NA	Water	200.7	
550-103741-D-1-A MS ^5	Matrix Spike	Total/NA	Water	200.7	
550-103741-D-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7	
550-103741-D-1-B MSD ^5	Matrix Spike Duplicate	Total/NA	Water	200.7	
550-103742-1 MS	FC-CCR-MW-7-6118	Total/NA	Water	200.7	
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.7	

### **Analysis Batch: 149071**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.7 Rev 4.4	148863

Page 20 of 37

TestAmerica Phoenix

6/28/2018

3

4

6

8

9

11

12

13

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103742-1 SDG: Cholla

## **Metals (Continued)**

#### **Analysis Batch: 149071 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-148863/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	148863
LCS 550-148863/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	148863
LCSD 550-148863/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-1 MS	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863

### **Analysis Batch: 149141**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.7 Rev 4.4	148863
MB 550-148863/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	148863
LCS 550-148863/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	148863
LCSD 550-148863/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-D-1-A MS	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-D-1-A MS ^5	Matrix Spike	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-D-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-D-1-B MSD ^5	Matrix Spike Duplicate	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-1 MS	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863

### Analysis Batch: 149397

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.7 Rev 4.4	148863

## **General Chemistry**

### **Analysis Batch: 148821**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	SM 2540C	_
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	SM 2540C	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	SM 2540C	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	SM 2540C	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	SM 2540C	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	SM 2540C	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	SM 2540C	
MB 550-148821/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-148821/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-148821/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-103742-1 DU	FC-CCR-MW-7-6118	Total/NA	Water	SM 2540C	

TestAmerica Phoenix

Page 21 of 37

# **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

# **General Chemistry (Continued)**

#### Analysis Batch: 148864

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	SM 4500 H+ B	
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	SM 4500 H+ B	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	SM 4500 H+ B	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	SM 4500 H+ B	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	SM 4500 H+ B	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	SM 4500 H+ B	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/30	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-103742-1 DU	FC-CCR-MW-7-6118	Total/NA	Water	SM 4500 H+ B	
550-103742-5 DU	FC-CCR-FD01-6118	Total/NA	Water	SM 4500 H+ B	

## Analysis Batch: 149023

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	SM 2320B	_
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	SM 2320B	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	SM 2320B	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	SM 2320B	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	SM 2320B	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	SM 2320B	
MB 550-149023/31	Method Blank	Total/NA	Water	SM 2320B	
MB 550-149023/5	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-149023/30	Lab Control Sample	Total/NA	Water	SM 2320B	
LCS 550-149023/4	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-149023/17	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
LCSD 550-149023/35	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-103742-1 DU	FC-CCR-MW-7-6118	Total/NA	Water	SM 2320B	
550-103743-E-1 DU	Duplicate	Total/NA	Water	SM 2320B	

#### **Analysis Batch: 149226**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-149226/1	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-149226/2	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-149226/5	Lab Control Sample Dup	Total/NA	Water	SM 2320B	

### **Analysis Batch: 149227**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	SM 2320B	
550-103738-A-1 DU	Duplicate	Total/NA	Water	SM 2320B	

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Client Sample ID: FC-CCR-MW-7-6118

Date Collected: 06/01/18 12:07 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103742-1

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 01:04	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 01:31	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:15	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 20:08	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 16:17	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821 (Start) (	06/05/18 08:44	YET	TAL PHX
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-MW-8-6118

Date Collected: 06/01/18 11:19

Lab Sample ID: 550-103742-2

**Matrix: Water** 

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 03:48	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 04:15	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:14	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	149141	06/07/18 21:53	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 21:59	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 17:25	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) (	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample	ID: FC	CCR-MW-49A-6118				Lab Sample ID: 550-103742-3
Date Collected:	06/01/18 1	2:49				Matrix: Water
Date Received: (	06/04/18 1	3:25				
	Batch	Batch	Dilution	Batch	Prepared	

	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab	
Total/NA	Analysis	300.0			148810	06/05/18 04:43	NBL	TAL PHX	
Total/NA	Analysis	300.0		200	148810	06/05/18 05:10	NBL	TAL PHX	
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX	
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:20	ARE	TAL PHX	
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX	
Total/NA	Analysis	200.7 Rev 4.4		5	149141	06/07/18 22:05	SGO	TAL PHX	

TestAmerica Phoenix

Page 23 of 37

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Client Sample ID: FC-CCR-MW-49A-6118

Date Collected: 06/01/18 12:49 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103742-3

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	200.7	<del></del>		148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 22:11	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		10	149397	06/12/18 12:43	ARE	TAL PHX
Total/NA	Analysis	SM 2320B		1	149227	06/10/18 12:30	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	(	06/05/18 08:44 06/06/18 10:20	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Lab Sample ID: 550-103742-4 Client Sample ID: FC-CCR-MW-61-6118

Date Collected: 06/01/18 09:26 Date Received: 06/04/18 13:25 **Matrix: Water** 

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 05:38	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 06:05	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:26	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 22:17	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 17:45	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) 0	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-FD01-6118

Date Collected: 06/01/18 09:26

Date Received: 06/04/18 13:25

05/18 11:50	BDN	TAL PHX
	Lab	Sample ID: 550-103742-5 Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 06:32	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 07:00	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:32	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 22:23	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 17:53	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) (	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

TestAmerica Phoenix

Page 24 of 37

Project/Site: CCR

TestAmerica Job ID: 550-103742-1

SDG: Cholla

Client Sample ID: FC-CCR-MW-74-6118

Date Collected: 06/01/18 08:20 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103742-6

Lab Sample ID: 550-103742-7

TAL PHX

TAL PHX

TAL PHX

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 07:27	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 07:55	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:38	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	149141	06/07/18 22:28	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 22:34	SGO	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 18:04	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) (	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-MW-75-6118

Analysis

Analysis

Analysis

SM 2320B

SM 2540C

SM 4500 H+ B

Date Collected: 06/01/18 10:38

Date Received: 06/04/18 13:25

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 09:17	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 09:44	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:44	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 22:40	SGO	TAL PHX

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148821

149023 06/06/18 18:46 DGS

148864 06/05/18 11:50 BDN

(Start) 06/05/18 08:44 (End) 06/06/18 10:20 YET

**Laboratory References:** 

Total/NA

Total/NA

Total/NA

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

**Matrix: Water** 

## **Accreditation/Certification Summary**

Client: Arizona Public Service Company
Project/Site: CCR
TestAmerica Job ID: 550-103742-1
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: 550-103742-1

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	рН	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

(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-7-6118 (550-103742-1)	$0.5 \pm 0.2$	$0.8 \pm 0.3$	$1.3 \pm 0.4$

Date of Analysis	6/6/2018	6/6/2018	6/6/2018

Robert L. Metzger, Ph.D., C.H.P

6/18/2018

Date

Laboratory License Number AZ0462

Page 28 of 37

6/28/2018

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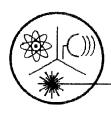
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3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-8-6118 (550-103742-2)	< 0.5	< 0.7	< 0.7

Date of Analysis	6/6/2018	6/6/2018	6/6/2018
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Robert L. Metzger, Ph.D., C.H.P

6/18/2018 Date

Laboratory License Number AZ0462

Page 29 of 37

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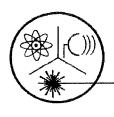
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(480) 897-9459 FAX (480) 892-5446

# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-49A-6118 (550-103742-3)	< 0.5	1.5 ± 0.3	$1.5 \pm 0.3$

r			
Date of Analysis	6/6/2018	6/6/2018	6/6/2018
Date of Allarysis	0/0/2018	0/0/2018	0/0/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462

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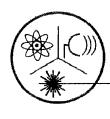
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(480) 897-9459 FAX (480) 892-5446

# Radiochemical Activity in Water (pCi/L)

TestAmerica
4625 E. Cotton Center Blvd., Suite #189
Phoenix, AZ 85040

Sampling Date: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-61-6118 (550-103742-4)	< 0.5	< 0.7	< 0.7

Date of Analysis	6/6/2018	6/6/2018	6/6/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462

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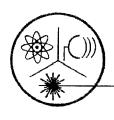
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3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD01-6118 (550-103742-5)	< 0.5	< 0.7	< 0.7

Date of Analysis	6/6/2018	6/6/2018	6/6/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462

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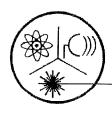
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3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-74-6118 (550-103742-6)	< 0.5	< 0.7	< 0.7

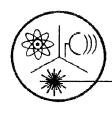
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Date of Analysis	6/6/2018	6/6/2018	6/6/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462



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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-75-6118 (550-103742-7)	< 0.5	$1.4 \pm 0.3$	1.4 ± 0.3

Date of Analysis	6/6/2018	6/6/2018	6/6/2018

6/18/2018

Robert L. Metzger, Ph.D., C.H.P.

Date

Laboratory License Number AZ0462

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Ver: 09/20/2016

Company Company

#### **TestAmerica** Preservation Codes A · HCL B · NaOH C · Zn Acetate D · Nitric Acid F · NaHSO4 F · MeOH G · Amchlor H · Ascorbic Acid COC.No. 550-21311,1 550-103742-1 Page: Page 1 of 1 I - Ice J - DI Water K - EDTA L - EDA Job 3 Job # Job 3 Job 3 S doc Ċί, enemistroo to nedmuk letoT ď S 2 Carrier Tracking No(s): State of Origin: Arizona Analysis Requested ken baker@testamericainc.com Accreditations Required (See note) State Program. - Arizona Chain of Custody Record SUB (Radium 226/228)/ Radium 226/228 × × × × Lab PM: Baker, Ken (ON TO EAY) CISINISM INTOTIA (Wawater, 8muolid, Dawasteloll, Preservation Code Water Water Matrix Water Water Water Type (C=comp, G=grab) Sample Mountain 11:19 Mountain 12:49 Mountain 09:26 Mountain 09:26 Sample Time 12:07 IAT Requested (days): Due Date Requested: 6/13/2018 Sample Date 6/1/18 6/1/18 6/1/18 6/1/18 6/1/18 Project #. 55009706 SSOW#: Phane: # OV # 0 Client Information (Sub Contract Lab) Phone (602) 437-3340 Fax (602) 454-9303 ample Identification - Client ID (Lab ID) FC-CCR-MW-49A-6118 (550-103742-3) C-CCR-MW-61-6118 (550-103742-4) FC-CCR-MW-7-6118 (550-103742-1) -C-CCR-MW-8-6118 (550-103742-2) -C-CCR-FD01-6118 (550-103742-5) 4625 East Cotton Ctr Blvd Suite 189 3245 North Washington Street, Radiation Safety Eng., Inc. Project Name: APS - Four Corners CCR Arizona Public Service Shipping/Receiving State, Zip: AZ, 85225 Chandler

TestAmerica Phoenix

M - Hexana
N - Nonne
O - AaNaO2
P - Na2O45
Q - Na2SO3
R - Na2SO3
R - Na2SO3
S - H2SO4
V - MCAN
W - PH 4-5
Z - other (specify)

Special Instructions/Note:

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Job 3 Job 3

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> Water Water

Mountain 08:20 Mountain 10:38

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FC-CCR-MW-74-6118 (550-103742-6) FC-CCR-MW-75-6118 (550-103742-7) Months

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Vote: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation not subcontract laboratories. This sample shipment is the contract laboratory or other instructions will be provided. Any changes to accreditation is should be brought to TestAmerica aboratories, inc. etertion immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, inc. Possible Hazard Identification

				Ĕ	mples are retained longer than 1 i
	Unconfirmed			Return To Client Disposal By Lah	Orchive For
	Deliverable Requested: I, II, III, IV, Other (specify)	Primary Deliverable Rank: 2		Şed	
	Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:	Shipment;
	Relinquished by:	Date/Time: 14 4154m	Company Frst Ary	Received by:	Date/Time:
	Kelinquished by:	Date/Time:	Company		Date/Time:
6	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:
/28/	Custody Seals Intact: Custody Seal No.: A Yes A No			Cooler Temperature(s) "C and Other Remarks:	
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# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-103742-1

SDG Number: Cholla

Login Number: 103742 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.</td <td>True</td> <td>Common</td>	True	Common
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.

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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: 550-103742-2

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Saken

Authorized for release by: 6/28/2018 4:04:57 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	11
QC Association Summary	15
Lab Chronicle	17
Certification Summary	20
Method Summary	21
Subcontract Data	22
Chain of Custody	30
Receipt Checklists	31

3

4

6

8

9

11

12

14

# **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2

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

motals	
Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.
M2	Matrix spike recovery was low, the associated blank spike recovery was acceptable.

# Classon

QC

RL**RPD** 

TEF

**TEQ** 

RER

**Quality Control** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

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

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

Job ID: 550-103742-2

Laboratory: TestAmerica Phoenix

**Narrative** 

Job Narrative 550-103742-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 6/4/2018 1:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.8° C, 1.8° C, 2.0° 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 nature of the sample matrix: FC-CCR-MW-7-6118 (550-103742-1) and FC-CCR-MW-49A-6118 (550-103742-3). The analyte was not detected in the diluted samples. 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: FC-CCR-MW-7-6118 (550-103742-1), FC-CCR-MW-8-6118 (550-103742-2), FC-CCR-MW-49A-6118 (550-103742-3), FC-CCR-MW-61-6118 (550-103742-4), FC-CCR-FD01-6118 (550-103742-5), FC-CCR-MW-74-6118 (550-103742-6) and FC-CCR-MW-75-6118 (550-103742-7). Elevated reporting limits (RLs) are provided. Samples were run at a x1, x4, x10, x20 dilutions. The x20 was the lowest dilution for which the internal standards did not fail.

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

#### 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: 550-103742-2

SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-103742-1	FC-CCR-MW-7-6118	Water	06/01/18 12:07	06/04/18 13:25
550-103742-2	FC-CCR-MW-8-6118	Water	06/01/18 11:19	06/04/18 13:25
550-103742-3	FC-CCR-MW-49A-6118	Water	06/01/18 12:49	06/04/18 13:25
550-103742-4	FC-CCR-MW-61-6118	Water	06/01/18 09:26	06/04/18 13:25
550-103742-5	FC-CCR-FD01-6118	Water	06/01/18 09:26	06/04/18 13:25
550-103742-6	FC-CCR-MW-74-6118	Water	06/01/18 08:20	06/04/18 13:25
550-103742-7	FC-CCR-MW-75-6118	Water	06/01/18 10:38	06/04/18 13:25

TestAmerica Job ID: 550-103742-2

Lab Sample ID: 550-103742-5

SDG: Cholla

Client Sample ID: FC-CCR-MW-7-6118	Lab Sample ID: 550-103742-1

Analyte	Result Qualifi	er RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.83	0.20	mg/L		200.7 Rev 4.4	Total/NA
Barium	0.017 D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-8-6118 Lab Sample ID: 550-103742-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	) Method	Prep Type
Fluoride	0.91	D1	0.80	mg/L	2	300.0	Total/NA
Lithium	1.2		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.011	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.011	D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-49A-6118 Lab Sample ID: 550-103742-3

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	1.1	0.20	mg/L	1 -	200.7 Rev 4.4	Total/NA
Barium	0.022 D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.018 D1	0.010	mg/L	20	200.8 LL	Total/NA

## Client Sample ID: FC-CCR-MW-61-6118 Lab Sample ID: 550-103742-4

Analyte	Result (	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	1.3	D1	0.80	mg/L	2	300.0	Total/NA
Lithium	0.36		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.014 I	D1	0.010	mg/L	20	200.8 LL	Total/NA
Cobalt	0.017 I	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.085	D1	0.010	mg/L	20	200.8 LL	Total/NA

## Client Sample ID: FC-CCR-FD01-6118

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	1.3	D1	0.80	mg/L		300.0	Total/NA
Lithium	0.36		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.014	D1	0.010	mg/L	20	200.8 LL	Total/NA
Cobalt	0.017	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.082	D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-74-6118 Lab Sample ID: 550-103742-6

Analyte	Result Qualifier	· RL	Unit	Dil Fac I	) Method	Prep Type
Fluoride	2.1 D1	0.80	mg/L		300.0	Total/NA
Lithium	0.49	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.019 D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.015 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.089 D1	0.010	mg/L	20	200.8 LL	Total/NA

## Client Sample ID: FC-CCR-MW-75-6118 Lab Sample ID: 550-103742-7

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	1.2	D1	0.80	mg/L		300.0	Total/NA
Lithium	0.40		0.20	mg/L	1	200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

6/28/2018

Page 6 of 31

3

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13

14

# **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

## Client Sample ID: FC-CCR-MW-75-6118 (Continued)

Analyte Barium	Result         Qualifier           0.020         D1		Unit mg/L		Method 200.8 LL	Prep Type Total/NA
Cadmium	0.0024 D1	0.0020	mg/L	20	200.8 LL	Total/NA
Cobalt	0.048 D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.17 D1	0.010	mg/L	20	200.8 LL	Total/NA

Lab Sample ID: 550-103742-7

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Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-7-6118

Date Collected: 06/01/18 12:07 Date Received: 06/04/18 13:25 Lab Sample ID: 550-103742-1

**Matrix: Water** 

Method: 300.0 - Anions, Ion Chromatography RL Unit Analyte Result Qualifier D Prepared Analyzed Dil Fac Fluoride ND D1 D5 0.80 06/05/18 01:04 mg/L Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac 0.20 06/05/18 11:56 06/06/18 20:15 Lithium 0.83 mg/L

Method: 200.8 LL - Metals (ICP/MS) Result Qualifier Unit Analyte RL Prepared Analyzed Dil Fac Arsenic ND D1 0.010 06/05/18 08:55 06/15/18 10:41 20 mg/L 0.017 D1 0.010 mg/L 06/05/18 08:55 06/15/18 10:41 20 **Barium** Cadmium NΠ D1 0.0020 mg/L 06/05/18 08:55 06/15/18 10:41 20 Cobalt ND D1 0.010 mg/L 06/05/18 08:55 06/15/18 10:41 20 Lead ND D1 0.010 06/05/18 08:55 06/15/18 10:41 20 mg/L ND D1 20 Molybdenum 0.010 mg/L 06/05/18 08:55 06/15/18 10:41 Selenium ND D1 0.010 06/05/18 08:55 06/23/18 13:29 20 mg/L Thallium ND D1 0.0020 mg/L 06/05/18 08:55 06/15/18 10:41 20

Client Sample ID: FC-CCR-MW-8-6118 Lab Sample ID: 550-103742-2 **Matrix: Water** 

Date Collected: 06/01/18 11:19 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.91	D1	0.80	mg/L			06/05/18 03:48	2
Method: 200.7 Rev 4.4 - Metals	(ICP)							
Analyte	. ,	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	1.2		0.20	mg/L		06/05/18 11:56	06/06/18 21:14	1

Method: 200.8 LL - Metals (ICP/MS) Result Qualifier RL **Analyte** Unit D Prepared Dil Fac Analyzed ND D1 0.010 Arsenic mg/L 06/05/18 08:55 06/15/18 11:15 20 **Barium** 0.011 D1 0.010 mg/L 06/05/18 08:55 06/15/18 11:15 20 ND D1 20 Cadmium 0.0020 mg/L 06/05/18 08:55 06/15/18 11:15 Cobalt ND D1 0.010 mg/L 06/05/18 08:55 06/15/18 11:15 20 Lead ND D1 0.010 mg/L 06/05/18 08:55 06/15/18 11:15 20 0.010 06/05/18 08:55 06/15/18 11:15 20 Molybdenum 0.011 D1 mg/L ND D1 06/05/18 08:55 06/23/18 13:59 20 Selenium 0.010 mg/L Thallium ND D1 0.0020 06/05/18 08:55 06/15/18 11:15 20 mg/L

Client Sample ID: FC-CCR-MW-49A-6118 Lab Sample ID: 550-103742-3

Date Collected: 06/01/18 12:49 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Io	n Chromatograpl	hy						
Analyte Fluoride	Result Q			mg/L	_ D	Prepared	Analyzed 06/05/18 04:43	Dil Fac
Method: 200.7 Rev 4.4 - Me Analyte	etals (ICP) Result Q	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

06/05/18 11:56 06/06/18 21:20 Lithium 1.1 0.20 mg/L

TestAmerica Phoenix

**Matrix: Water** 

Page 8 of 31

6/28/2018

# **Client Sample Results**

Client: Arizona Public Service Compar Project/Site: CCR	ıy					ГestAmerica .	Job ID: 550-10 SDG	)3742-2 : Cholla
Method: 200.8 LL - Metals (ICP/MS)		Overlifier.	DI	1124		Durananad	Analomad	D:: F-
Analyte		Qualifier	RL	Unit	D	Prepared 06/05/18 08:55	Analyzed	Dil Fa
Arsenic		D1	0.010	mg/L				20
Barium	0.022		0.010	mg/L			06/15/18 11:17	20
Cadmium		D1	0.0020	mg/L			06/15/18 11:17	20
Cobalt	ND	D1	0.010	mg/L			06/15/18 11:17	20
Lead	ND	D1	0.010	mg/L			06/15/18 11:17	20
Molybdenum	0.018		0.010	mg/L			06/15/18 11:17	20
Selenium Thallium	ND ND	D1 D1	0.010 0.0020	mg/L mg/L			06/23/18 14:01 06/15/18 11:17	20 20
Client Sample ID: FC-CCR-MW late Collected: 06/01/18 09:26					La		ID: 550-103 Matrix	
Date Received: 06/04/18 13:25								
Method: 300.0 - Anions, Ion Chrom Analyte		iphy Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.3	D1	0.80	mg/L			06/05/18 05:38	
Method: 200.7 Rev 4.4 - Metals (ICF	P)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Lithium	0.36		0.20	mg/L		06/05/18 11:56	06/06/18 21:26	
Method: 200.8 LL - Metals (ICP/MS) Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Arsenic	ND	D1	0.010	<del></del>		•	06/15/18 11:19	20
	0.014		0.010	mg/L			06/15/18 11:19	2
Barium			0.0020	_				
Cadmium	ND	D1		mg/L			06/15/18 11:19	2
Cobalt	0.017		0.010	mg/L			06/15/18 11:19	2
Lead		D1	0.010	mg/L			06/15/18 11:19	2
Molybdenum	0.085		0.010	mg/L			06/15/18 11:19	2
Selenium		D1	0.010	mg/L			06/23/18 14:04	2
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:19	2
Client Sample ID: FC-CCR-FD0	01-61	18			La	b Sample	ID: 550-103	
Pate Received: 06/04/18 13:25							Matrix	vvale
Method: 300.0 - Anions, Ion Chrom		i <mark>phy</mark> Qualifier	RL	Unit		Duamanad	A malumad	Dil Fac
Analyte			0.80		D	Prepared	Analyzed 06/05/18 06:32	DII Fac
Fluoride	1.3	D1	0.80	mg/L			00/05/16 00.32	4
Method: 200.7 Rev 4.4 - Metals (ICF					_			
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.36		0.20	mg/L		06/05/18 11:56	06/06/18 21:32	•
Method: 200.8 LL - Metals (ICP/MS) Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:22	20
Barium	0.014	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:22	20
Cadmium		D1	0.0020	mg/L			06/15/18 11:22	20
Cobalt	0.017		0.010	mg/L			06/15/18 11:22	20
Lead		D1	0.010	mg/L			06/15/18 11:22	20
Molybdenum	0.082		0.010	mg/L			06/15/18 11:22	20
Solonium	0.002		0.010	mg/L			06/23/19 14:06	

0.010

0.0020

ND D1

ND D1

Selenium

Thallium

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20

06/05/18 08:55 06/23/18 14:06

06/05/18 08:55 06/15/18 11:22

Page 9 of 31 6/28/2018

mg/L

mg/L

## **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-74-6118

Date Collected: 06/01/18 08:20 Date Received: 06/04/18 13:25 Lab Sample ID: 550-103742-6

**Matrix: Water** 

Method: 300.0 - Anio Analyte	,	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.1	D1	0.80	mg/L			06/05/18 07:27	2
Method: 200 7 Pov 4	4. Matala (ICD)							
Method: 200.7 Rev 4.	4 - Metais (ICP)							
Analyte	• • •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:24	20
Barium	0.019	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:24	20
Cadmium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:24	20
Cobalt	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:24	20
Lead	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:24	20
Molybdenum	0.015	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:24	20
Selenium	0.089	D1	0.010	mg/L		06/05/18 08:55	06/23/18 14:08	20
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:24	20

Lab Sample ID: 550-103742-7 Client Sample ID: FC-CCR-MW-75-6118

Date Collected: 06/01/18 10:38

**Matrix: Water** 

Date Received: 06/04/18 13:25

Method: 300.0 - Anions, lo	n Chromatogra	ıphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.2	D1	0.80	mg/L			06/05/18 09:17	2
Method: 200.7 Rev 4.4 - M	etals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.40		0.20	mg/L		06/05/18 11:56	06/06/18 21:44	1
Method: 200.8 LL - Metals	(ICP/MS)							

Method: 200.8 LL - Met	als (ICP/MS)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:26	20
Barium	0.020	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:26	20
Cadmium	0.0024	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:26	20
Cobalt	0.048	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:26	20
Lead	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:26	20
Molybdenum	0.17	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:26	20
Selenium	ND	D1	0.010	mg/L		06/05/18 08:55	06/23/18 14:10	20
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:26	20

TestAmerica Job ID: 550-103742-2

Client: Arizona Public Service Company Project/Site: CCR

SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: 550-103742-1 MSD Client Sample ID: FC-CCR-MW-7-6118 **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 148810** 

Sample Sample Spike MSD MSD %Rec. RPD Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit ND D1 800 Fluoride 865 D1 mg/L 108 80 - 120 20

Lab Sample ID: 550-103742-1MS Client Sample ID: FC-CCR-MW-7-6118 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 148810** 

Sample Sample Spike MS MS %Rec. Result Qualifier Result Qualifier Added Limits Analyte Unit %Rec Fluoride  $\overline{ND}$   $\overline{D1}$ 800 873 D1 mg/L 109 80 - 120

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

Lab Sample ID: 550-103742-1 MSD Client Sample ID: FC-CCR-MW-7-6118 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149071 Prep Batch: 148863** Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit Limits RPD Limit Lithium 0.832 1.00 98 70 - 130 1.81 mg/L

Lab Sample ID: 550-103742-1MS Client Sample ID: FC-CCR-MW-7-6118 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149071** 

**Prep Batch: 148863** Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Limits Unit %Rec Lithium 0.832 1.00 1.80 mg/L 97 70 - 130

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

Lab Sample ID: MB 550-148822/1-A **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA Analysis Batch: 149720 **Prep Batch: 148822** 

	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Barium	ND		0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Cadmium	ND		0.00010	mg/L		06/05/18 08:55	06/15/18 10:27	1
Cobalt	ND		0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Lead	ND		0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Molybdenum	ND		0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Thallium	ND		0.00010	mg/L		06/05/18 08:55	06/15/18 10:27	1

Lab Sample ID: MB 550-148822/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 150245

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Arsenic 0.00050 mg/L 06/05/18 08:55 06/23/18 13:16 ND Barium ND 06/05/18 08:55 06/23/18 13:16 0.00050 mg/L Cadmium ND 0.00010 mg/L 06/05/18 08:55 06/23/18 13:16 Cobalt ND 0.00050 06/05/18 08:55 06/23/18 13:16 mg/L

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**Prep Batch: 148822** 

Page 11 of 31

6/28/2018

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2 SDG: Cholla

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

MB MB

Lab Sample ID: MB 550-148822/1-A

Lab Sample ID: LCS 550-148822/2-A

**Matrix: Water** 

**Matrix: Water** 

**Analysis Batch: 150245** 

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

**Prep Batch: 148822** 

Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	0.0	0050	mg/L	_	06/05/18 08:55	06/23/18 13:16	1
Molybdenum	ND	0.0	0050	mg/L		06/05/18 08:55	06/23/18 13:16	1
Selenium	ND	0.0	0050	mg/L		06/05/18 08:55	06/23/18 13:16	1
Thallium	ND	0.0	0010	mg/L		06/05/18 08:55	06/23/18 13:16	1

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA

Analysis Batch: 149720	Spike	LCS	LCS				Prep Batch: 148822 %Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Arsenic	0.100	0.102	-	mg/L		102	85 - 115
Barium	0.100	0.0990		mg/L		99	85 - 115
Cadmium	0.100	0.0966		mg/L		97	85 - 115
Cobalt	0.100	0.0995		mg/L		100	85 - 115
Lead	0.100	0.0991		mg/L		99	85 - 115
Molybdenum	0.100	0.0982		mg/L		98	85 - 115
Thallium	0.100	0.0988		mg/L		99	85 - 115

Lab Sample ID: LCS 550-148822/2-A **Client Sample ID: Lab Control Sample** 

**Matrix: Water** 

Analysis Batch: 150245

	Prep Type: Total/NA
	<b>Prep Batch: 148822</b>
S LCS	%Rec.

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Arsenic	0.100	0.102		mg/L		102	85 - 115	
Barium	0.100	0.102		mg/L		102	85 - 115	
Cadmium	0.100	0.102		mg/L		102	85 <sub>-</sub> 115	
Cobalt	0.100	0.102		mg/L		102	85 - 115	
Lead	0.100	0.101		mg/L		101	85 <sub>-</sub> 115	
Molybdenum	0.100	0.103		mg/L		103	85 - 115	
Selenium	0.100	0.101		mg/L		101	85 - 115	
Thallium	0.100	0.102		mg/L		102	85 - 115	

Lab Sample ID: LCSD 550-148822/3-A **Client Sample ID: Lab Control Sample Dup** Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 149720

				Prep Ba	itch: 14	18822
D				%Rec.		RPD
lifier	Unit	D	%Rec	Limits	RPD	Limit
	mg/L		96	85 - 115	6	20
	mg/L		99	85 - 115	0	20
	mg/L		100	85 - 115	4	20
	ma/l		96	85 115	3	20

Spike LCSD LCSI Analyte Added Result Quali Arsenic 0.100 0.0961 Barium 0.100 0.0988 Cadmium 0.100 0.100 Cobalt 0.100 0.0964 85 - 115 mg/L 96 20 Lead 0.100 0.0988 mg/L 99 85 - 115 20 Molybdenum 85 - 115 0.100 0.0989 mg/L 99 20 Thallium 0.100 0.0973 mg/L 85 - 115 20

TestAmerica Job ID: 550-103742-2

Client: Arizona Public Service Company

Project/Site: CCR

SDG: Cholla

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

Lab Sample ID: LCSD 550-148822/3-A			(	Client S	ample	ID: Lat	Control	Sample	e Dup
Matrix: Water							<b>Prep Ty</b>	pe: Tot	al/NA
Analysis Batch: 150245							Prep Ba	atch: 14	48822
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.100	0.101		ma/l		101	85 115		20

Lab Sample ID: 550-103742 Matrix: Water Analysis Batch: 149720		Sample	Snika	MSD	MSD	Clie	nt Sa	mple ID	: FC-CCR Prep Typ Prep Ba %Rec.	e: Tot	al/NA
Analyte	•	Sample Qualifier	Spike Added	_	Qualifier	Unit	D	%Rec	%Rec.	RPD	Limit
Arsenic	ND	D1 -	0.100	0.102		mg/L		102	70 - 130	3	20
Barium	0.017	D1	0.100	0.122		mg/L		105	70 - 130	2	20
Cadmium	ND	D1	0.100	0.105		mg/L		105	70 - 130	2	20
Cobalt	ND	D1	0.100	0.0973		mg/L		97	70 - 130	1	20
Lead	ND	D1	0.100	0.101		mg/L		101	70 - 130	0	20
Molybdenum	ND	D1	0.100	0.114		mg/L		107	70 - 130	2	20
Thallium	ND	D1	0.100	0.0966		mg/L		97	70 - 130	0	20

Lab Sample ID: 550-103742 Matrix: Water Analysis Batch: 150245	2-1 MSD					Clie	ent Sa	mple IC	: FC-CCR Prep Typ Prep Ba	e: Tot	al/NA
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	ND	D1	0.100	0.107	D1	mg/L		104	70 - 130	2	20

Lab Sample ID: 550-103742 Matrix: Water Analysis Batch: 149720		Sample	Spike	MS	MS	Clie	nt Sample		Prep Type: Total/NA Prep Batch: 148822 %Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Arsenic	ND	D1	0.100	0.0991		mg/L		99	70 - 130
Barium	0.017	D1	0.100	0.119		mg/L		102	70 - 130
Cadmium	ND	D1	0.100	0.103		mg/L		103	70 - 130
Cobalt	ND	D1	0.100	0.0961		mg/L		96	70 - 130
Lead	ND	D1	0.100	0.101		mg/L		101	70 - 130
Molybdenum	ND	D1	0.100	0.111		mg/L		105	70 - 130
Thallium	ND	D1	0.100	0.0963		mg/L		96	70 - 130

Lab Sample ID: 550-103742-	Lab Sample ID: 550-103742-1MS					Client Sample ID: FC-CCR-MW-7-611						
Matrix: Water									Prep Type: Total/NA			
Analysis Batch: 150245									<b>Prep Batch: 148822</b>			
	Sample	Sample	Spike	MS	MS				%Rec.			
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits			
Selenium	ND	D1	0.100	0.109	D1	mg/L		106	70 - 130			

6/28/2018

## QC Sample Results

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

Method: 245.1 - Mercury (CVAA)

Lab Sample ID: MB 550-148891/1-A	Client Sample ID: Method Blank
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 149005	Prep Batch: 148891

**Analysis Batch: 149005** MB MB

Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac 0.00020 mg/L 06/05/18 14:43 06/06/18 16:51 Hg ND

Lab Sample ID: LCS 550-148891/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149005 Prep Batch: 148891** Spike LCS LCS %Rec. Added Result Qualifier Unit Limits Analyte %Rec 0.0100 85 - 115 Hg 0.0107 mg/L 107

Lab Sample ID: LCSD 550-148891/3-A **Client Sample ID: Lab Control Sample Dup Matrix: Water Prep Type: Total/NA** Analysis Batch: 149005 **Prep Batch: 148891** Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Limits RPD Limit Unit D %Rec 0.0100 Hg 0.0106 mg/L 106 85 - 115

Lab Sample ID: 550-103742-1MS Client Sample ID: FC-CCR-MW-7-6118 **Matrix: Water** Prep Type: Total/NA Analysis Batch: 149005 **Prep Batch: 148891** Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit Limits Hg 0.0029 M2 0.0100 0.00904 M2 mg/L 61 70 - 130

Client: Arizona Public Service Company

TestAmerica Job ID: 550-103742-2 SDG: Cholla

HPLC/IC

Project/Site: CCR

**Analysis Batch: 148810** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	300.0	
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	300.0	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	300.0	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	300.0	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	300.0	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	300.0	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	300.0	
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	300.0	
550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	300.0	

## Metals

**Prep Batch: 148822** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.8	_
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.8	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.8	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.8	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.8	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.8	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.8	
MB 550-148822/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-148822/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-148822/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.8	
550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	200.8	

## Prep Batch: 148863

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.7	
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.7	
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.7	
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.7	
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.7	
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.7	
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.7	
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.7	
550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	200.7	

## **Prep Batch: 148891**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-148891/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-148891/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-148891/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	245.1	

## **Analysis Batch: 149005**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-148891/1-A	Method Blank	Total/NA	Water	245.1	148891
LCS 550-148891/2-A	Lab Control Sample	Total/NA	Water	245.1	148891

TestAmerica Phoenix

Page 15 of 31 6/28/2018

# **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

## **Metals (Continued)**

## **Analysis Batch: 149005 (Continued)**

	Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
	LCSD 550-148891/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	148891
İ	550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	245.1	148891

## **Analysis Batch: 149071**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863
550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	200.7 Rev 4.4	148863

## **Analysis Batch: 149720**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.8 LL	148822
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.8 LL	148822
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.8 LL	148822
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.8 LL	148822
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.8 LL	148822
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.8 LL	148822
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.8 LL	148822
MB 550-148822/1-A	Method Blank	Total/NA	Water	200.8 LL	148822
LCS 550-148822/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	148822
LCSD 550-148822/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	148822
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.8 LL	148822
550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	200.8 LL	148822

## **Analysis Batch: 150245**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103742-1	FC-CCR-MW-7-6118	Total/NA	Water	200.8 LL	148822
550-103742-2	FC-CCR-MW-8-6118	Total/NA	Water	200.8 LL	148822
550-103742-3	FC-CCR-MW-49A-6118	Total/NA	Water	200.8 LL	148822
550-103742-4	FC-CCR-MW-61-6118	Total/NA	Water	200.8 LL	148822
550-103742-5	FC-CCR-FD01-6118	Total/NA	Water	200.8 LL	148822
550-103742-6	FC-CCR-MW-74-6118	Total/NA	Water	200.8 LL	148822
550-103742-7	FC-CCR-MW-75-6118	Total/NA	Water	200.8 LL	148822
MB 550-148822/1-A	Method Blank	Total/NA	Water	200.8 LL	148822
LCS 550-148822/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	148822
LCSD 550-148822/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	148822
550-103742-1 MSD	FC-CCR-MW-7-6118	Total/NA	Water	200.8 LL	148822
550-103742-1MS	FC-CCR-MW-7-6118	Total/NA	Water	200.8 LL	148822

TestAmerica Job ID: 550-103742-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-7-6118

Date Collected: 06/01/18 12:07 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103742-1

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 01:04	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:15	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 10:41	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 13:29	TEK	TAL PHX

Client Sample ID: FC-CCR-MW-8-6118 Lab Sample ID: 550-103742-2

Date Collected: 06/01/18 11:19

**Matrix: Water** 

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 03:48	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:14	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 11:15	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 13:59	TEK	TAL PHX

Client Sample ID: FC-CCR-MW-49A-6118 Lab Sample ID: 550-103742-3

Date Collected: 06/01/18 12:49 Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	148810	06/05/18 04:43	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:20	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 11:17	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 14:01	TEK	TAL PHX

Client Sample ID: FC-CCR-MW-61-6118

Lab Sample ID: 550-103742-4 Date Collected: 06/01/18 09:26 **Matrix: Water** 

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 05:38	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:26	ARE	TAL PHX

TestAmerica Phoenix

Page 17 of 31

10

**Matrix: Water** 

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-61-6118

Date Collected: 06/01/18 09:26 Date Received: 06/04/18 13:25 Lab Sample ID: 550-103742-4

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 11:19	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 14:04	TEK	TAL PHX

Client Sample ID: FC-CCR-FD01-6118 Lab Sample ID: 550-103742-5

Date Collected: 06/01/18 09:26

Matrix: Water

Lab Sample ID: 550-103742-6

Date Received: 06/04/18 13:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	148810	06/05/18 06:32	NBL	TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	148863 149071	06/05/18 11:56 06/06/18 21:32		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.8 200.8 LL		20	148822 149720	00,00,.000.00		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.8 200.8 LL		20	148822 150245	06/05/18 08:55 06/23/18 14:06		TAL PHX TAL PHX

Client Sample ID: FC-CCR-MW-74-6118

Date Collected: 06/01/18 08:20

Date Received: 06/04/18 13:25

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 07:27	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:38	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 11:24	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 14:08	TEK	TAL PHX

Client Sample ID: FC-CCR-MW-75-6118

Date Collected: 06/01/18 10:38

Date Received: 06/04/18 13:25

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 09:17	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:44	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 11:26	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 14:10	TEK	TAL PHX

TestAmerica Phoenix

Page 18 of 31

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Lab Sample ID: 550-103742-7 Matrix: Water

**Matrix: Water** 

## **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2

SDG: Cholla

#### **Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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: 550-103742-2
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

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## **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103742-2

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
245.1	Mercury (CVAA)	EPA	TAL PHX
Subcontract	Radium 226/228	None	Radiation
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

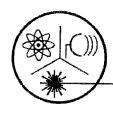
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

None = None

#### Laboratory References:

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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



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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-7-6118 (550-103742-1)	$0.5\pm0.2$	$0.8 \pm 0.3$	1.3 ± 0.4

- 1				
	Date of Analysis	6/6/2018	6/6/2018	6/6/2018

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6/18/2018

Date

Laboratory License Number AZ0462

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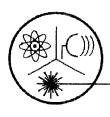
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3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-8-6118 (550-103742-2)	< 0.5	< 0.7	< 0.7

Date of Analysis	6/6/2018	6/6/2018	6/6/2018
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Robert L. Metzger, Ph.D., C.H.F

6/18/2018 Date

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Laboratory License Number AZ0462

Page 23 of 31

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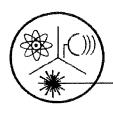
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3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-49A-6118 (550-103742-3)	< 0.5	$1.5 \pm 0.3$	$1.5 \pm 0.3$

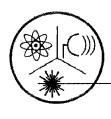
	·	·	
Date of Analysis	6/6/2018	6/6/2018	6/6/2018

6/18/2018

Robert L. Metzger, Ph.D., C.H.P.

Date

Laboratory License Number AZ0462



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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-61-6118 (550-103742-4)	< 0.5	< 0.7	< 0.7

	Date of Analysis	6/6/2018	6/6/2018	6/6/2018
I		<del>-</del>	-, -,	

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462

Page 25 of 31

6/28/2018

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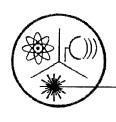
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3245 N. WASHINGTON ST. + CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD01-6118 (550-103742-5)	< 0.5	< 0.7	< 0.7

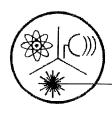
Date of Analysis	6/6/2018	6/6/2018	6/6/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462



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(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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-74-6118 (550-103742-6)	< 0.5	< 0.7	< 0.7

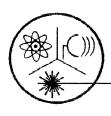
Date of Analysis	6/6/2018	6/6/2018	6/6/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462



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: June 01, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-75-6118 (550-103742-7)	< 0.5	$1.4 \pm 0.3$	1.4 ± 0.3

			and a contract of the contract
Date of Analysis	6/6/2018	6/6/2018	6/6/2018

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.. Metzger, Ph.D., C.H.P.

6/18/2018 Date

Laboratory License Number AZ0462

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Ver: 09/20/2016

Client information (Sub Contract Lab)		Bak	Baker, Ken		550-311 1	
Client Contact Shipping/Becaiving	Phone:	E-Mail		State of Origin:	Page:	
Company:		ken	ken.baker@testamericainc.com	Arizona	Page 1 of 1	
Radiation Safety Eng., Inc.			Accreditations Required (See note): State Program - Arizona		Job #:	
Address: 3245 North Washington Street	Due Date Requested:				Preservation Codes:	
City	0/13/2018		Analysis Requested	uested		
Chandler	(IAI Requested (days):					ane e
State, Zip: AZ, 85225					<b>.</b>	1a02 048
Phone	PO#:		jórs. Mars			\$203 5203
Email:	WO #:		(0	7. 45. D	H - Ascorbic Acid I - Ice	T - TSP Dodecahydrate U - Acetone
Project Name: APS - Four Corners CCR	Project #. 55009706		N JO S	SJBuji	J - DI Water K - EDTA L - EDA	V - MCAA W - pH 4-5 Z - olher (soecify)
Sile: Arizona Public Service	SSOW#:		¢λ}gs	guos 3	Other:	3
Sample identification - Client ID (Lab ID)	Sample Date Time	Sample Matrix Type (w-water, g-wold, G-comp, g-water)	2 beratis Alei Misov, Interne SS mulbas) (Ut	о тәфімий Гесо		
	X	Preservation Code:	$\downarrow$	<u> </u>	Special Instructions/Note:	ons/Note:
FC-CCR-MW-7-6118 (550-103742-1)	6/1/18 12:07 Mountain	Water	X		Job 3	
FC-CCR-MW-8-6118 (550-103742-2)	6/1/18 Mountain	Water	×	2	Job 3	1
FC-CCR-MW-49A-6118 (550-103742-3)	6/1/18 12:49 Mountain	Water	×	2	Job 3	
FC-CCR-MW-61-6118 (550-103742-4)	6/1/18 09:26 Mountain	Water	×	C	C C C Sqop	
FC-CCR-FD01-6118 (550-103742-5)	6/1/18 09:26 Mountain	Water	×	N		
FC-CCR-MW-74-6118 (550-103742-6)	6/1/18 08:20 Mountain	Water	×	N N		- 1
FC-CCR-MW-75-6118 (550-103742-7)	6/1/18 10:38 Mountain	Water	×	0.0	7 5	3 ar
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/lests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditations are current to date, return the signed Chain of Custody attacking to said complicance to TestAmerica laboratories, inc. aftertion immediately. If all requested accreditations are current to date, return the signed Chain of Custody attacking to said complicance to TestAmerica laboratories, inc.	nies, Inc. places the ownership of m matrix being analyzed, the sampler to date, return the signed Chain of	lethod, analyte & accreditation of must be shipped back to the T Custody attesting to said compli	ompliance upon out subcontract laboratories. This stAmerica laboratory or other instructions will be pance to TestAmerica Laboratories, inc.	sample shipment is forwarded under of ovidad. Any changes to accreditation	lant-of-custody. If the laboratory status should be brought to Test	/ does not Vamerica
Possible Hazard Identification			Samula Disposal ( & fee may be presented if manulances	in the contraction of the contraction		
Unconfirmed			Return To Client	Assessed it samples are retained	ed fonger than 1 month)	
Deliverable Requested: I, II, III, IV, Other (specify)	Primary Deliverable Rank: 2	2	Requirem	Posar by Lab	re ror	
linquished by:	Date:		Time:	Method of Shipment:		
Reinquished by: Reinquished by: Reformitiend by:	Osterline: 14 4:54m	Company	Received by:	VICA Date/Time: -/ S	Company	1
Ruin (chairea by:	Date/Time;	Сатрапу	Received by:	Date/Time:	Сомрапу	,
	Date/Time:	Сотрану	Received by:	Date/Time:	Company	,
Custody Seals Intact: Custody Seal No.:  A Yes A No			Cooler Temperature(s) "C and Other Remarks.	arks;		

TestAmerica Bretish as an another the testing

Chain of Custody Record

4625 East Cotton Ctr Blvd Suite 189 Phoenix, AZ 85040 Phone (602) 437-3340 Fax (602) 454-9303

TestAmerica Phoenix

TestAmerica Phoenix		Chain	Chain of Custody Becord	τ	
4625 E Cotton Center Blvd Suite 189		2	(	3	
Phoenix, AZ 85040 phone 602.437.3340 fax 602.454.9303	Regulatory Program:				
Client Contact	Doug Lavarnway		Doug Lavarnway	F001613	l estAmerica Laboratories, Inc.
APS Four Corners	928-587-0319		Lab Contact:	Carrier	1 0000
End of County Road 6675	Analysis Turnarounc	round Time	,9é,		_
Aexico 87416			S 'o		For Jah Jisa Oniv.
6	TAT if different from Below		(N		Walk-in Client:
			/ \		Lab Sampling:
Project Name: CCR			) co		
PO#			/ MS a, Co a, Co		Job / SDG No.:
	Sample		2M r 1) 7.0 58 ,2/ 52 6/		
Sample Identification	Sample Sample (C=Comp.	# of Matrix Cont.	Filtered Perform Perform 200.8 (A TI) TIP EPA 300		Sample Specific Notes:
FC-CCR-MW-7-6118 🖒 🖰 (	6/1/2018 1207 G	×			
FC-CCR-MW-8-6118	6/1/2018 1119 G	w 4	× ×		
FC-CCR-MW-49A-6118		4	× ×		
FC-CCR-MW-61-6118	6/1/2018 926 G	4	,		
FC-CCR-FD01-6118		4	< >		
	ROOM	4	< :		
E C C C D NAM 7E 6110		+	×		
	5 1038 G	· A	× × × × × ×		
1					
Preservation [sed: 1- Inc. 9- UCI: 9- USEQ4: 4-UND0. 5- N-Q1C ON					
Doesho Data Hamistonia	=NaOH; 6= Other				
A Hazardous Waste? dispose of the sample.	Please List any EPA Waste Codes for the	or the sample in the	Sample Disposal ( A fee may	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)	d longer than 1 month)
Special Instructions/QC Requirements & Comments:					
		) 10	No.		
Custody Seals Intact:	Custody Seal No.:		Cooler Temp. (*C): Obs'd	Obsid:	Thorm ID No.
Relinquished by:	Company: The	Date/Time:	Received by:	Сотра	Date/Time:
Relinquished by:	Company:	Date/Fime:	Received by:	Company:	Date/Time:
Rednquished by:	еотрапу:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:
18	1.600	\$ \$\displays{c}\$	Los Charles	Form No CA	Form No CA-C-WI-000 Box 4.3 defend of frontests
			1	3	טייייייייייייייייייייייייייייייייייייי
			2 3 4 5	7 8 9	2 3 4

# **TestAmerica Phoenix**

86/28/2018

## **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-103742-2

SDG Number: Cholla

Login Number: 103742 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.</td <td>True</td> <td></td>	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.

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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: 550-113026-1

Client Project/Site: APS - Four Corners CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 11/30/2018 5:18:48 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

-----LINKS -----

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	10
QC Association Summary	19
Lab Chronicle	22
Certification Summary	24
Method Summary	25
Chain of Custody	26
Receipt Checklists	28

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# **Definitions/Glossary**

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

blank spike was acceptable.

Toxicity Equivalent Quotient (Dioxin)

TestAmerica Job ID: 550-113026-1

## **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.
M2	Matrix spike recovery was low, the associated blank spike recovery was acceptable.
Motals	

#### 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

#### **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**

**TEQ** 

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)

Page 3 of 28

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## **Case Narrative**

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

TestAmerica Job ID: 550-113026-1

Job ID: 550-113026-1

**Laboratory: TestAmerica Phoenix** 

Narrative

Job Narrative 550-113026-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.9° C and 3.6° C.

#### HPLC/IC

Method(s) 300.0: The following sample was diluted for Fluoride by method EPA 300.0 due to the nature of the sample matrix: FC-CCR-MW49A-11418 (550-113026-5). This analyte was not detected in the diluted samples. Elevated reporting limits (RLs) have been provided and these data have been qualified with D1 and D5 flags.

Method(s) 300.0: Fluoride by method EPA 300.0 was reanalyzed for the following sample at a lower dilution per the client's request to meet the minimum detection limit of 0.80 mg/L; FC-CCR-MW7-11418 (550-113026-1), FC-CCR-MW8-11418 (550-113026-2) and FC-CCR-MW49A-11418 (550-113026-5).

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.

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# **Sample Summary**

Matrix

Water

Water

Water

Water

Water

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

**Client Sample ID** 

FC-CCR-MW7-11418

FC-CCR-MW8-11418

FC-CCR-MW61-11318

FC-CCR-MW75-11318

FC-CCR-MW49A-11418

Lab Sample ID

550-113026-1

550-113026-2

550-113026-3

550-113026-4

550-113026-5

TestAmerica Job ID: 550-113026-1

Collected	Received	
11/04/18 09:02	11/07/18 13:00	
11/04/18 08:19	11/07/18 13:00	

11/03/18 14:44 11/07/18 13:00 11/03/18 15:25 11/07/18 13:00

11/04/18 09:59 11/07/18 13:00

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

TestAmerica Job ID: 550-113026-1

Lab Sample ID: 550-113026-1

Lab Sample ID: 550-113026-2

Lab Sample ID: 550-113026-3

Lab Sample ID: 550-113026-4

Lab Sample ID: 550-113026-5

## Client Sample ID: FC-CCR-MW7-11418

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	680	D2	400	mg/L	200	300.0	Total/NA
Sulfate	6100	D2	400	mg/L	200	300.0	Total/NA
Boron	7.4	M3	0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	320	M3	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	9900	D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.4	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: FC-CCR-MW8-11418

Analyte	Result Qua	alifier RL	Unit	Dil Fac D	Method	Prep Type
Chloride	1200 D2	400	mg/L	200	300.0	Total/NA
Sulfate	10000 D2	400	mg/L	200	300.0	Total/NA
Boron	14	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	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	12.2 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW61-11318

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	340	D1	10	mg/L	5	300.0	Total/NA
Fluoride	1.3	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	3600	D2	400	mg/L	200	300.0	Total/NA
Boron	37		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	5300	D2	100	mg/L	1	SM 2540C	Total/NA
pH	8.6	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

## Client Sample ID: FC-CCR-MW75-11318

Analyte	Result	Qualifier	RL	Unit	Dil Fac [	Method	Prep Type
Chloride	310	D1 -	10	mg/L	5	300.0	Total/NA
Fluoride	1.2	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	4300	D2	400	mg/L	200	300.0	Total/NA
Boron	24	M3	0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	430	M3	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	6200	D2	100	mg/L	1	SM 2540C	Total/NA
pH	8.3	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	12.5	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW49A-11418

 Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	590	D2	400	mg/L	200	300.0	Total/NA
Sulfate	19000	D2	400	mg/L	200	300.0	Total/NA
Boron	1.8		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

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

11/30/2018

Page 6 of 28

# **Detection Summary**

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

TestAmerica Job ID: 550-113026-1

Lab Sample ID: 550-113026-5

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## Client Sample ID: FC-CCR-MW49A-11418 (Continued)

Analyte	Result Qualifier	RL	Unit	Dil Fac	Method	Prep Type
Total Dissolved Solids	27000 D2	200	mg/L	1	SM 2540C	Total/NA
pН	7.4 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	12.8 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

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TestAmerica Job ID: 550-113026-1

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

Client Sample ID: FC-CCR-MW7-11418

Date Collected: 11/04/18 09:02 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113026-1

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	680	D2	400	mg/L			11/14/18 11:11	200
Fluoride	ND	D1 D5 M2	0.80	mg/L			11/28/18 02:55	2
Sulfate	6100	D2	400	mg/L			11/14/18 11:11	200
Method: 200.7 Rev 4.4 - Metals (IC	<b>P</b> )							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	7.4	M3	0.050	mg/L		11/09/18 07:33	11/13/18 13:31	1
Calcium	320	M3	2.0	mg/L		11/09/18 07:33	11/13/18 13:31	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	9900	D2	100	mg/L			11/08/18 12:33	1
pH	7.4	H5	1.7	SU			11/12/18 13:18	1
Temperature	13.0	H5	0.1	Degrees C			11/12/18 13:18	1

Lab Sample ID: 550-113026-2 Client Sample ID: FC-CCR-MW8-11418 **Matrix: Water** 

Date Collected: 11/04/18 08:19 Date Received: 11/07/18 13:00

Method: 300.0 - Anions	s, Ion Chromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1200	D2	400	mg/L			11/14/18 15:57	200
Fluoride	ND	D1 D5	0.80	mg/L			11/28/18 02:00	2
Sulfate	10000	D2	400	mg/L			11/14/18 15:57	200

Method: 200.7 Rev 4.4 - Metals	(ICP)						
Analyte	Result Qua	alifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	14	0.050	mg/L		11/09/18 07:33	11/13/18 13:54	1
Calcium	390	2.0	mg/L		11/09/18 07:33	11/13/18 13:54	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	15000	D2	200	mg/L		-	11/08/18 12:33	1
pH	7.3	H5	1.7	SU			11/12/18 13:18	1
Temperature	12.2	H5	0.1	Degrees C			11/12/18 13:18	1

Lab Sample ID: 550-113026-3 Client Sample ID: FC-CCR-MW61-11318 Date Collected: 11/03/18 14:44 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Io	n Chromatograph	ту					
Analyte	Result Q	ualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	340 D	<u>1</u> 10	mg/L			11/14/18 16:15	5
Fluoride	1.3 D	1 0.80	mg/L			11/17/18 04:24	2
Sulfate	3600 D	<b>2</b> 400	mg/L			11/14/18 16:34	200

Method: 200.7 Rev 4.4 - Metals	(ICP)						
Analyte	Result Qu	ualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	37	0.050	mg/L		11/09/18 07:33	11/13/18 14:00	1
Calcium	470	2.0	mg/L		11/09/18 07:33	11/13/18 14:00	1

Page 8 of 28

TestAmerica Phoenix

11/30/2018

Client Sample ID: FC-CCR-MW61-11318

Date Collected: 11/03/18 14:44 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113026-3

**Matrix: Water** 

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5300	D2	100	mg/L			11/08/18 12:33	1
pH	8.6	H5	1.7	SU			11/12/18 13:18	1
Temperature	12.5	H5	0.1	Degrees C			11/12/18 13:18	1

Client Sample ID: FC-CCR-MW75-11318 Lab Sample ID: 550-113026-4

Date Collected: 11/03/18 15:25 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac Chloride 310 D1 10 mg/L 11/21/18 04:35 5 **Fluoride** 0.80 11/20/18 20:52 2 1.2 D1 mg/L **Sulfate** 400 mg/L 11/21/18 05:57 200 4300 D2

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac D Boron 24 **M3** 0.050 mg/L 11/09/18 07:33 11/13/18 13:48 2.0 11/09/18 07:33 11/13/18 13:48 **Calcium** 430 M3 mg/L

	eneral Chemistry nalyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
To	otal Dissolved Solids	6200	D2	100	mg/L			11/08/18 12:33	1
pl	4	8.3	H5	1.7	SU			11/12/18 13:18	1
Te	emperature	12.5	H5	0.1	Degrees C			11/12/18 13:18	1

Client Sample ID: FC-CCR-MW49A-11418 Lab Sample ID: 550-113026-5

Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00

**Sulfate** 

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac 400 Chloride 590 D2 mg/L 11/14/18 15:20 200 Fluoride ND D1 D5 0.80 mg/L 11/14/18 20:07 2

400

19000 D2

mg/L

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac 0.050 Boron 1.8 mg/L 11/09/18 07:33 11/13/18 14:06 **Calcium** 380 2.0 mg/L 11/09/18 07:33 11/13/18 14:06

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	27000	D2	200	mg/L			11/09/18 10:22	1
pH	7.4	H5	1.7	SU			11/12/18 13:18	1
Temperature	12.8	H5	0.1	Degrees C			11/12/18 13:18	1

**Matrix: Water** 

**Matrix: Water** 

200

11/14/18 15:20

11/30/2018

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

# Method: 300.0 - Anions, Ion Chromatography

Client Sample ID: Method Blank Lab Sample ID: MB 550-161852/1042 **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 161852** 

	MR	MR						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			11/14/18 06:17	1
Fluoride	ND		0.40	mg/L			11/14/18 06:17	1
Sulfate	ND		2.0	mg/L			11/14/18 06:17	1
	Chloride Fluoride	Analyte         Result           Chloride         ND           Fluoride         ND	Analyte         Result         Qualifier           Chloride         ND           Fluoride         ND	Analyte         Result Chloride         Qualifier ND         RL 2.0           Fluoride         ND         0.40	Analyte         Result Chloride         Qualifier         RL DIM RL DIM RIM RIM RIM RIM RIM RIM RIM RIM RIM R	Chloride         ND         2.0         mg/L           Fluoride         ND         0.40         mg/L	Analyte         Result Chloride         Qualifier ND         RL 2.0         Unit mg/L mg/L         D mg/L mg/L           Fluoride         ND         0.40         mg/L	Analyte         Result Chloride         Qualifier ND         RL 2.0         Unit mg/L mg/L         D mg/L mg/L         Prepared 11/14/18 06:17           Fluoride         ND         0.40         mg/L         11/14/18 06:17

Lab Sample ID: LCS 550-161852/73 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161852** 

		Spike	LCS	LCS				%Rec.	
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	 	20.0	21.5		mg/L		107	90 - 110	
Fluoride		4.00	4.16		mg/L		104	90 - 110	
Sulfate		20.0	20.5		mg/L		103	90 - 110	

Lab Sample ID: LCSD 550-161852/74 **Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA Matrix: Water** 

Analysis Batch: 161852

	S	Spike LCS	D LCSD			%Rec.		RPD
Analyte	A	dded Resu	lt Qualifier	Unit D	%Rec	Limits	RPD	Limit
Chloride		20.0 21	.4	mg/L	107	90 - 110	0	20
Fluoride		4.00 4.1	6	mg/L	104	90 - 110	0	20
Sulfate		20.0 20	.5	mg/L	102	90 - 110	0	20
	Chloride	Analyte A Chloride Fluoride	Analyte         Added         Result           Chloride         20.0         21           Fluoride         4.00         4.1	AnalyteAddedResultQualifierChloride20.021.4Fluoride4.004.16	Analyte         Added Chloride         Result 20.0         Qualifier mg/L         Unit mg/L         D mg/L           Fluoride         4.00         4.16         mg/L         mg/L	Analyte         Added         Result 20.0         Qualifier 21.4         Unit mg/L         D mg/L         %Rec           Chloride         20.0         21.4         mg/L         107           Fluoride         4.00         4.16         mg/L         104	Analyte         Added Chloride         Result 20.0         Qualifier 20.0         Unit mg/L         D mg/L         %Rec Limits 107 90 - 110           Fluoride         4.00         4.16         mg/L         104         90 - 110	Analyte         Added Chloride         Result 20.0         Qualifier 20.0         Unit 20.0         Description         %Rec 20.0         Limits 20.0         RPD 20.0           Fluoride         4.00         4.16         mg/L         104         90 - 110         0

Lab Sample ID: 550-113012-A-1 MS ^2 Client Sample ID: Matrix Spike **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161852

,	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	13	D1	8.00	9.67	D1	ma/l		104	80 120	 

Lab Sample ID: 550-113012-A-1 MS ^200 **Client Sample ID: Matrix Spike Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 161852** 

,	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	800	D2	4000	5340	D2	mg/L		114	80 - 120	 
Sulfate	1200	D2	4000	5490	D2	mg/L		107	80 - 120	

Lab Sample ID: 550-113012-A-1 MSD ^2 **Client Sample ID: Matrix Spike Duplicate** Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 161852

, ,	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	1.3	D1	8.00	9.79	D1	mg/L		106	80 - 120	1	20

TestAmerica Phoenix

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

# Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-113012-A-1 MSD ^200 **Client Sample ID: Matrix Spike Duplicate Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161852

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	800	D2	4000	5310	D2	mg/L		113	80 - 120	1	20	
Sulfate	1200	D2	4000	5460	D2	mg/L		107	80 - 120	1	20	

Lab Sample ID: 550-113026-1 MS Client Sample ID: FC-CCR-MW7-11418 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 161852

7a., 6.6 _ a 10 10 a	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	ND	D1 D5	20.0	20.9	D1	mg/L		102	80 - 120	

Lab Sample ID: 550-113026-1 MS Client Sample ID: FC-CCR-MW7-11418 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 161852

Analysis Daten. 101002	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	680	D2	4000	5160	D2	mg/L		112	80 - 120	
Sulfate	6100	D2	4000	10400	D2	mg/L		108	80 - 120	

Client Sample ID: FC-CCR-MW7-11418 Lab Sample ID: 550-113026-1 MSD **Prep Type: Total/NA** 

**Matrix: Water** 

Analysis Batch: 161852

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	ND	D1 D5	20.0	21.0	D1	mg/L		103	80 - 120	1	20

Lab Sample ID: 550-113026-1 MSD Client Sample ID: FC-CCR-MW7-11418 **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 161852** 

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	680	D2	4000	5200	D2	mg/L		113	80 - 120	1	20
Sulfate	6100	D2	4000	10400	D2	mg/L		110	80 - 120	1	20

Lab Sample ID: MB 550-162250/2 **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 162250** 

	MR	MR						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			11/16/18 19:31	1
Fluoride	ND		0.40	mg/L			11/16/18 19:31	1
Sulfate	ND		2.0	ma/l			11/16/18 19·31	1

Lab Sample ID: LCS 550-162250/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 162250

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	20.0	21.4		mg/L	_	107	90 - 110	 
Fluoride	4.00	4.11		mg/L		103	90 - 110	

TestAmerica Phoenix

Page 11 of 28

90 - 110

102

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

# Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 550-162250/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 162250** 

Spike LCS LCS %Rec. Added Result Qualifier Analyte Unit %Rec Limits

20.0

Lab Sample ID: LCSD 550-162250/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

20.5

ma/L

**Analysis Batch: 162250** 

Sulfate

Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Unit %Rec Limits RPD Limit Chloride 21.4 20.0 90 - 110 0 20 mg/L 107 Fluoride 4.00 90 - 110 20 4.10 mg/L 103 O Sulfate 20.0 20.5 mg/L 103 90 - 110 20

Lab Sample ID: 550-113529-A-1 MS **Client Sample ID: Matrix Spike Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 162250** 

Sample Sample Spike MS MS %Rec. Result Qualifier Added Analyte Result Qualifier Unit D %Rec Limite Fluoride 2.2 4 00 6.28 102 80 - 120 mg/L

Lab Sample ID: 550-113529-A-1 MS ^100 **Client Sample ID: Matrix Spike Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 162250** 

Sample Sample Spike MS MS %Rec. Result Qualifier Result Qualifier **Analyte** Added Unit %Rec Limits Chloride ND D1 2000 2430 D1 112 80 - 120 mg/L 80 - 120 Sulfate 1400 D2 2000 3570 D2 mg/L 110

**Client Sample ID: Matrix Spike Duplicate** Lab Sample ID: 550-113529-A-1 MSD **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 162250** 

Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits RPD Limit 4.00 Fluoride 2.2 6.21 mg/L 100 80 - 120

Lab Sample ID: 550-113529-A-1 MSD ^100 Client Sample ID: Matrix Spike Duplicate Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 162250** 

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier RPD Analyte Unit D %Rec Limits Limit 2000 Chloride ND D1 2440 D1 mg/L 112 80 - 120 0 20 Sulfate 1400 D2 2000 3570 D2 110 80 - 120 20 mg/L

Lab Sample ID: MB 550-162493/2 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 162493** 

	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			11/20/18 17:37	1
Fluoride	ND		0.40	mg/L			11/20/18 17:37	1
Sulfate	ND		2.0	mg/L			11/20/18 17:37	1

TestAmerica Phoenix

Page 12 of 28

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

# Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 550-162493/5 Matrix: Water			Client Sample ID: Lab Control Sample Prep Type: Total/NA
Analysis Batch: 162493	Sniko	100 100	%Pag

	Spike	LUS	LUS				MRGC.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	 20.0	20.2		mg/L		101	90 - 110	
Fluoride	4.00	4.03		mg/L		101	90 - 110	
Sulfate	20.0	20.2		mg/L		101	90 - 110	

Lab Sample ID: LCSD 550-162493/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 162493** 

	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	20.0	20.2		mg/L		101	90 - 110	0	20	
Fluoride	4.00	4.04		mg/L		101	90 - 110	0	20	
Sulfate	20.0	20.2		mg/L		101	90 - 110	0	20	
	Chloride Fluoride	AnalyteAddedChloride20.0Fluoride4.00	Analyte         Added         Result           Chloride         20.0         20.2           Fluoride         4.00         4.04	AnalyteAddedResult QualifierChloride20.020.2Fluoride4.004.04	Analyte         Added         Result         Qualifier         Unit           Chloride         20.0         20.2         mg/L           Fluoride         4.00         4.04         mg/L	Analyte         Added         Result 20.0         Qualifier mg/L         Unit mg/L         D mg/L           Fluoride         4.00         4.04         mg/L         mg/L	Analyte         Added         Result 20.0         Qualifier 20.2         Unit mg/L         D mg/L         %Rec           Chloride         20.0         20.2         mg/L         101           Fluoride         4.00         4.04         mg/L         101	Analyte         Added Chloride         Result 20.0         Qualifier 20.2         Unit mg/L         D mg/L         Result 20.1         Limits 20.1           Fluoride         4.00         4.04         mg/L         101         90 - 110	Analyte         Added Chloride         Result 20.0         Qualifier 20.2         Unit mg/L         D %Rec plants         Limits RPD plants           Fluoride         4.00         4.04         mg/L         101         90 - 110         0	Analyte         Added         Result 20.0         Qualifier mg/L         Unit mg/L         D mg/L         MRec 2 Limits por 101         RPD 2 Limits por 101         Limits por 101         RPD 2 Limits por 101         PD 2 Limits por 101         MREC 20.0         Limits por 101         PD 2 Por 101         MREC 20.0         Limits por 101         PD 2 Por 101         PD 2 Por 101         Limits por 101         PD 2 Por 101 <th< td=""></th<>

Lab Sample ID: 550-113026-4 MS Client Sample ID: FC-CCR-MW75-11318 **Matrix: Water** Prep Type: Total/NA Analysis Batch: 162493 Sample Sample Spike MS MS %Rec.

Result Qualifier Added Result Qualifier Limits Analyte Unit D %Rec 100 Chloride 310 D1 416 D1 mg/L 108 80 - 120

Lab Sample ID: 550-113026-4 MS Client Sample ID: FC-CCR-MW75-11318 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 162493 MS MS Sample Sample Spike %Rec. Result Qualifier Added Analyte Result Qualifier Limits Unit D %Rec Sulfate 4300 D2 4000 8460 D2 mg/L 104 80 - 120

Lab Sample ID: 550-113026-4 MSD Client Sample ID: FC-CCR-MW75-11318 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 162493** 

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	310	D1	100	415	D1	mg/L		107	80 - 120		20

Lab Sample ID: 550-113026-4 MSD Client Sample ID: FC-CCR-MW75-11318 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 162493

RPD Sample Sample Spike MSD MSD %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit Sulfate 4300 D2 4000 8450 D2 mg/L 104 80 - 120

Lab Sample ID: MB 550-162499/2 **Client Sample ID: Method Blank** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 162499** 

	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			11/20/18 18:25	1
Fluoride	ND		0.40	mg/L			11/20/18 18:25	1
Sulfate	ND		2.0	mg/L			11/20/18 18:25	1

TestAmerica Phoenix

11/30/2018

Page 13 of 28

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

# Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 550-162499/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 162499

	<b>Бріке</b>	LUS	LUS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	 20.0	21.4		mg/L		107	90 - 110	
Fluoride	4.00	4.12		mg/L		103	90 - 110	
Sulfate	20.0	20.6		mg/L		103	90 - 110	

Lab Sample ID: LCSD 550-162499/6 **Client Sample ID: Lab Control Sample Dup** Prep Type: Total/NA **Matrix: Water** 

**Analysis Batch: 162499** 

	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	20.0	21.5		mg/L		107	90 - 110	0	20	
Fluoride	4.00	4.14		mg/L		103	90 - 110	1	20	
Sulfate	20.0	20.6		mg/L		103	90 - 110	0	20	
	Chloride Fluoride	AnalyteAddedChloride20.0Fluoride4.00	Analyte         Added         Result           Chloride         20.0         21.5           Fluoride         4.00         4.14	AnalyteAddedResultQualifierChloride20.021.5Fluoride4.004.14	Analyte         Added Chloride         Result 20.0         Qualifier mg/L         Unit mg/L           Fluoride         4.00         4.14         mg/L	Analyte         Added Chloride         Result 20.0         Qualifier mg/L         Unit mg/L         D mg/L           Fluoride         4.00         4.14         mg/L         mg/L	Analyte         Added Chloride         Result 20.0         Qualifier 21.5         Unit mg/L         D mg/L         %Rec           Fluoride         4.00         4.14         mg/L         103	Analyte         Added Chloride         Result 20.0         Qualifier 21.5         Unit mg/L         D %Rec plants         Limits           Fluoride         4.00         4.14         mg/L         103         90 - 110	Analyte         Added Chloride         Result 20.0         Qualifier 21.5         Unit mg/L         D %Rec plants         Limits RPD plants           Fluoride         4.00         4.14         mg/L         103         90 - 110         1	Analyte         Added Chloride         Result 20.0         Qualifier 21.5         Unit mg/L         D mg/L         Result 107         Po mg/L         Limits po mg/L         RPD po mg/L         Limits po mg/L         Publication           Fluoride         4.00         4.14         mg/L         103         90 - 110         1         20

Lab Sample ID: 550-113026-4 MS Client Sample ID: FC-CCR-MW75-11318 **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 162499** 

	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	1.2	D1	8.00	9.18	D1	mg/L	_	100	80 - 120	

Lab Sample ID: 550-113026-4 MSD Client Sample ID: FC-CCR-MW75-11318 **Prep Type: Total/NA** 

**Matrix: Water** 

Analysis Batch: 162499

Alialysis Datell. 102400												
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Fluoride	1 2	D1	8.00	9.26	D1	ma/l		101	80 120		20	

Lab Sample ID: MB 550-163090/2 Client Sample ID: Method Blank **Prep Type: Total/NA** 

**Matrix: Water** 

Analysis Batch: 163090

	MR	MR						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			11/27/18 20:10	1
Fluoride	ND		0.40	mg/L			11/27/18 20:10	1
Sulfate	ND		2.0	ma/l			11/27/18 20:10	1

Lab Sample ID: LCS 550-163090/5 **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 163090

Analysis Batem 100000								
-	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	 20.0	21.3		mg/L		107	90 - 110	
Fluoride	4.00	4.11		mg/L		103	90 - 110	
Sulfate	20.0	20.4		ma/l		102	90 _ 110	

TestAmerica Phoenix

90 - 110

102

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

# Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 550-163090/6	Client Sample ID: Lab Control Sample Dup
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 163090	

Spike LCSD LCSD %Rec. RPD Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit Chloride 20.0 21.3 mg/L 20 107 90 - 110 0 Fluoride 4.00 4.10 102 20 mg/L 90 - 110 0

Lab Sample ID: 550-113026-1 MS Client Sample ID: FC-CCR-MW7-11418 **Matrix: Water** Prep Type: Total/NA

20.4

mg/L

20.0

**Analysis Batch: 163090** 

Sulfate

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Limits Unit %Rec Fluoride ND D1 M2 D5 8.00 6.47 D1 M2 80 - 120 mg/L 77

Lab Sample ID: 550-113026-1 MS Client Sample ID: FC-CCR-MW7-11418 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 163090** 

MS MS Sample Sample Spike %Rec. Analyte Result Qualifier Added Result Qualifier %Rec Limits Unit Chloride 800 D2 4000 5310 D2 mg/L 113 80 - 120 Sulfate 6300 D2 4000 10600 D2 109 80 - 120 mg/L

Lab Sample ID: 550-113026-1 MSD Client Sample ID: FC-CCR-MW7-11418 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 163090

Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit 8.00 Fluoride ND D1 M2 D5 6.80 D1 mg/L 81 80 - 120 5

Lab Sample ID: 550-113026-1 MSD Client Sample ID: FC-CCR-MW7-11418 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 163090** 

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier Limits RPD **Analyte** Unit %Rec Limit Chloride 800 D2 4000 5340 D2 mg/L 114 80 - 120 20 Sulfate 6300 D2 4000 10600 D2 mg/L 108 80 - 120n 20

# Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-161452/1-A **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161800 Prep Batch: 161452** 

	IVID	IVID						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L	_	11/09/18 07:33	11/13/18 13:11	1
Calcium	ND		2.0	mg/L		11/09/18 07:33	11/13/18 13:11	1

TestAmerica Phoenix

11/30/2018

20

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

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

Lab Sample ID: LCS 550-161452/2-A Matrix: Water Analysis Batch: 161800				Clien	t Sa	mple ID	Prep Type: Total/NA Prep Batch: 161452
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	1.00	0.923		mg/L		92	85 - 115
Calcium	21.0	20.4		mg/L		97	85 - 115

Lab Sample ID: LCSD 550-161452/3-A			(	Client S	ample	ID: Lab	Control	Sample	e Dup
Matrix: Water							Prep Ty	pe: Tot	al/NA
Analysis Batch: 161800							Prep Ba	atch: 10	61452
•	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	0.942		mg/L		94	85 - 115	2	20
Calcium	21.0	20.7		mg/L		99	85 - 115	2	20

Lab Sample ID: 550-11302 Matrix: Water Analysis Batch: 161800	26-1 MS					Clie	nt Sar	nple ID	: FC-CCR-MW7-11418 Prep Type: Total/NA Prep Batch: 161452
-	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	7.4	M3	1.00	8.17	M3	mg/L		81	70 - 130
Calcium	320	M3	21.0	338	M3	mg/L		95	70 - 130

Lab Sample ID: 550-113026 Matrix: Water Analysis Batch: 161800	6-1 MSD					Clier	it Sar	nple ID:	: FC-CCR- Prep Typ Prep Ba	e: Tot	al/NA
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	7.4	M3	1.00	7.97	M3	mg/L		61	70 - 130	2	20
Calcium	320	M3	21.0	326	M3	mg/L		40	70 - 130	4	20

Lab Sample ID: 550-113026- Matrix: Water Analysis Batch: 161800	4 MS					Client	Sam	ple ID:	FC-CCR-MW75-11318 Prep Type: Total/NA Prep Batch: 161452
-	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	24	M3	0.100	23.3	M3	mg/L		-578	70 - 130
Calcium	430	M3	2.10	426	M3	mg/L		-172	70 - 130

Matrix: Water Analysis Batch: 161800			Client	Sam	pie iD:	ا-Prep Ty Prep Ba Prep Ba	pe: Tot	otal/NA			
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	24	M3	0.100	23.2	M3	mg/L		-623	70 - 130	0	20
Calcium	430	M3	2 10	427	M3	ma/l		-115	70 - 130	0	20

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

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-161396/1 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161396** 

MB MB Analyte Result Qualifier RL Unit Analyzed Dil Fac D Prepared Total Dissolved Solids 20 11/08/18 12:33 ND mg/L

Lab Sample ID: LCS 550-161396/2 Client Sample ID: Lab Control Sample **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161396** 

Spike LCS LCS %Rec. Added Limits Analyte Result Qualifier Unit %Rec Total Dissolved Solids 1000 974 mg/L 97 90 - 110

Lab Sample ID: LCSD 550-161396/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161396

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit Analyte Unit D %Rec Total Dissolved Solids 1000 974 mg/L 97

Client Sample ID: FC-CCR-MW75-11318 Lab Sample ID: 550-113026-4 DU Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 161396** 

DU DU Sample Sample RPD Result Qualifier Result Qualifier Unit **RPD** Limit Total Dissolved Solids 6200 D2 6210 D2 mg/L 0.5

Lab Sample ID: MB 550-161467/1 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161467** 

MR MR Analyte Result Qualifier RL Unit Analyzed Prepared Total Dissolved Solids ND 20 11/09/18 10:22 mg/L

Lab Sample ID: LCS 550-161467/2 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 161467** 

LCS LCS Spike %Rec. Added Result Qualifier Analyte Unit %Rec Limits **Total Dissolved Solids** 1000 99 988 mg/L 90 - 110

Lab Sample ID: LCSD 550-161467/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161467

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits Analyte Unit %Rec **RPD** Limit **Total Dissolved Solids** 1000 982 mg/L 98 90 - 110

Lab Sample ID: 550-113012-A-1 DU **Client Sample ID: Duplicate Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161467** 

DU DU Sample Sample **RPD** Result Qualifier Result Qualifier Analyte Unit D RPD Limit Total Dissolved Solids 3200 D2 3080 D2 3 mg/L

TestAmerica Phoenix

Page 17 of 28

11/30/2018

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# **QC Sample Results**

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

TestAmerica Job ID: 550-113026-1

**Client Sample ID: Lab Control Sample** 

Client Sample ID: FC-CCR-MW75-11318

**Prep Type: Total/NA** 

**Prep Type: Total/NA** 

8.0

Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-161638/12

**Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161638** 

Spike LCSSRM LCSSRM %Rec. Analyte Added Result Qualifier Unit D %Rec Limits 7.00 7.0 SU рН 100.3 98.5 - 101.

Lab Sample ID: LCSSRM 550-161638/23

**Matrix: Water** 

**Analysis Batch: 161638** 

Spike LCSSRM LCSSRM %Rec. Analyte Added Result Qualifier Unit D %Rec Limits рН 7.00 7.0 SU 100.3 98.5 - 101.

Lab Sample ID: 550-113026-4 DU

**Matrix: Water** 

Temperature

Analysis Batch: 161638								
_	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
pH	8.3	H5	8.3	H5	SU	_	 0.1	5

12.6 H5

Degrees C

12.5 H5

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

# HPLC/IC

# **Analysis Batch: 161852**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	300.0	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	300.0	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	300.0	
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	300.0	
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	300.0	
MB 550-161852/1042	Method Blank	Total/NA	Water	300.0	
LCS 550-161852/73	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-161852/74	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113012-A-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-113012-A-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-113012-A-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113012-A-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	300.0	

# **Analysis Batch: 162250**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batc
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	300.0	
MB 550-162250/2	Method Blank	Total/NA	Water	300.0	
LCS 550-162250/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-162250/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113529-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
550-113529-A-1 MS ^100	Matrix Spike	Total/NA	Water	300.0	
550-113529-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113529-A-1 MSD ^100	Matrix Spike Duplicate	Total/NA	Water	300.0	

# **Analysis Batch: 162493**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	300.0	
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	300.0	
MB 550-162493/2	Method Blank	Total/NA	Water	300.0	
LCS 550-162493/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-162493/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113026-4 MS	FC-CCR-MW75-11318	Total/NA	Water	300.0	
550-113026-4 MS	FC-CCR-MW75-11318	Total/NA	Water	300.0	
550-113026-4 MSD	FC-CCR-MW75-11318	Total/NA	Water	300.0	
550-113026-4 MSD	FC-CCR-MW75-11318	Total/NA	Water	300.0	

# **Analysis Batch: 162499**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	300.0	_
MB 550-162499/2	Method Blank	Total/NA	Water	300.0	
LCS 550-162499/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-162499/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113026-4 MS	FC-CCR-MW75-11318	Total/NA	Water	300.0	
550-113026-4 MSD	FC-CCR-MW75-11318	Total/NA	Water	300.0	

Page 19 of 28

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

TestAmerica Job ID: 550-113026-1

# **HPLC/IC (Continued)**

# **Analysis Batch: 163090**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	300.0	
MB 550-163090/2	Method Blank	Total/NA	Water	300.0	
LCS 550-163090/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-163090/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	300.0	

# **Metals**

# **Prep Batch: 161452**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	200.7	
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	200.7	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	200.7	
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	200.7	
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	200.7	
MB 550-161452/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-161452/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-161452/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	200.7	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	200.7	
550-113026-4 MS	FC-CCR-MW75-11318	Total/NA	Water	200.7	
550-113026-4 MSD	FC-CCR-MW75-11318	Total/NA	Water	200.7	

# **Analysis Batch: 161800**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	200.7 Rev 4.4	161452
MB 550-161452/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	161452
LCS 550-161452/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	161452
LCSD 550-161452/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-4 MS	FC-CCR-MW75-11318	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-4 MSD	FC-CCR-MW75-11318	Total/NA	Water	200.7 Rev 4.4	161452

# **General Chemistry**

# **Analysis Batch: 161396**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	SM 2540C	
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	SM 2540C	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	SM 2540C	
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	SM 2540C	

TestAmerica Phoenix

Page 20 of 28 11/30/2018

2

3

4

6

9

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44

12

# **QC Association Summary**

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

TestAmerica Job ID: 550-113026-1

# **General Chemistry (Continued)**

# **Analysis Batch: 161396 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-161396/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-161396/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-161396/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-113026-4 DU	FC-CCR-MW75-11318	Total/NA	Water	SM 2540C	

# **Analysis Batch: 161467**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	SM 2540C	
MB 550-161467/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-161467/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-161467/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-113012-A-1 DU	Duplicate	Total/NA	Water	SM 2540C	

# **Analysis Batch: 161638**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	SM 4500 H+ B	
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	SM 4500 H+ B	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	SM 4500 H+ B	
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	SM 4500 H+ B	
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161638/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161638/23	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-113026-4 DU	FC-CCR-MW75-11318	Total/NA	Water	SM 4500 H+ B	

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

Client Sample ID: FC-CCR-MW7-11418 Lab Sample ID: 550-113026-1

Date Collected: 11/04/18 09:02 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	161852	11/14/18 11:11	NEL	TAL PHX
Total/NA	Analysis	300.0		2	163090	11/28/18 02:55	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 13:31	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396 (Start) 1	11/08/18 12:33	YET	TAL PHX
					` ,	11/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW8-11418 Lab Sample ID: 550-113026-2

Date Collected: 11/04/18 08:19 **Matrix: Water** Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	161852	11/14/18 15:57	NEL	TAL PHX
Total/NA	Analysis	300.0		2	163090	11/28/18 02:00	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 13:54	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW61-11318 Lab Sample ID: 550-113026-3

Date Collected: 11/03/18 14:44 **Matrix: Water** Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161852	11/14/18 16:15	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161852	11/14/18 16:34	NEL	TAL PHX
Total/NA	Analysis	300.0		2	162250	11/17/18 04:24	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 14:00	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396		YET	TAL PHX
					(Start) 1	11/08/18 12:33		
					(End) 1	11/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

# **Lab Chronicle**

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

TestAmerica Job ID: 550-113026-1

Lab Sample ID: 550-113026-4

**Matrix: Water** 

Client Sample ID: FC-CCR-MW75-11318

Date Collected: 11/03/18 15:25 Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			162499	11/20/18 20:52	NEL	TAL PHX
Total/NA	Analysis	300.0		5	162493	11/21/18 04:35	NEL	TAL PHX
Total/NA	Analysis	300.0		200	162493	11/21/18 05:57	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 13:48	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	, ,	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW49A-11418

Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00 Lab Sample ID: 550-113026-5

Matrix: Water

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	161852	11/14/18 15:20	NEL	TAL PHX
Total/NA	Analysis	300.0		2	161852	11/14/18 20:07	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 14:06	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	(/	1/09/18 10:22 1/12/18 10:30	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

**Laboratory References:** 

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

TestAmerica Phoenix

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# **Accreditation/Certification Summary**

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

TestAmerica Job ID: 550-113026-1

# **Laboratory: TestAmerica Phoenix**

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

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

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# **Method Summary**

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

TestAmerica Job ID: 550-113026-1

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

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TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

TestAmerica

phone 602,437 3340 fax 623,445.6192											TestAmerica	TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway	anager:	Doug Lav	arnway	S	ite Co	ontac	t D	Site Contact: Doug Lavarnway	Date: 11/7/2018	COC No:	
PO Box 355, MS 4915	Analysis Tu	Analysis Turnaround Time	rnaround T	ime	1			+		-	Job No.	
Fruitland, NM 87416	Calendar (	Calendar ( C ) or Work Days (W)	k Days (W)				_	_			-	12027
Phone:	TATHO	TAT if different from Below	elow 7 Days	lys		1)	_	_			1.1	2000
Fax:		2 v	C			/ / N		_			SDG No.	
Project Name: CCR		1 4	1 week			(Y	204	304				
E-Mail Address:		2	2 days			MSD		_	_			
		10	1 day		mple	VIS / I						
Sample Identification	Sample Date	Sample Time	Sample Type	Matrix C	Cont of	Perform N	EPA 200.7	EPA 300.0	SM 4500-l		Samp	Sample Specific Notes
FC-CCR-MW7-11418	11/4/2018	902	G	8	2 Z		×	×	×			
FC-CCR-MW8-11418 -2	11/4/2018	819	G	W	2		×	×	×			
FC-CCR-MW61-11318	3 11/3/2018	1444	G	W	2 N		×	×	×			
FC-CCR-MW75-11318 -4	11/3/18	1525	G	٧	N	×	×	×	×			
FC-CCR-MW49A-11418 - 5	5 11/4/18	959	G	×	N		×	×	×			, De la
								1 1				
								on —	550-113026 Chain (	Chain of Custody		
Preservation Used: 1=1ce, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other	VO3; 5=NaOH; 6	Other			-		1	-				
Possible Hazard Identification  Non-Hazard Flammable Skin Irritant		Poison	Unkn	Unknown	Ш	San	□ <sub>Re</sub>	Disp	le Disposal ( A fee may l	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client Disposal By Lab Archive For Month	are retained longer than  Archive For	1 month)  Months
Special Instructions/QC Requirements & Comments: Need Fluoride reporting limit ≤ 0.8 mg/L	ments:						_		3.6.	325%	) PC	
Relinquished by Lavaran	Company	2 St		Date/Time:	20	Received		A Day	when	Company:	J Date/Time	B:05am
JV.	Company			Date/Time		Reca	Received by	PA.	J	Company	Date/Time	
Relinquished by	Company			Date/Time		Reco	Received	11	2	Company	Date/Time:	7500

TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

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Client Contact	Project Ma	inager: Do	Project Manager: Doug Lavarnway	way	Site C	ontact: Do	Site Contact: Doug Lavarnway	Date: 11/7/2018	COC No:
To Four Comers	Tel/Fax: 928-587-0519	-587-0319			Lank	Lab Contact: Ken Baker	n Baker	Carrier:	1 00 1
O B0X 355, MS 4915		Analysis Lurnaround Lime	iaround i iii	ie		e,			JOB NO.
hone:	TAT if	TAT if different from Below 7.D	low 7 Days		)	Mo, S	d		270911
ax:		2 W	20		/ / N	Pb,	nbine		SDG No.
roject Name: CCR		I week	rek		( Y	Co,	com		
-Mail Address:		2 days	IVS			Cd,	228		
		I day	ay		_	7 (Li) , Ba,			
Sample Identification	Sample Date	Sample Time	Sample Type M	# of	Filtered Sa Perform N	EPA 200.7 200.8 (As, TI)	Radium 2 EPA 300.0		Sample Specific Notes
-C-CCR-MW7-11418	11/4/2018	902		W 4	z	×	×		
C-CCR-MW8-11418 -2	11/4/2018	819	G	4	Z	×	×		
*C-CCR-MW61-11318 -3	11/3/2018	1444	G	W 4	Z	×	×		
-C-CCR-MW75-11318 -4	11/3/18	1525	G	W 4	z	×	×		
C-CCR-MW49A-11418 -5	11/4/18	959	G	W 4	Z	×	×		
				++					
reservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other oscible Hazard Identification	NO3; 5=NaOH; 6	= Other			2	male Dist	neal ( A fee m	Sample Disnosal ( A fee may be assessed if samples are retained longer than 1 month)	rational longer than 1 month
lammable	Skin Irritant	Poison	Unkhown	TRIN I	_ 6	Return	Return To Client	Disposal By Lab	Archive For Months
ions/QC Requirements & ith collision cell	nments:	= 10						(3,6%)	
Por Lavarra	Company	S	D	Date/Time:	1	Received (	Rome	- Jo Rundung	Date/Time
3	Company:		a	Date/Time:		Received by	00	Company	Date/Time:
elinquished by	Company:		D	Date/Time:	Re	Received by		Company	17-7-18 1300

Client: Arizona Public Service Company

Job Number: 550-113026-1

Login Number: 113026 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.



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: 550-113026-2

Client Project/Site: APS - Four Corners CCR

# For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 11/21/2018 4:09:38 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	10
QC Association Summary	15
Lab Chronicle	17
Certification Summary	19
Method Summary	20
Chain of Custody	21
Receipt Checklists	23

4

8

9

11

12

# **Definitions/Glossary**

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

TestAmerica Job ID: 550-113026-2

# **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.
Motale	

Qualifier	Qualifier Description
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.
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
B1	Target analyte detected in method blank at or above the method reporting limit.

# Glossary

RER

RPD

TEF

TEQ

RL

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

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

TestAmerica Phoenix

Page 3 of 23 11/21/2018

# **Case Narrative**

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

TestAmerica Job ID: 550-113026-2

Job ID: 550-113026-2

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-113026-2

# Comments

No additional comments.

## Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.9° C and 3.6° 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: FC-CCR-MW7-11418 (550-113026-1), FC-CCR-MW8-11418 (550-113026-2) and FC-CCR-MW49A-11418 (550-113026-5). This analyte was not detected in the diluted samples. 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.

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# **Sample Summary**

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

TestAmerica Job ID: 550-113026-2

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3:00	
2.00	

Lab Sample ID	Client Sample ID	Matrix	Collected Received
550-113026-1	FC-CCR-MW7-11418	Water	11/04/18 09:02 11/07/18 13:00
550-113026-2	FC-CCR-MW8-11418	Water	11/04/18 08:19 11/07/18 13:00
550-113026-3	FC-CCR-MW61-11318	Water	11/03/18 14:44 11/07/18 13:00
550-113026-4	FC-CCR-MW75-11318	Water	11/03/18 15:25 11/07/18 13:00
550-113026-5	FC-CCR-MW49A-11418	Water	11/04/18 09:59 11/07/18 13:00

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

TestAmerica Job ID: 550-113026-2

Lab Sample ID: 550-113026-1

Lab Sample ID: 550-113026-3

Lab Sample ID: 550-113026-4

Lab Sample ID: 550-113026-5

Client Sam	ple ID:	FC-CCR	-MW7-11418
------------	---------	--------	------------

Analyte	Result Q	Qualifier	RL	Unit	Dil Fac [	) Method	Prep Type
Lithium	0.83		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.014 B	37	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.00056		0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.0070		0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0035		0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00010		0.00010	mg/L	1	200.8 LL	Total/NA

## Client Sample ID: FC-CCR-MW8-11418 Lab Sample ID: 550-113026-2

Analyte	Result Qualif	er RL	Unit	Dil Fac D	Method	Prep Type
Lithium	1.1	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.00064	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0090	0.00050	mg/L	1	200.8 LL	Total/NA
Cadmium	0.00015	0.00010	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.011	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0014	0.00050	mg/L	1	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW61-11318

Analyte	Result Qua	lifier RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.35	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.00084	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.015	0.00050	mg/L	1	200.8 LL	Total/NA
Cadmium	0.00088	0.00010	mg/L	1	200.8 LL	Total/NA
Cobalt	0.018	0.00050	mg/L	1	200.8 LL	Total/NA
Lead	0.00086	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.090	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.00061	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00016	0.00010	mg/L	1	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW75-11318

Analyte	Result	Qualifier	RL	Unit	Dil Fac I	O Method	Prep Type
Fluoride	1.2	D1	0.80	mg/L		300.0	Total/NA
Lithium	0.39	M1	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.00060		0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.017		0.00050	mg/L	1	200.8 LL	Total/NA
Cadmium	0.0018		0.00010	mg/L	1	200.8 LL	Total/NA
Cobalt	0.045		0.00050	mg/L	1	200.8 LL	Total/NA
Lead	0.0030		0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.18		0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0026		0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00018		0.00010	mg/L	1	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW49A-11418

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lithium	1.2		0.20	mg/L	1	_	200.7 Rev 4.4	Total/NA
Arsenic	0.0012		0.00050	mg/L	1		200.8 LL	Total/NA
Barium	0.020		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 - Four Corners CCR

TestAmerica Job ID: 550-113026-2

Lab Sample ID: 550-113026-5

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# Client Sample ID: FC-CCR-MW49A-11418 (Continued)

Analyte	Result Qualifier	RL	Unit	Dil Fac	) Method	Prep Type
Cadmium	0.00027	0.00010	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0020	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.014	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0016	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.0016	0.00010	mg/L	1	200.8 LL	Total/NA

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

Client Sample ID: FC-CCR-MW7-11418

Date Collected: 11/04/18 09:02 Date Received: 11/07/18 13:00 Lab Sample ID: 550-113026-1

Matrix: Water

Method: 300.0 - Anio	ns, Ion Chromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND ND	D1 D5	2.0	mg/L			11/14/18 10:53	5
- Method: 200.7 Rev 4.	4 - Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.83		0.20	mg/L		11/09/18 07:33	11/13/18 13:31	1
- Method: 200.8 LL - M	etals (ICP/MS)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L		11/11/18 11:15	11/12/18 12:31	1
Barium	0.014	B7	0.00050	mg/L		11/11/18 11:15	11/12/18 12:31	1
Cadmium	ND		0.00010	mg/L		11/11/18 11:15	11/12/18 12:31	1
Cobalt	0.00056		0.00050	mg/L		11/11/18 11:15	11/12/18 12:31	1
Lead	ND		0.00050	mg/L		11/11/18 11:15	11/19/18 22:10	1
Molybdenum	0.0070		0.00050	mg/L		11/11/18 11:15	11/12/18 12:31	1
Selenium	0.0035		0.00050	mg/L		11/11/18 11:15	11/12/18 12:31	1
Thallium	0.00010		0.00010	mg/L		11/11/18 11:15	11/12/18 12:31	1

Client Sample ID: FC-CCR-MW8-11418 Lab Sample ID: 550-113026-2

Date Collected: 11/04/18 08:19

Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	2.0	mg/L			11/14/18 15:38	5
Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte	· · ·	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	1.1	-	0.20	mg/L		11/09/18 07:33	11/13/18 13:54	1
Analyte Arsenic	0.00064	Qualifier	RL 0.00050	Unit mg/L	D	Prepared 11/11/18 11:15	Analyzed 11/19/18 22:17	Dil Fac
Method: 200.8 LL - Me	tals (ICP/MS)							
Barium	0.0004		0.00050	mg/L		11/11/18 11:15	11/19/18 22:17	1
Cadmium	0.00015		0.00030	mg/L		11/11/18 11:15	11/19/18 22:17	1
Cobalt	ND		0.00050	mg/L		11/11/18 11:15	11/19/18 22:17	
Lead	ND		0.00050	mg/L		11/11/18 11:15	11/19/18 22:17	1
Molybdenum	0.011		0.00050	mg/L		11/11/18 11:15	11/19/18 22:17	1
Selenium	0.0014		0.00050	mg/L		11/11/18 11:15	11/19/18 22:17	1
Thallium	ND		0.00010	mg/L		11/11/18 11:15	11/19/18 22:17	

Client Sample ID: FC-CCR-MW61-11318

Date Collected: 11/03/18 14:44

Date Received: 11/07/18 13:00

:00							
n Chromatograph	ny						
Result Qu	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
ND D1	1 D5	2.0	mg/L			11/14/18 16:15	5
etals (ICP)							
• •	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
0.35		0.20	mg/L		11/09/18 07:33	11/13/18 14:00	1
	Result Q  Policy (ICP)  Result Q  Result Q	Result Qualifier ND D1 D5  etals (ICP) Result Qualifier Qualifier	n Chromatography Result Qualifier RL ND D1 D5 2.0  Petals (ICP) Result Qualifier RL	rn Chromatography Result Qualifier RL Unit ND D1 D5 2.0 mg/L  retals (ICP) Result Qualifier RL Unit	Chromatography	rn Chromatography Result Qualifier RL Unit D Prepared ND D1 D5 2.0 mg/L  retals (ICP) Result Qualifier RL Unit D Prepared	Chromatography

TestAmerica Phoenix

Lab Sample ID: 550-113026-3

Page 8 of 23

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**Matrix: Water** 

11/21/2018

**Matrix: Water** 

# **Client Sample Results**

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

Selenium

**Thallium** 

TestAmerica Job ID: 550-113026-2

	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00084		0.00050	mg/L		11/11/18 11:15	11/19/18 22:19	-
Barium	0.015		0.00050	mg/L		11/11/18 11:15	11/19/18 22:19	
Cadmium	0.00088		0.00010	mg/L		11/11/18 11:15	11/19/18 22:19	•
Cobalt	0.018		0.00050	mg/L		11/11/18 11:15	11/19/18 22:19	•
Lead	0.00086		0.00050	mg/L		11/11/18 11:15	11/19/18 22:19	
Molybdenum	0.090		0.00050	mg/L		11/11/18 11:15	11/19/18 22:19	
Selenium	0.00061		0.00050	mg/L		11/11/18 11:15	11/19/18 22:19	
Thallium	0.00016		0.00010	mg/L		11/11/18 11:15	11/19/18 22:19	
Client Sample ID: FC-CCF Date Collected: 11/03/18 15:25 Date Received: 11/07/18 13:00		1318			La	b Sample	ID: 550-113 Matrix	
Method: 300.0 - Anions, Ion C	Chromatogra	phy						
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.2	D1	0.80	mg/L			11/14/18 19:49	2
Method: 200.7 Rev 4.4 - Meta	• •							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.39	M1	0.20	mg/L		11/09/18 07:33	11/13/18 13:48	,
Method: 200.8 LL - Metals (IC								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Arsenic	0.00060		0.00050	mg/L			11/19/18 22:22	
Barium	0.017		0.00050	mg/L			11/19/18 22:22	
Cadmium	0.0018		0.00010	mg/L		11/11/18 11:15	11/19/18 22:22	
Cobalt	0.045		0.00050	mg/L		11/11/18 11:15	11/19/18 22:22	
to the second second second second second second second second second second second second second second second	0.0030		0.00050	mg/L		11/11/18 11:15	11/19/18 22:22	
Lead			0.00050	mg/L		11/11/18 11:15	11/19/18 22:22	
Lead Molybdenum	0.18		0.00050					
Molybdenum	0.18 0.0026		0.00050	mg/L		11/11/18 11:15	11/19/18 22:22	
							11/19/18 22:22 11/19/18 22:22	
Molybdenum Selenium Thallium Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59	0.0026 0.00018 R-MW49A-	11418	0.00050	mg/L	La	11/11/18 11:15		8026-t
Molybdenum Selenium Thallium Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00 Method: 300.0 - Anions, Ion C Analyte	0.0026 0.00018 R-MW49A- Chromatogra Result	phy Qualifier	0.00050 0.00010	mg/L mg/L	La	11/11/18 11:15	11/19/18 22:22  ID: 550-113  Matrix:  Analyzed	Dil Fac
Molybdenum Selenium Thallium Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00 Method: 300.0 - Anions, Ion C	0.0026 0.00018 R-MW49A- Chromatogra Result	phy	0.00050 0.00010	mg/L mg/L		11/11/18 11:15 <b>Ib Sample</b>	11/19/18 22:22 ID: 550-113 Matrix	026-5 : Water
Molybdenum Selenium Thallium  Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion C Analyte Fluoride  Method: 200.7 Rev 4.4 - Meta	0.0026 0.00018  R-MW49A- Chromatogra Result ND	phy Qualifier	0.00050 0.00010	mg/L mg/L		11/11/18 11:15 <b>Ib Sample</b>	11/19/18 22:22  ID: 550-113  Matrix:  Analyzed	B026-5 Water
Molybdenum Selenium Thallium Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00 Method: 300.0 - Anions, Ion C Analyte	0.0026 0.00018  R-MW49A- Chromatogra Result ND	phy Qualifier D1 D5	0.00050 0.00010 RL 2.0	mg/L mg/L  Unit mg/L	D	11/11/18 11:15  ab Sample  Prepared  Prepared	11/19/18 22:22  ID: 550-113	Dil Fa
Molybdenum Selenium Thallium  Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion C Analyte Fluoride  Method: 200.7 Rev 4.4 - Meta Analyte Lithium  Method: 200.8 LL - Metals (IC)	0.0026 0.00018  R-MW49A-  Chromatogra Result ND  Is (ICP) Result 1.2	phy Qualifier D1 D5	0.00050 0.00010 RL 2.0  RL 0.20	mg/L mg/L  Unit mg/L  Unit mg/L	D	11/11/18 11:15  Ab Sample  Prepared  Prepared  11/09/18 07:33	11/19/18 22:22  ID: 550-113	Dil Fa
Molybdenum Selenium Thallium  Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion Consults Fluoride  Method: 200.7 Rev 4.4 - Meta Analyte Lithium  Method: 200.8 LL - Metals (ICAnalyte	0.0026 0.00018  R-MW49A-  Chromatogra Result ND  Is (ICP) Result 1.2  P/MS) Result	phy Qualifier D1 D5	0.00050 0.00010 RL 2.0  RL 0.20	mg/L mg/L  Unit mg/L  Unit  Unit	D	11/11/18 11:15  Ab Sample  Prepared  Prepared  11/09/18 07:33  Prepared	11/19/18 22:22  ID: 550-113	Dil Fa
Molybdenum Selenium Thallium  Client Sample ID: FC-CCF Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion CAnalyte Fluoride  Method: 200.7 Rev 4.4 - Meta Analyte Lithium  Method: 200.8 LL - Metals (ICAnalyte Arsenic	0.0026 0.00018  R-MW49A-  Chromatogra Result ND  Is (ICP) Result 1.2  P/MS) Result 0.0012	phy Qualifier D1 D5	0.00050 0.00010  RL 2.0  RL 0.20  RL 0.00050	mg/L mg/L  Unit mg/L  Unit mg/L  Unit mg/L	D	Prepared 11/11/18 11:15  Prepared 11/09/18 07:33  Prepared 11/11/18 11:15	11/19/18 22:22  ID: 550-113	Dil Fa
Molybdenum Selenium Thallium  Client Sample ID: FC-CCI Pate Collected: 11/04/18 09:59 Pate Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion Control Analyte Fluoride  Method: 200.7 Rev 4.4 - Meta Analyte Lithium  Method: 200.8 LL - Metals (ICO Analyte Arsenic Barium	0.0026 0.00018  R-MW49A-  Chromatogra Result ND  Is (ICP) Result 1.2  P/MS) Result 0.0012 0.020	phy Qualifier D1 D5	0.00050 0.00010  RL 0.20  RL 0.00050 0.00050	mg/L mg/L  Unit mg/L  Unit mg/L  unit mg/L  mg/L	D	Prepared 11/11/18 11:15  Prepared 11/09/18 07:33  Prepared 11/11/18 11:15 11/11/18 11:15	11/19/18 22:22  ID: 550-113  Matrix:  Analyzed 11/14/18 15:02  Analyzed 11/13/18 14:06  Analyzed 11/19/18 22:24 11/19/18 22:24	Dil Fa
Molybdenum Selenium Thallium  Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion Control Analyte Fluoride  Method: 200.7 Rev 4.4 - Meta Analyte Lithium  Method: 200.8 LL - Metals (ICO Analyte Arsenic Barium Cadmium	0.0026 0.00018  R-MW49A-  Chromatogra Result ND  Is (ICP) Result 1.2  P/MS) Result 0.0012 0.020 0.00027	phy Qualifier D1 D5	0.00050 0.00010  RL 0.20  RL 0.00050 0.00050 0.00050	mg/L mg/L  Unit mg/L  Unit mg/L  Unit mg/L  mg/L  mg/L  mg/L  mg/L	D	Prepared 11/11/18 11:15  Prepared 11/09/18 07:33  Prepared 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15	11/19/18 22:22  ID: 550-113  Matrix:  Analyzed 11/14/18 15:02  Analyzed 11/13/18 14:06  Analyzed 11/19/18 22:24 11/19/18 22:24 11/19/18 22:24	Dil Fa
Molybdenum Selenium Thallium  Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion C Analyte Fluoride  Method: 200.7 Rev 4.4 - Meta Analyte Lithium  Method: 200.8 LL - Metals (IC Analyte Arsenic Barium Cadmium Cobalt	0.0026 0.00018  R-MW49A-  Chromatogra Result ND  Is (ICP) Result 1.2  P/MS) Result 0.0012 0.0020 0.00027 0.0020	phy Qualifier D1 D5	RL 0.20 RL 0.00050 0.00050 0.00010 0.00050 0.00050	mg/L mg/L  Unit mg/L  Unit mg/L  unit mg/L  mg/L  mg/L  mg/L  mg/L  mg/L	D	Prepared 11/11/18 11:15  Prepared 11/09/18 07:33  Prepared 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15	11/19/18 22:22  ID: 550-113  Matrix:  Analyzed  11/14/18 15:02  Analyzed  11/13/18 14:06  Analyzed  11/19/18 22:24  11/19/18 22:24  11/19/18 22:24  11/19/18 22:24	Dil Fa
Molybdenum Selenium Thallium  Client Sample ID: FC-CCI Date Collected: 11/04/18 09:59 Date Received: 11/07/18 13:00  Method: 300.0 - Anions, Ion C Analyte Fluoride  Method: 200.7 Rev 4.4 - Meta Analyte Lithium  Method: 200.8 LL - Metals (IC Analyte Arsenic Barium Cadmium	0.0026 0.00018  R-MW49A-  Chromatogra Result ND  Is (ICP) Result 1.2  P/MS) Result 0.0012 0.020 0.00027	phy Qualifier D1 D5	0.00050 0.00010  RL 0.20  RL 0.00050 0.00050 0.00050	mg/L mg/L  Unit mg/L  Unit mg/L  Unit mg/L  mg/L  mg/L  mg/L  mg/L	D	Prepared 11/11/18 11:15  Prepared 11/09/18 07:33  Prepared 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15	11/19/18 22:22  ID: 550-113  Matrix:  Analyzed  11/14/18 15:02  Analyzed  11/13/18 14:06  Analyzed  11/19/18 22:24  11/19/18 22:24  11/19/18 22:24  11/19/18 22:24	026-5 Water

0.00050

0.00010

0.0016

0.0016

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11/11/18 11:15 11/19/18 22:24

11/11/18 11:15 11/19/18 22:24

Page 9 of 23 11/21/2018

mg/L

mg/L

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

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-161852/1042 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161852** 

MB MB Analyte Result Qualifier RL Unit Analyzed Dil Fac D Prepared 0.40 Fluoride ND mg/L 11/14/18 06:17

Lab Sample ID: LCS 550-161852/73 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161852** 

Spike LCS LCS %Rec. Result Qualifier Added Limits Analyte Unit %Rec Fluoride 4.00 4.16 mg/L 104 90 - 110

Lab Sample ID: LCSD 550-161852/74 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161852** 

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit Analyte Unit D %Rec Fluoride 4.00 4.16 mg/L 104

Lab Sample ID: 550-113012-A-1 MS ^2 **Client Sample ID: Matrix Spike** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 161852** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride 1.3 D1 8.00 9.67 D1 104 80 - 120 mg/L

Lab Sample ID: 550-113012-A-1 MSD ^2 Client Sample ID: Matrix Spike Duplicate **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161852** 

Spike MSD MSD %Rec. RPD Sample Sample Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits RPD Limit Fluoride 1.3 D1 8.00 9.79 D1 106 mg/L 80 - 120 20

Lab Sample ID: 550-113026-1 MS Client Sample ID: FC-CCR-MW7-11418 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 161852

Sample Sample Spike MS MS %Rec. Analyte **Result Qualifier** Added Result Qualifier Unit D %Rec Limits Fluoride ND D1 D5 20.0 20.9 D1 102 80 - 120 mg/L

Lab Sample ID: 550-113026-1 MSD Client Sample ID: FC-CCR-MW7-11418 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 161852

Sample Sample Spike MSD MSD %Rec. **RPD Result Qualifier** Added Result Qualifier Limits **Analyte** Unit %Rec **RPD** Limit Fluoride ND D1 D5 20.0 21.0 D1 mg/L 103 80 - 120 20

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

2

America 300 ID: 550-113026-2

Method: 2	200.7 Rev	<b>4.4 - Metals</b>	(ICP)
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Lab Sample ID: MB 550-161452/1-A	Client Sample ID: Method Blank
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 161800	Prep Batch: 161452
ND ND	

MB MB

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		11/09/18 07:33	11/13/18 13:11	1

Lab Sample ID: LCS 550-161452/2-A				Clie	nt Sai	mple ID	: Lab Control Sample
Matrix: Water							Prep Type: Total/NA
Analysis Batch: 161800							<b>Prep Batch: 161452</b>
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Lithium	1.00	0.925		mg/L		92	85 - 115 — — — — — — — — — — — — — — — — — —

Lab Sample ID: LCSD 550-161452/3-A	Client Sample ID: Lab Control Sample Du								
Matrix: Water							Prep Ty	pe: Tot	al/NA
Analysis Batch: 161800							Prep B	atch: 10	61452
•	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	1.00	0.934		mg/L		93	85 - 115	1	20

Lab Sample ID: 550-113020	6-1 MS					Clie	nt Sar	nple ID	: FC-CCR	-MW7-11418
Matrix: Water									Prep Ty	pe: Total/NA
Analysis Batch: 161800									Prep Ba	atch: 161452
-	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Lithium	0.83		1.00	1.76		ma/L		93	70 - 130	

Lab Sample ID: 550-113026-1 MSD						Client Sample ID: FC-CCR-MW7-								
Matrix: Water									Prep Ty	pe: Tot	al/NA			
Analysis Batch: 161800									Prep Ba	atch: 16	1452			
_	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD			
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit			
Lithium	0.83		1.00	1.78		mg/L		95	70 - 130	1	20			

Lab Sample ID: 550-113026-4 MS						Client Sample ID: FC-CCR-MW75-11318						
Matrix: Water									Prep Type: Total/NA			
Analysis Batch: 161800									<b>Prep Batch: 161452</b>			
	Sample	Sample	Spike	MS	MS				%Rec.			
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits			
Lithium	0.39	M1	0.100	1.32	M1	mg/L		926	70 - 130			

Lab Sample ID: 550-113026-4 MSD Matrix: Water							t Sam	ple ID:	FC-CCR-I		
Analysis Batch: 161800	Sample	Sample	Spike	MSD	MSD				Prep Ba	atch: 16	81452 RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	0.39	M1	0.100	1.32	M1	mg/L		931	70 - 130	0	20

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

Method: 200.8 LL - Metals (ICP/MS)

Lab Sample ID: MB 550-161587/1-A

**Matrix: Water** 

Analysis Batch: 161641

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

**Prep Batch: 161587** 

_	MB I	MB					•			
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac		
Arsenic	ND ND		0.00050	mg/L		11/11/18 11:15	11/12/18 12:24	1		
Barium	0.000556 E	B1	0.00050	mg/L		11/11/18 11:15	11/12/18 12:24	1		
Cadmium	ND		0.00010	mg/L		11/11/18 11:15	11/12/18 12:24	1		
Cobalt	ND		0.00050	mg/L		11/11/18 11:15	11/12/18 12:24	1		
Molybdenum	ND		0.00050	mg/L		11/11/18 11:15	11/12/18 12:24	1		
Selenium	ND		0.00050	mg/L		11/11/18 11:15	11/12/18 12:24	1		
Thallium	ND		0.00010	mg/L		11/11/18 11:15	11/12/18 12:24	1		

Lab Sample ID: MB 550-161587/1-A

**Matrix: Water** 

**Analysis Batch: 162387** 

Client Sample ID: Method Blank

**Prep Batch: 161587** 

Prep Type: Total/NA

	MB MB						
Analyte	Result Qualific	er RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND ND	0.00050	mg/L		11/11/18 11:15	11/19/18 22:03	1
Barium	ND	0.00050	mg/L		11/11/18 11:15	11/19/18 22:03	•
Cadmium	ND	0.00010	mg/L		11/11/18 11:15	11/19/18 22:03	
Cobalt	ND	0.00050	mg/L		11/11/18 11:15	11/19/18 22:03	
Lead	ND	0.00050	mg/L		11/11/18 11:15	11/19/18 22:03	
Molybdenum	ND	0.00050	mg/L		11/11/18 11:15	11/19/18 22:03	•
Selenium	ND	0.00050	mg/L		11/11/18 11:15	11/19/18 22:03	
Thallium	ND	0.00010	mg/L		11/11/18 11:15	11/19/18 22:03	•
Cadmium Cobalt Lead Molybdenum Selenium	ND ND ND ND ND	0.00010 0.00050 0.00050 0.00050 0.00050	mg/L mg/L mg/L mg/L mg/L		11/11/18 11:15 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15 11/11/18 11:15	11/19/18 22:03 11/19/18 22:03 11/19/18 22:03 11/19/18 22:03 11/19/18 22:03	

Lab Sample ID: LCS 550-161587/2-A

**Matrix: Water** 

Analysis Batch: 161641

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

**Prep Batch: 161587** 

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Arsenic	0.100	0.101		mg/L		101	85 - 115	
Barium	0.100	0.101		mg/L		101	85 - 115	
Cadmium	0.100	0.101		mg/L		101	85 - 115	
Cobalt	0.100	0.100		mg/L		100	85 - 115	
Molybdenum	0.100	0.101		mg/L		101	85 - 115	
Selenium	0.100	0.100		mg/L		100	85 - 115	
Thallium	0.100	0.101		ma/l		101	85 - 115	

Lab Sample ID: LCS 550-161587/2-A

**Matrix: Water** 

**Analysis Batch: 162387** 

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA

**Prep Batch: 161587** 

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Arsenic	0.100	0.100		mg/L		100	85 - 115	
Barium	0.100	0.0935		mg/L		93	85 - 115	
Cadmium	0.100	0.0991		mg/L		99	85 - 115	
Cobalt	0.100	0.101		mg/L		101	85 - 115	
Lead	0.100	0.0981		mg/L		98	85 - 115	
Molybdenum	0.100	0.102		mg/L		102	85 - 115	
Selenium	0.100	0.102		mg/L		102	85 - 115	
Thallium	0.100	0.0973		mg/L		97	85 - 115	

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Page 12 of 23

11/21/2018

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

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

Lab Sample ID: LCSD 550-161587/3-A Matrix: Water Analysis Batch: 161641			(	Client Sa	ample	ID: Lab	Control : Prep Typ Prep Ba	e: Tot	al/NA
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.100	0.100		mg/L		100	85 - 115	1	20
Barium	0.100	0.0999		mg/L		100	85 - 115	1	20
Cadmium	0.100	0.101		mg/L		101	85 - 115	0	20
Cobalt	0.100	0.100		mg/L		100	85 - 115	0	20
Molybdenum	0.100	0.101		mg/L		101	85 - 115	1	20
Selenium	0.100	0.0973		mg/L		97	85 - 115	3	20
Thallium	0.100	0.100		mg/L		100	85 - 115	1	20

Lab Sample ID: LCSD 550-161587/3-A Matrix: Water			(	Client Sa	ample	ID: Lat	Prep Po	e: Tot	al/NA
Analysis Batch: 162387	Spike	LCSD	LCSD				Prep Ba %Rec.	itcii. It	RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.100	0.0988		mg/L		99	85 - 115	1	20
Barium	0.100	0.0930		mg/L		93	85 - 115	0	20
Cadmium	0.100	0.0980		mg/L		98	85 - 115	1	20
Cobalt	0.100	0.0991		mg/L		99	85 - 115	2	20
Lead	0.100	0.0967		mg/L		97	85 - 115	1	20
Molybdenum	0.100	0.102		mg/L		102	85 - 115	1	20
Selenium	0.100	0.102		mg/L		102	85 - 115	0	20
Thallium	0.100	0.0967		mg/L		97	85 - 115	1	20

Lab Sample ID: 550-113020 Matrix: Water Analysis Batch: 161641		Sample	Spike	ме	MS	Clie	nt Sar	nple ID	: FC-CCR-MW7-11418 Prep Type: Total/NA Prep Batch: 161587 %Rec.
Analyte	•	Qualifier	Added	_	Qualifier	Unit	D	%Rec	Limits
Arsenic	ND		0.100	0.111		mg/L	=	110	70 - 130
Barium	0.014	B7	0.100	0.112		mg/L		98	70 - 130
Cadmium	ND		0.100	0.0911		mg/L		91	70 - 130
Cobalt	0.00056		0.100	0.0962		mg/L		96	70 - 130
Molybdenum	0.0070		0.100	0.113		mg/L		106	70 - 130
Selenium	0.0035		0.100	0.132		mg/L		128	70 - 130
Thallium	0.00010		0.100	0.0881		mg/L		88	70 - 130

Lab Sample ID: 550-11302 Matrix: Water	26-1 MS					Clie	nt San	nple ID	: FC-CCR-MW7-11418 Prep Type: Total/NA
Analysis Batch: 162387	Sample	Sample	Spike	MS	MS				Prep Batch: 161587 %Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Lead	ND		0.100	0.0855		mg/L		85	70 - 130

Lab Sample ID: 550-113026	S-1 MSD					Clie	nt Sar	nple ID	: FC-CCR-	-MW7-	11418
Matrix: Water									Prep Typ	e: Tot	al/NA
Analysis Batch: 161641									Prep Ba	itch: 16	61587
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	ND		0.100	0.114		mg/L		113	70 - 130	3	20
Barium	0.014	B7	0.100	0.114		mg/L		100	70 - 130	1	20

TestAmerica Phoenix

11/21/2018

Page 13 of 23

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# **QC Sample Results**

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

TestAmerica Job ID: 550-113026-2

- 7

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

Lab Sample ID: 550-113020 Matrix: Water Analysis Batch: 161641	S-1 MSD					Clie	nt Sar	nple ID	: FC-CCR   Prep Tyl   Prep Ba	oe: Tot	al/NA
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	ND		0.100	0.0924	-	mg/L		92	70 - 130	1	20
Cobalt	0.00056		0.100	0.0968		mg/L		96	70 - 130	1	20
Molybdenum	0.0070		0.100	0.114		mg/L		107	70 - 130	1	20
Selenium	0.0035		0.100	0.133		mg/L		129	70 - 130	1	20
Thallium	0.00010		0.100	0.0885		mg/L		88	70 - 130	0	20

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

Lab Sample ID: 550-113020 Matrix: Water	6-1 MSD					Clie	nt San	nple ID	FC-CCR Prep Ty		
Analysis Batch: 162387									Prep Ba	tch: 16	<b>31587</b>
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lead - DL	ND		0.100	0.0853		mg/L		85	70 - 130		20

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

# HPLC/IC

# **Analysis Batch: 161852**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	300.0	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	300.0	
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	300.0	
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	300.0	
MB 550-161852/1042	Method Blank	Total/NA	Water	300.0	
LCS 550-161852/73	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-161852/74	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113012-A-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-113012-A-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	300.0	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	300.0	

# **Metals**

# **Prep Batch: 161452**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	200.7	<del></del>
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	200.7	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	200.7	
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	200.7	
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	200.7	
MB 550-161452/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-161452/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-161452/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	200.7	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	200.7	
550-113026-4 MS	FC-CCR-MW75-11318	Total/NA	Water	200.7	
550-113026-4 MSD	FC-CCR-MW75-11318	Total/NA	Water	200.7	

# **Prep Batch: 161587**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	200.8	
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	200.8	
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	200.8	
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	200.8	
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	200.8	
MB 550-161587/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-161587/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-161587/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	200.8	
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	200.8	
550-113026-1 MSD - DL	FC-CCR-MW7-11418	Total/NA	Water	200.8	

# **Analysis Batch: 161641**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	200.8 LL	161587
MB 550-161587/1-A	Method Blank	Total/NA	Water	200.8 LL	161587
LCS 550-161587/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	161587
LCSD 550-161587/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	161587

TestAmerica Phoenix

Page 15 of 23 11/21/2018

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# **QC Association Summary**

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

TestAmerica Job ID: 550-113026-2

# **Metals (Continued)**

# **Analysis Batch: 161641 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	200.8 LL	161587
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	200.8 LL	161587

# **Analysis Batch: 161800**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	200.7 Rev 4.4	161452
MB 550-161452/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	161452
LCS 550-161452/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	161452
LCSD 550-161452/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-1 MSD	FC-CCR-MW7-11418	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-4 MS	FC-CCR-MW75-11318	Total/NA	Water	200.7 Rev 4.4	161452
550-113026-4 MSD	FC-CCR-MW75-11318	Total/NA	Water	200.7 Rev 4.4	161452

# **Analysis Batch: 162387**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113026-1	FC-CCR-MW7-11418	Total/NA	Water	200.8 LL	161587
550-113026-2	FC-CCR-MW8-11418	Total/NA	Water	200.8 LL	161587
550-113026-3	FC-CCR-MW61-11318	Total/NA	Water	200.8 LL	161587
550-113026-4	FC-CCR-MW75-11318	Total/NA	Water	200.8 LL	161587
550-113026-5	FC-CCR-MW49A-11418	Total/NA	Water	200.8 LL	161587
MB 550-161587/1-A	Method Blank	Total/NA	Water	200.8 LL	161587
LCS 550-161587/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	161587
LCSD 550-161587/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	161587
550-113026-1 MS	FC-CCR-MW7-11418	Total/NA	Water	200.8 LL	161587
550-113026-1 MSD - DI	FC-CCR-MW7-11418	Total/NA	Water	200.811	161587

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

Client Sample ID: FC-CCR-MW7-11418 Lab Sample ID: 550-113026-1

Date Collected: 11/04/18 09:02 Matrix: Water

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161852	11/14/18 10:53	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 13:31	ARE	TAL PHX
Total/NA	Prep	200.8			161587	11/11/18 11:15	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161641	11/12/18 12:31	TEK	TAL PHX
Total/NA	Prep	200.8			161587	11/11/18 11:15	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	162387	11/19/18 22:10	TEK	TAL PHX

Client Sample ID: FC-CCR-MW8-11418 Lab Sample ID: 550-113026-2

Date Collected: 11/04/18 08:19 **Matrix: Water** Date Received: 11/07/18 13:00

Batch Dilution Batch Batch **Prepared** Method Number or Analyzed **Prep Type** Type Run **Factor** Analyst Lab Total/NA 300.0 5 161852 11/14/18 15:38 TAL PHX Analysis NEL Total/NA 200.7 TAL PHX Prep 161452 11/09/18 07:33 SGO Total/NA Analysis 200.7 Rev 4.4 161800 11/13/18 13:54 ARE TAL PHX 1 Total/NA Prep 200.8 161587 11/11/18 11:15 SLS TAL PHX TAL PHX Total/NA Analysis 200.8 LL 162387 11/19/18 22:17 TEK 1

Client Sample ID: FC-CCR-MW61-11318 Lab Sample ID: 550-113026-3

Date Collected: 11/03/18 14:44 **Matrix: Water** Date Received: 11/07/18 13:00

Dilution Batch **Batch** Batch **Prepared Prep Type** Method Type Run **Factor** Number or Analyzed Analyst Lab Total/NA 300.0 11/14/18 16:15 NEL TAL PHX Analysis 5 161852 Total/NA Prep 200.7 161452 11/09/18 07:33 SGO TAL PHX Total/NA Analysis 200.7 Rev 4.4 161800 11/13/18 14:00 ARE TAL PHX 1 Total/NA 200.8 TAL PHX Prep 161587 11/11/18 11:15 SLS TAL PHX Total/NA Analysis 200.8 LL 162387 11/19/18 22:19 TEK 1

Client Sample ID: FC-CCR-MW75-11318 Lab Sample ID: 550-113026-4

Date Collected: 11/03/18 15:25 **Matrix: Water** Date Received: 11/07/18 13:00

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161852	11/14/18 19:49	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 13:48	ARE	TAL PHX
Total/NA	Prep	200.8			161587	11/11/18 11:15	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	162387	11/19/18 22:22	TEK	TAL PHX

TestAmerica Phoenix

# **Lab Chronicle**

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

Client Sample ID: FC-CCR-MW49A-11418

TestAmerica Job ID: 550-113026-2

Lab Sample ID: 550-113026-5

Date Collected: 11/04/18 09:59 **Matrix: Water** Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161852	11/14/18 15:02	NEL	TAL PHX
Total/NA	Prep	200.7			161452	11/09/18 07:33	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161800	11/13/18 14:06	ARE	TAL PHX
Total/NA	Prep	200.8			161587	11/11/18 11:15	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	162387	11/19/18 22:24	TEK	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 - Four Corners CCR

TestAmerica Job ID: 550-113026-2

# **Laboratory: TestAmerica Phoenix**

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

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

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# **Method Summary**

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

TestAmerica Job ID: 550-113026-2

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

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TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# TestAmerica

# Chain of Custody Record

tion  -1  -2  -3  -12SO4: 4=HNO3:  4   Skin Irrita  tements & Commen  t ≤ 0.8 mg/L	priorie 602,457,3340,188,623,443,6192			TestAmerica Laboratories, Inc.
TellFax: 93   355, MS 4915   Calendar     355, MS 4915   Calendar     4	lient Contact		Date: 11/7/2018	
NM 87416   Calendar   Intition   Calendar   Intition   Calendar   Intition   Calendar   Intition   Intition   Calendar   Intition	915	Lab College, North Congress	Control	Job No.
Sample Identification  R-MW7-11418  R-MW61-11318  R-MW75-11318  R-MW49A-11418  R-MW75-11318  R-	Calendar			112076
Sample Identification  Sample Identification  R-MW7-11418  R-MW7-11418  R-MW75-11318  R-MW49A-11418  R-MW75-11318  R-M		1)		11 2000
CCR   Sample Identification   Sample   Date	CO			SDG No.
Sample   Sample   Date				
Sample   Sample   Date   7-11418		Ca) F, S		
Sample Identification   Sample	1 day	MS / I 7 (B, 0 (CI, C (TD:		
W7-11418  W8-11418  W61-11318  W75-11318  W75-11318  -4  11/3/2018  W75-11318  -4  11/3/2018  W49A-11418  -5  11/3/2018  11/3/18  11/3		Filtered Si Perform M EPA 200. EPA 300. SM 2540C SM 4500-		Sample Specific Notes
W8-11418	7	2 X X X X		
W61-11318	-2	× × × ×		
W75-11318  W49A-11418  -4  11/3/18  W49A-11418  -5  11/4/18  11/4/18  Identification  General Skin Irritant  Flammable Skin Irritant  Polso  ctions/QC Requirements & Comments:  de reporting limit \( \) 0.8 mg/L  Company  Company  After the company  Company	-3	2 X X X X		
w49A-11418 - ≤ 11/4/18  ed: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6  Identification  d	11	2 N X X X X X		
ed: 1=1ce, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6 Identification  d Skin Irritani retions/QC Requirements & Comments:  de reporting limit ≤ 0.8 mg/L  Company  Company	7	2 X X X X		
Identification Identi		550-113026 Chain of Custody	of Custody	
Identification  d □ Flammable □ Skin Irritant  ctions/QC Requirements & Comments:  de reporting limit ≤ 0.8 mg/L  Company  Company	lce, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other			
de reporting limit ≤ 0.8 mg/L  Luvarane	lammable	Sample Disposal ( A fee may t	ee may be assessed if samples are retained longer than 1 month)  Disposal By Lab Archive For Mont	etained longer than 1 month) Archive For Months
Lyverney	s/QC Requirements & Comments: porting limit ≤ 0.8 mg/L	13,60	( 7385 ) N	PC
	1	905 Received by	Company J	Date Time 11/7/18 & Bann
	Company		Company	Date/Time
Relinquished by:	Company. Date/Time	me: Received by	J. W. Company	Date/Time 1300

TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

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Project Manager: Doug Lavarnway   Sinc Connect Varie   Lavarnway   Diace   117/2818   Telefre 128-86731(1) to Work   Mark   Valvarnway   Diace   117/2818   Diace   117/2818   Diace   Valvarnway	hone 602,437,3340 fax 623,445,6192																						Tes	m V	eric	aLa	bor	ator	TestAmerica Laboratories, Inc.	nc.	
Salph   Salp		P	roject Ma	nager: D	oug Lavai	rnway	200	ite C	onta	3:	guo	Lava	rnway		Date	=	7/20	18					COC	Z	100	1			1		1_
Statis	And notification	1	CVF3X: 920-	201-0217			1		01112	13	1	Daker	1	1	1	-15	1	1	1	1		L		-	0			18	S		1
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Sample   S	-Mail Address:			12	days				_	Cd,	228																				_
Sample   S			0	-	day		- Land		_	Ва,	26 +	_			_																
W8-11418	Sample Identification		Sample Date	Sample Time																					Sam	ole S	pecif	E Z	les		
W8-11418         - Z         11/4/2018         819         G         W         4         N         X	=C-CCR-MW7-11418		1/4/2018	902		×			×	×	×	×				-	-														
W61-11318	=C-CCR-MW8-11418		1/4/2018	819	G			-	×	×	×	×																			
W45A-11418 -4 11/3/18 1525 G W 4 N X X X X X X X X X X X X X X X X X X	C-CCR-MW61-11318	3	1/3/2018	1444	G	W		-	×	×	×	×				-	-														
W49A-11418 -5 114118 959 G W 4 N X X X X X X X X X X X X X X X X X X	C-CCR-MW75-11318	7-4	11/3/18	1525	G	W		-	×	×	×	×																			
del: 1= Ice, 2= IICl; 3= H2SO4; 4=IINO3; 5=NaOII; 6= Other    Company   Comp	C-CCR-MW49A-11418	5	11/4/18	959	G	W		-	×	×	×	×																			
ed: 1= lee, 2= HCl: 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other  Identification    Identification   Skin Irritant   Poisbard   Unkhamin   Sample Disposal (A fee may be assessed if samples are retained   Poisbard   Company   Poisbard   Poisb																															
Identification  Identification								++								++-	-	$\pm \pm$													
Identification  Id	reservation Used: 1= Ice, 2= HCl; 3= H2SO4;	4=HNO3; 5	=NaOH; 6=	Other												$\vdash$	+														
with collision cell  Zed by Radiation Safety  Company  Company  Company  Company  Company  Company  Company  Company  Company  Date/Time: Received by  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company	lammable	Skin Irritani		oison	Unk	now,		Sa	du	e Di	spo	sal ( )	a fee m	gy be a	ispo	sal l	ifs	due	les	□ are	etai	ned	For	ger	than	1 11	Mor	h)			
Company  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company  Company	special Instructions/QC Requirements & Wethod 200.8 with collision cell	Comments		= 10	- 1			ŀ								V	(2)	3	00	-	N	-	73				S			- 1	
Company:  Date/Time: Received by Company:  Company:  Date/Time: Received by Company:	1	C	window	S		Date/Time	2	Re	ceive	>a	7	3	2	0		-6	omp	X,m	b	1	1		Date	70	10	00		A	R	4	
Company: Date/Time: Received by Company		Ω	ompany:			Date/Time		Re	ceive	d by	1	0				0	omp	Van					Date	(Tim	6						
	Relinquished by	0	ompany:			Date/Time		R	Ceiva	UZ Z	111	1	1			KI O	73	100	X,	,	1		Paris	110	700	8		w	0	0	

# **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-113026-2

Login Number: 113026 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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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: 550-113026-3

Client Project/Site: APS - Four Corners CCR

# For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 11/20/2018 10:25:17 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

-----LINKS -----

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

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

TestAmerica Job ID: 550-113026-3

# **Table of Contents**

Cover Page	1
Table of Contents	
Definitions/Glossary	3
Case Narrative	
Sample Summary	5
Certification Summary	6
Method Summary	7
Subcontract Data	8
Chain of Custody	14
Receint Checklists	16

4

5

6

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9

# **Definitions/Glossary**

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

TestAmerica Job ID: 550-113026-3

**Glossary** 

LOQ

MDA

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)

Minimum Detectable Concentration (Radiochemistry) MDC MDL Method Detection Limit MLMinimum Level (Dioxin)

NC Not Calculated

ND Not Detected at the reporting limit (or MDL or EDL if shown)

Minimum Detectable Activity (Radiochemistry)

**PQL** Practical Quantitation Limit

QC **Quality Control** 

Relative Error Ratio (Radiochemistry) **RER** 

RLReporting Limit or Requested Limit (Radiochemistry)

Limit of Quantitation (DoD/DOE)

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 - Four Corners CCR

TestAmerica Job ID: 550-113026-3

Job ID: 550-113026-3

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-113026-3

### Comments

No additional comments.

### Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.9° C and 3.6° C.

### 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: APS - Four Corners CCR

TestAmerica Job ID: 550-113026-3

Lab Sample ID	Client Sample ID	Matrix	Collected Received
550-113026-1	FC-CCR-MW7-11418	Water	11/04/18 09:02 11/07/18 13:00
550-113026-2	FC-CCR-MW8-11418	Water	11/04/18 08:19 11/07/18 13:00
550-113026-3	FC-CCR-MW61-11318	Water	11/03/18 14:44 11/07/18 13:00
550-113026-4	FC-CCR-MW75-11318	Water	11/03/18 15:25 11/07/18 13:00
550-113026-5	FC-CCR-MW49A-11418	Water	11/04/18 09:59 11/07/18 13:00

# **Accreditation/Certification Summary**

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

TestAmerica Job ID: 550-113026-3

**Laboratory: TestAmerica Phoenix** 

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

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

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# **Method Summary**

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

TestAmerica Job ID: 550-113026-3

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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: November 04, 2018 Sample Received: November 08, 2018 Analysis Completed: November 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW7-11418 (550-113026-1)	< 0.5	< 0.7	< 0.7

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
		11/2/2010	11/9/2016

Robert L. Metzger, Ph.D., C.H.P.

11/19/2018

Date

FAX (480) 892-5446



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. \* CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 04, 2018 Sample Received: November 08, 2018 Analysis Completed: November 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW8-11418 (550-113026-2)	< 0.5	< 0.7	< 0.7

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Robert L. Metzger, Ph.D., C.H.P.

11/19/2018

Date

FAX (480) 892-5446



# 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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW61-11318 (550-113026-3)	< 0.5	< 0.7	< 0.7

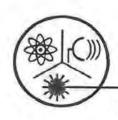
Date of Analysis	11/9/2018	11/9/2018	11/9/2018
Date of Allarysis	11/9/2018	11/9/2016	11/9/2016

Robert L. Metzger, Ph.D., C.H.P.

11/19/2018

Date

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# 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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW75-11318 (550-113026-4)	< 0.5	< 0.7	< 0.7

		1. 7.0 mm- 1	
Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Robert L. Metzger, Ph.D., C.H.P.

11/19/2018

Date

FAX (480) 892-5446

# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. + CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

Radiochemical Activity in Water (pCi/L)

**TestAmerica** 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 04, 2018 Sample Received: November 08, 2018 Analysis Completed: November 19, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW49A-11418 (550-113026-5)	< 0.5	1.4 ± 0.3	1.4 ± 0.3

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Robert L. Metzger, Ph.D., C.H.P.

11/19/2018

Date

Ver. 09/20/2016

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4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040 TestAmerica Phoenix

# Chain of Custody Record

phone 602 437 3340 fax 623 445 6192													Test America I	TestAmerica Laboratories Inc.
Client Contact	Project N	Project Manager: Doug Lavarnway	Doug Lav	arnway		šitė	9	act:		Site Contact: Doug Lavarnway	Date: 11/7/2018	//2018	COC No:	
APS Four Corners	Tel/Fax: 92	Tel/Fax: 928-288-1394				ab C	ont	act:	Ke	Lab Contact: Ken Baker	Carrier:		1 of	1 COCs
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FC-CCR-MW75-11318	11/3/18	1525	G	W	2	×	×	×	×	×				
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Special Instructions/QC Requirements & Comments: Need Fluoride reporting limit ≤ 0.8 mg/L	ments:									3.6	$\binom{2}{2}$	( )B	28	
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TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

**Chain of Custody Record** 

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hone 602.437.3340 fax 623.445.6192																				Te	V1S	me	ESE	E	bor	ator	ies,	TestAmerica Laboratories, Inc.		
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PS Four Corners	Tel/Fax: 9:	Tel/Fax: 928-587-0319			_	Lab Contact: Ken Baker	onta	ct:	Ken	Bal	er	Carrier:	67							П	_		of			C	COCs			_
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Š	Company			Date/Time:		Rec	Received by	d by	1	1)	0		Q	Company	V			ľ		D	te/l	Date/Time				1				
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Client: Arizona Public Service Company

Job Number: 550-113026-3

Login Number: 113026 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td>Common</td>	True	Common
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.



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: 550-115113-1

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

## For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Authorized for release by: 1/21/2019 12:23:02 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

**Review your project** results through Total Access

**Have a Question?** 



Visit us at: www.testamericainc.com

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

intended to be the legally binding equivalent of a traditionally handwritten signature.

This report has been electronically signed and authorized by the signatory. Electronic signature is

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
	4
Sample Summary	5
Detection Summary	6
Client Sample Results	9
QC Sample Results	15
QC Association Summary	22
Lab Chronicle	26
Certification Summary	30
Method Summary	31
Chain of Custody	32
Receipt Checklists	34

3

4

6

8

9

11

12

# **Definitions/Glossary**

Client: Arizona Public Service Company

**Qualifier Description** 

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

# **Qualifiers**

# **HPLC/IC** Qualifier

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.
D2	Sample required dilution due to high concentration of analyte.

# **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

ND

PQL

QC

RLRPD

RER

TEF

**TEQ** 

Abbreviation	These commonly used abbreviations may or may not be present in this report.
n	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

Not Detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

**Quality Control** 

Page 3 of 34

1/21/2019

# **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Job ID: 550-115113-1

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-115113-1

### Comments

No additional comments.

### Receipt

The samples were received on 12/18/2018 12:33 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.2° C and 3.7° 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: FC-CCR-MW38R-121518 (550-115113-2), FC-CCR-MW57-121518 (550-115113-3), FC-CCR-MW17R-121718 (550-115113-5), FC-CCR-DMX4-121618 (550-115113-6), FC-CCR-FD02-121618 (550-115113-7), FC-CCR-MW56-121618 (550-115113-8) and FC-CCR-MW15-121618 (550-115113-9). 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

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: CCR

TestAmerica Job ID: 550-115113-1 SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected Red	ceived
550-115113-1	FC-CCR-MW75-121518	Water	12/15/18 16:27 12/18/	/18 12:33
550-115113-2	FC-CCR-MW38R-121518	Water	12/15/18 14:14 12/18/	/18 12:33
550-115113-3	FC-CCR-MW57-121518	Water	12/15/18 13:15 12/18/	/18 12:33
550-115113-4	FC-CCR-MW61-121518	Water	12/15/18 15:39 12/18/	/18 12:33
550-115113-5	FC-CCR-MW17R-121718	Water	12/17/18 07:47 12/18/	/18 12:33
550-115113-6	FC-CCR-DMX4-121618	Water	12/16/18 12:41 12/18/	/18 12:33
550-115113-7	FC-CCR-FD02-121618	Water	12/16/18 12:41 12/18/	/18 12:33
550-115113-8	FC-CCR-MW56-121618	Water	12/16/18 14:17 12/18/	/18 12:33
550-115113-9	FC-CCR-MW15-121618	Water	12/16/18 09:51 12/18/	/18 12:33

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

# Client Sample ID: FC-CCR-MW75-121518

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	280	D2	200	mg/L	100	300.0	Total/NA
Fluoride	1.2	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	4300	D2	400	mg/L	200	300.0	Total/NA
Boron	25	M3	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
Magnesium	220	M3	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	21		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	1200	M3	0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	87		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	87		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	6600	D2	100	mg/L	1	SM 2540C	Total/NA
pH	8.4	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: FC-CCR-MW38R-121518

# Lab Sample ID: 550-115113-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	440	D2	400	mg/L	200	300.0	Total/NA
Sulfate	8900	D2	400	mg/L	200	300.0	Total/NA
Boron	19		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	680		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	39		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	2500	D2	2.0	mg/L	4	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	270		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	270		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	13000	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: FC-CCR-MW57-121518

# Lab Sample ID: 550-115113-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	510	D2	400	mg/L	200	_	300.0	Total/NA
Sulfate	7800	D2	400	mg/L	200		300.0	Total/NA
Boron	2.1		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
Magnesium	610		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	42		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2200		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	470		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	470		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	12000	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: FC-CCR-MW61-121518

Chloride

Client Sample ID: F	C-CCR-MW61-121518			Lab Sample ID: 5	50-115113-4
Analyto	Posult Qualifier	DI	Unit	Dil Fac D Method	Prop Type

200

This Detection Summary does not include radiochemical test results.

310 D2

TestAmerica Phoenix

Total/NA

1/21/2019

Page 6 of 34

mg/L

100

300.0

Client: Arizona Public Service Company

TestAmerica Job ID: 550-115113-1 Project/Site: CCR SDG: Cholla

Client Sample ID: FC-CCR-MW61-121518 (Continued)

Lab Samp	le ID:	550-1	15113-4
----------	--------	-------	---------

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	1.3	D1	0.80	mg/L	2	_	300.0	Total/NA
Sulfate	3500	D2	400	mg/L	200		300.0	Total/NA
Boron	40		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
Magnesium	120		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	20		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	1000		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	85		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	75		6.0	mg/L	1		SM 2320B	Total/NA
Carbonate Alkalinity as CaCO3	9.8		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	5500	D2	100	mg/L	1		SM 2540C	Total/NA
pH	8.7	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: FC-CCR-MW17R-121718

# Lab Sample ID: 550-115113-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	400	D2	400	mg/L	200	300.0	Total/NA
Sulfate	4000	D2	400	mg/L	200	300.0	Total/NA
Boron	38		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
Magnesium	260		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	19		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	1000		0.50	mg/L	1	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	6200	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: FC-CCR-DMX4-121618

# Lab Sample ID: 550-115113-6

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	780	D2	400	mg/L	200	- ;	300.0	Total/NA
Sulfate	9100	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	420		2.0	mg/L	1	:	200.7 Rev 4.4	Total/NA
Magnesium	730		2.0	mg/L	1	:	200.7 Rev 4.4	Total/NA
Potassium	40		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2800	D2	2.0	mg/L	4	:	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	380		6.0	mg/L	1	;	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	380		6.0	mg/L	1	;	SM 2320B	Total/NA
Total Dissolved Solids	15000	D2	100	mg/L	1	;	SM 2540C	Total/NA
pH	7.7	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: FC-CCR-FD02-121618

# Lab Sample ID: 550-115113-7

Analyte	Result C	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	790 D	)2	400	mg/L	200	300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

1/21/2019

Page 7 of 34

Client: Arizona Public Service Company

TestAmerica Job ID: 550-115113-1 Project/Site: CCR

SDG: Cholla

Lab Sample ID: 550-115113-7

Lab Sample ID: 550-115113-8

Lab Sample ID: 550-115113-9

# Client Sample ID: FC-CCR-FD02-121618 (Continued)

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	9300	D2	400	mg/L	200	_	300.0	Total/NA
Boron	2.5		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	420		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	720		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	40		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	2900	D2	2.0	mg/L	4		200.7 Rev 4.4	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	14000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.7	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: FC-CCR-MW56-121618

Analyte	Result	Qualifier	RL	Unit	Dil Fac I	) Method	Prep Type
Chloride	1500	D2	400	mg/L	200	300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200	300.0	Total/NA
Boron	3.0		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	420		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	1300	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
Potassium	54		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	3400	D2	2.0	mg/L	4	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	650		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	650		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	19000	D2	200	mg/L	1	SM 2540C	Total/NA
pH	7.1	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: FC-CCR-MW15-121618

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	990 D2	400	mg/L	200	300.0	Total/NA
Sulfate	6500 D2	400	mg/L	200	300.0	Total/NA
Boron	8.8	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
Magnesium	550	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	38	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	610	6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	610	6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	12000 D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.2 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	11.2 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-MW75-121518

Date Collected: 12/15/18 16:27 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115113-1

**Matrix: Water** 

12/19/18 14:35

12/19/18 14:35

12/19/18 14:35

12/19/18 14:35

12/19/18 11:51

12/27/18 14:17

12/27/18 14:17

Method: 300.0 - Anions, Ion C Analyte	•	ı <mark>phy</mark> Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	280		200	<u></u>			12/27/18 00:41	100
Fluoride		D1	0.80	mg/L			12/22/18 03:57	2
Sulfate	4300		400	mg/L			12/22/18 04:52	200
- Method: 200.7 Rev 4.4 - Meta	ls (ICP)							
Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	25	M3	0.050	mg/L		12/20/18 10:34	12/29/18 02:09	1
Calcium	450	M3	2.0	mg/L		12/20/18 10:34	12/27/18 11:56	1
Magnesium	220	M3	2.0	mg/L		12/20/18 10:34	12/27/18 11:56	1
Potassium	21		0.50	mg/L		12/20/18 10:34	12/27/18 11:56	1
Sodium	1200	M3	0.50	mg/L		12/20/18 10:34	12/27/18 11:56	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	87		6.0	mg/L		-	12/19/18 14:35	1

87

ND

ND

ND

6600 D2

8.4 H5

12.6 H5

D

**Bicarbonate Alkalinity as CaCO3** 

Carbonate Alkalinity as CaCO3

Hydroxide Alkalinity as CaCO3

Alkalinity, Phenolphthalein

**Total Dissolved Solids** 

рΗ

**Temperature** 

Date Received: 12/18/18 12:33

Client Sample ID: FC-CCR-MW38R-121518	Lab Sample ID: 550-115113-2
Date Collected: 12/15/18 14:14	Matrix: Water

6.0

6.0

6.0

6.0

100

1.7

0.1

mg/L

mg/L

mg/L

mg/L

mg/L

Degrees C

SU

Method: 300.0 - Anions, I	on Chromatogra	iphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	440	D2	400	mg/L			12/22/18 01:48	200
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 01:30	2
Sulfate	8900	D2	400	mg/L			12/22/18 01:48	200

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	19		0.050	mg/L		12/20/18 10:34	12/29/18 03:22	1
Calcium	410		2.0	mg/L		12/20/18 10:34	12/27/18 12:45	1
Magnesium	680		2.0	mg/L		12/20/18 10:34	12/27/18 12:45	1
Potassium	39		0.50	mg/L		12/20/18 10:34	12/27/18 12:45	1
Sodium	2500	D2	2.0	mg/L		12/20/18 10:34	12/29/18 03:16	4

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	270		6.0	mg/L			12/19/18 14:53	1
Bicarbonate Alkalinity as CaCO3	270		6.0	mg/L			12/19/18 14:53	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 14:53	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 14:53	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 14:53	1
Total Dissolved Solids	13000	D2	100	mg/L			12/19/18 11:51	1
pH	7.6	H5	1.7	SU			12/26/18 14:18	1

TestAmerica Phoenix

Page 9 of 34

1/21/2019

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-MW38R-121518

Date Collected: 12/15/18 14:14 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-2

**Matrix: Water** 

**General Chemistry (Continued)** 

Result Qualifier RL Unit Dil Fac Analyte D Prepared Analyzed **Temperature** 7.8 H5 0.1 Degrees C 12/26/18 14:18

Client Sample ID: FC-CCR-MW57-121518 Lab Sample ID: 550-115113-3

Date Collected: 12/15/18 13:15 **Matrix: Water** 

Date Received: 12/18/18 12:33

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier Unit RL D Prepared Analyzed Dil Fac 400 200 Chloride 510 D2 mg/L 12/22/18 02:25 Fluoride ND D1 D5 0.80 mg/L 12/22/18 02:06 2 400 **Sulfate** 7800 D2 mg/L 12/22/18 02:25 200

Method: 200.7 Rev 4.4 - Metals (ICP) Result Qualifier Unit **Analyte** RL Prepared Analyzed Dil Fac Boron 0.050 <u>12/20/18 10:34</u> <u>12/29/18 03:28</u> 2.1 mg/L 2.0 Calcium 430 mg/L 12/20/18 10:34 12/27/18 12:51 Magnesium 610 2.0 mg/L 12/20/18 10:34 12/27/18 12:51 **Potassium** 0.50 mg/L 12/20/18 10:34 12/27/18 12:51 42 2200 0.50 12/20/18 10:34 12/27/18 12:51 **Sodium** mg/L

**General Chemistry** Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac **Alkalinity as CaCO3** 470 6.0 mg/L 12/19/18 15:03 **Bicarbonate Alkalinity as CaCO3** 470 6.0 mg/L 12/19/18 15:03 Carbonate Alkalinity as CaCO3 ND 6.0 mg/L 12/19/18 15:03 Alkalinity, Phenolphthalein ND 6.0 mg/L 12/19/18 15:03 Hydroxide Alkalinity as CaCO3 ND 6.0 mg/L 12/19/18 15:03 100 mg/L **Total Dissolved Solids** 12000 D2 12/19/18 11:51 SU pН 7.5 H5 1.7 12/26/18 14:18 **Temperature** 9.6 H5 0.1 Degrees C 12/26/18 14:18

Client Sample ID: FC-CCR-MW61-121518

Lab Sample ID: 550-115113-4 Date Collected: 12/15/18 15:39 **Matrix: Water** 

Date Received: 12/18/18 12:33

Method: 300.0 - Anions	, Ion Chromatography						
Analyte	Result Qua	lifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	310 D2	200	mg/L			12/26/18 23:27	100
Fluoride	1.3 D1	0.80	mg/L			12/22/18 02:43	2
Sulfate	3500 D2	400	mg/L			12/22/18 03:02	200

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	40		0.050	mg/L		12/20/18 10:34	12/29/18 03:39	1
Calcium	490		2.0	mg/L		12/20/18 10:34	12/27/18 12:57	1
Magnesium	120		2.0	mg/L		12/20/18 10:34	12/27/18 12:57	1
Potassium	20		0.50	mg/L		12/20/18 10:34	12/27/18 12:57	1
Sodium	1000		0.50	mg/L		12/20/18 10:34	12/27/18 12:57	1

TestAmerica Job ID: 550-115113-1

Client: Arizona Public Service Company

Project/Site: CCR

SDG: Cholla

Client Sample ID: FC-CCR-MW61-121518

Date Collected: 12/15/18 15:39 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-4

**Matrix: Water** 

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	85		6.0	mg/L		<del>-</del>	12/19/18 15:11	1
Bicarbonate Alkalinity as CaCO3	75		6.0	mg/L			12/19/18 15:11	1
Carbonate Alkalinity as CaCO3	9.8		6.0	mg/L			12/19/18 15:11	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 15:11	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 15:11	1
Total Dissolved Solids	5500	D2	100	mg/L			12/19/18 11:51	1
pH	8.7	H5	1.7	SU			12/26/18 14:18	1
Temperature	9.8	H5	0.1	Degrees C			12/26/18 14:18	1

Client Sample ID: FC-CCR-MW17R-121718 Lab Sample ID: 550-115113-5

Date Collected: 12/17/18 07:47 Date Received: 12/18/18 12:33

**Matrix: Water** 

Method: 300.0 - Anions, Ion	<b>Chromatogra</b>	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	400	D2	400	mg/L			12/22/18 07:56	200
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 07:38	2
Sulfate	4000	D2	400	mg/L			12/22/18 07:56	200

Analyte	Result C	Qualifier F	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	38	0.0	50	mg/L		12/20/18 10:34	12/29/18 03:45	1
Calcium	450	2	.0	mg/L		12/20/18 10:34	12/27/18 13:03	1
Magnesium	260	2	.0	mg/L		12/20/18 10:34	12/27/18 13:03	1
Potassium	19	0.	50	mg/L		12/20/18 10:34	12/27/18 13:03	1
Sodium	1000	0.	50	mg/L		12/20/18 10:34	12/27/18 13:03	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	130		6.0	mg/L			12/19/18 15:19	1
Bicarbonate Alkalinity as CaCO3	130		6.0	mg/L			12/19/18 15:19	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 15:19	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 15:19	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 15:19	1
<b>Total Dissolved Solids</b>	6200	D2	100	mg/L			12/19/18 11:56	1
pH	7.5	H5	1.7	SU			12/26/18 14:18	1
Temperature	9.6	H5	0.1	Degrees C			12/26/18 14:18	1

Client Sample ID: FC-CCR-DMX4-121618 Lab Sample ID: 550-115113-6

Date Collected: 12/16/18 12:41 Date Received: 12/18/18 12:33

Method: 300.0 - Anions, Ion	Chromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	780	D2	400	mg/L			12/22/18 08:33	200
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 08:15	2
Sulfate	9100	D2	400	mg/L			12/22/18 08:33	200

TestAmerica Phoenix

**Matrix: Water** 

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-DMX4-121618

Date Collected: 12/16/18 12:41 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-6

**Matrix: Water** 

Method: 200.7 Rev 4.4 - Me	etals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.6		0.050	mg/L		12/20/18 10:34	12/29/18 03:57	1
Calcium	420		2.0	mg/L		12/20/18 10:34	12/27/18 13:09	1
Magnesium	730		2.0	mg/L		12/20/18 10:34	12/27/18 13:09	1
Potassium	40		0.50	mg/L		12/20/18 10:34	12/27/18 13:09	1
Sodium	2800	D2	2.0	mg/L		12/20/18 10:34	12/29/18 03:51	4
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	380		6.0	mg/L	- <del>-</del> -	Tropulcu	12/19/18 15:30	1
Bicarbonate Alkalinity as CaCO3	380		6.0	mg/L			12/19/18 15:30	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 15:30	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 15:30	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 15:30	1
Total Dissolved Solids	15000	D2	100	mg/L			12/19/18 11:51	1
pH	7.7	H5	1.7	SU			12/26/18 14:18	1
Temperature	9.8	H5	0.1	Degrees C			12/26/18 14:18	1

Lab Sample ID: 550-115113-7 Client Sample ID: FC-CCR-FD02-121618 **Matrix: Water** 

Date Collected: 12/16/18 12:41

Date Received: 12/18/18 12:33

Method: 300.0 - Anions, Ion Chromatography										
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac		
Chloride	790	D2	400	mg/L			12/22/18 09:10	200		
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 08:51	2		
Sulfate	9300	D2	400	mg/L			12/22/18 09:10	200		

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.5		0.050	mg/L		12/20/18 10:34	12/29/18 04:09	1
Calcium	420		2.0	mg/L		12/20/18 10:34	12/27/18 13:20	1
Magnesium	720		2.0	mg/L		12/20/18 10:34	12/27/18 13:20	1
Potassium	40		0.50	mg/L		12/20/18 10:34	12/27/18 13:20	1
Sodium	2900	D2	2.0	mg/L		12/20/18 10:34	12/29/18 04:03	4

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	390		6.0	mg/L			12/19/18 15:40	1
Bicarbonate Alkalinity as CaCO3	390		6.0	mg/L			12/19/18 15:40	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 15:40	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 15:40	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 15:40	1
<b>Total Dissolved Solids</b>	14000	D2	100	mg/L			12/19/18 11:51	1
pH	7.7	H5	1.7	SU			12/26/18 14:18	1
Temperature	10.5	H5	0.1	Degrees C			12/26/18 14:18	1

1/21/2019

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-MW56-121618

Date Collected: 12/16/18 14:17 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-8

Lab Sample ID: 550-115113-9

**Matrix: Water** 

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1500	D2	400	mg/L			12/22/18 09:47	200
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 09:28	2
Sulfate	12000	D2	400	mg/L			12/22/18 09:47	200
Method: 200.7 Rev 4.4 - Metals (	ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	3.0		0.050	mg/L		12/20/18 10:34	12/29/18 04:20	1
Calcium	420		2.0	mg/L		12/20/18 10:34	12/27/18 13:26	1
Magnesium	1300	D2	8.0	mg/L		12/20/18 10:34	12/29/18 04:15	4
Potassium	54		0.50	mg/L		12/20/18 10:34	12/27/18 13:26	1
Sodium	3400	D2	2.0	mg/L		12/20/18 10:34	12/29/18 04:15	4
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	650		6.0	mg/L			12/19/18 16:24	1
Bicarbonate Alkalinity as CaCO3	650		6.0	mg/L			12/19/18 16:24	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 16:24	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 16:24	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 16:24	1
<b>Total Dissolved Solids</b>	19000	D2	200	mg/L			12/19/18 11:51	1
pH	7.1	H5	1.7	SU			12/26/18 14:18	1
Temperature	10.1	H5	0.1	Degrees C			12/26/18 14:18	1

Client Sample ID: FC-CCR-MW15-121618

Date Collected: 12/16/18 09:51

Date Received: 12/18/18 12:33

hromatogra	phy						
Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
990	D2	400	mg/L			12/22/18 10:23	200
ND	D1 D5	0.80	mg/L			12/22/18 10:05	2
6500	D2	400	mg/L			12/22/18 10:23	200
•	Result 990 ND	Result   Qualifier	Result         Qualifier         RL           990         D2         400           ND         D1         D5         0.80	Result         Qualifier         RL         Unit           990         D2         400         mg/L           ND         D1         D5         0.80         mg/L	Result 990 D2         Qualifier 400 mg/L         RL mg/L         Unit mg/L         D           ND D1 D5         0.80         mg/L	Result 990 D2         Qualifier 400         RL mg/L mg/L mg/L           ND D1 D5         0.80         mg/L	Result 990 D2         Qualifier 400         RL mg/L mg/L         Unit mg/L mg/L         D Prepared 12/22/18 10:23           ND D1 D5         0.80         mg/L         12/22/18 10:05

Method: 200.7 Rev 4.4	- Metals (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	8.8	0.050	mg/L		12/20/18 10:34	12/29/18 04:26	1
Calcium	440	2.0	mg/L		12/20/18 10:34	12/27/18 13:32	1
Magnesium	550	2.0	mg/L		12/20/18 10:34	12/27/18 13:32	1
Potassium	38	0.50	mg/L		12/20/18 10:34	12/27/18 13:32	1
Sodium	2100	0.50	mg/L		12/20/18 10:34	12/27/18 13:32	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	610		6.0	mg/L			12/19/18 16:36	1
Bicarbonate Alkalinity as CaCO3	610		6.0	mg/L			12/19/18 16:36	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 16:36	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 16:36	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 16:36	1
Total Dissolved Solids	12000	D2	100	mg/L			12/19/18 11:51	1
pH	7.2	H5	1.7	SU			12/26/18 14:18	1

Page 13 of 34

TestAmerica Phoenix

1/21/2019

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-MW15-121618

Date Collected: 12/16/18 09:51 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115113-9

Matrix: Water

**General Chemistry (Continued)** 

Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac

 Temperature
 11.2
 H5
 0.1
 Degrees C
 12/26/18 14:18
 1

-0

4

5

7

8

10

11

13

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography

MD MD

Lab Sample ID: MB 550-165329/2 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

	IVID	IAID						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/21/18 19:03	1
Fluoride	ND		0.40	mg/L			12/21/18 19:03	1
Sulfate	ND		2.0	mg/L			12/21/18 19:03	1

Lab Sample ID: LCS 550-165329/5 **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 165329** 

		Spike	LCS	LCS				%Rec.	
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	 	20.0	20.9		mg/L		105	90 - 110	
Fluoride		4.00	4.06		mg/L		101	90 - 110	
Sulfate		20.0	20.0		mg/L		100	90 - 110	

Lab Sample ID: LCSD 550-165329/6 **Client Sample ID: Lab Control Sample Dup Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

		Spike	LCSD	LCSD				%Rec.		RPD
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride		20.0	21.0		mg/L		105	90 - 110	0	20
Fluoride		4.00	4.06		mg/L		101	90 - 110	0	20
Sulfate		20.0	20.1		mg/L		100	90 - 110	0	20

Lab Sample ID: 550-115113-1 MS Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 165329

7 <b>,</b> 0.0	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	1.2		8.00	9.53	D1	ma/L		103	80 - 120	

Lab Sample ID: 550-115113-1 MS Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Sample Sample Spike MS MS %Rec Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Sulfate 4300 D2 4000 8450 D2 mg/L 103 80 - 120

Lab Sample ID: 550-115113-1 MSD Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 165329

_	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	1.2		8.00	9.49	D1	ma/L		103	80 - 120		20

Lab Sample ID: 550-115113-1 MSD Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit Sulfate 4300 D2 4000 8420 D2 mg/L 102 80 - 120 NC

Client: Arizona Public Service Company TestAmerica Job ID: 550-115113-1 Project/Site: CCR

SDG: Cholla

# Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-115114-B-1 MS ^200 Client Sample ID: Matrix Spike **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits Sulfate 4000 3400 D2 7370 D2 mg/L 100 80 - 120

Lab Sample ID: 550-115114-B-1 MSD ^200 Client Sample ID: Matrix Spike Duplicate **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Limits Analyte Result Qualifier Unit **RPD** Limit D %Rec 4000 Sulfate 3400 D2 7350 D2 mg/L 100 80 - 120 20

Client Sample ID: Matrix Spike Lab Sample ID: 550-115115-B-1 MS ^200 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Sample Sample Spike MS MS %Rec. Result Qualifier Added Result Qualifier Limits Analyte Unit D %Rec Chloride 2300 D2 4000 6670 D2 109 80 - 120 mg/L Sulfate 14000 D2 4000 17200 D2 mg/L 86 80 - 120

Lab Sample ID: 550-115115-B-1 MSD ^200 **Client Sample ID: Matrix Spike Duplicate** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 165329** 

Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Limits **RPD** Limit Unit D %Rec Chloride 2300 D2 4000 6640 D2 mg/L 108 80 - 120 0 20 Sulfate 14000 D2 4000 17100 D2 mg/L 84 80 - 120 20

Lab Sample ID: MB 550-165473/1024 Client Sample ID: Method Blank Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 165473** 

	IVID	IVID						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/26/18 20:42	1
Fluoride	ND		0.40	mg/L			12/26/18 20:42	1
Sulfate	ND		2.0	mg/L			12/26/18 20:42	1

Lab Sample ID: LCS 550-165473/25 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165473** 

	Spike	LCS	LCS				%Rec.		
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Chloride	20.0	21.3		mg/L		106	90 - 110		
Fluoride	4.00	4.09		mg/L		102	90 - 110		
Sulfate	20.0	20.3		mg/L		101	90 - 110		

Lab Sample ID: LCSD 550-165473/26 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 165473** 

Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit Chloride 20.0 21.3 mg/L 106 90 - 110 n

Client: Arizona Public Service Company

Lab Sample ID: LCSD 550-165473/26

Method: 300.0 - Anions, Ion Chromatography (Continued)

Project/Site: CCR

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

**Matrix: Water Analysis Batch: 165473** 

	<b>Spike</b>	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Fluoride	4.00	4.10		mg/L		102	90 - 110	0	20	
Sulfate	20.0	20.3		mg/L		102	90 - 110	0	20	

Lab Sample ID: 550-115113-1 MS Client Sample ID: FC-CCR-MW75-121518

**Matrix: Water** Prep Type: Total/NA

. ..

**Analysis Batch: 165473** Spike MS MS %Rec. Sample Sample

Result Qualifier **Analyte** Result Qualifier Added Unit %Rec Limits Chloride 280 D2 2000 2430 D2 108 80 - 120 mg/L

Lab Sample ID: 550-115113-1 MSD Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165473** 

MSD MSD Sample Sample Spike %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit Chloride 280 D2 2000 2430 D2 mg/L 108 80 - 120 0

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-164986/1-A Client Sample ID: Method Blank Prep Type: Total/NA **Matrix: Water Analysis Batch: 165571 Prep Batch: 164986** 

	MB I	MB						
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		2.0	mg/L	_	12/20/18 10:34	12/27/18 11:36	1
Magnesium	ND		2.0	mg/L		12/20/18 10:34	12/27/18 11:36	1
Potassium	ND		0.50	mg/L		12/20/18 10:34	12/27/18 11:36	1
Sodium	ND		0.50	mg/L		12/20/18 10:34	12/27/18 11:36	1

Lab Sample ID: LCS 550-164986/2-A **Client Sample ID: Lab Control Sample Matrix: Water** 

**Analysis Batch: 165571** Prep Batch: 164986 Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit D %Rec Limits 21.0 22.0 mg/L 105 85 - 115

Calcium Magnesium 21.0 21.2 mg/L 101 85 - 115 Potassium 20.0 20.2 101 mg/L 85 - 115 Sodium 20.0 19.9 85 - 115 mg/L 99

Lab Sample ID: LCSD 550-164986/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 165571 **Prep Batch: 164986** 

Analysis Baton, 100071							i icp Dt	10011. 1	J-1000	
-	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Calcium	21.0	21.6		mg/L		103	85 - 115	2	20	
Magnesium	21.0	20.9		mg/L		100	85 - 115	2	20	
Potassium	20.0	19.9		mg/L		100	85 - 115	2	20	
Sodium	20.0	19.5		mg/L		98	85 - 115	2	20	

TestAmerica Phoenix

Page 17 of 34

Prep Type: Total/NA

Client Sample ID: FC-CCR-MW75-121518

70 - 130

%Rec.

Limits

70 - 130

Prep Type: Total/NA

**Prep Batch: 164986** 

Prep Type: Total/NA

Prep Type: Total/NA

Prep Batch: 164986

RPD

**RPD** 

Limit

Client Sample ID: FC-CCR-MW75-121518

Client Sample ID: FC-CCR-MW75-121518

Client Sample ID: FC-CCR-MW75-121518

D %Rec

-62

%Rec.

Limits

**Client Sample ID: Lab Control Sample** 

70 - 130

%Rec

34

Client: Arizona Public Service Company

Project/Site: CCR

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

20.0

Spike

Added

1.00

1200 M3

Sample Sample

Sample Sample

Result Qualifier

Lab Sample ID: 550-115113-1 MS Matrix: Water

Matrix: Water Analysis Batch: 165571	Sample	Sample	Spike	MS	MS				Prep Type: Tot Prep Batch: 10 %Rec.	
Analyte	•	Qualifier	Added	_	Qualifier	Unit	D	%Rec	Limits	
Calcium	450	M3	21.0	471	M3	mg/L		86	70 - 130	
Magnesium	220	M3	21.0	243	M3	mg/L		101	70 - 130	
Potassium	21		20.0	42.8		mg/L		107	70 - 130	

1250 M3

MS MS

25.3 M3

MSD MSD

24.4 M3

Result Qualifier

Result Qualifier

mg/L

Unit

mg/L

Unit

mg/L

Lab Sample ID: 550-115113-1 MS

**Matrix: Water** 

Sodium

Analysis Batch: 165722

7 tilaly 0.0	Datoiii	
A I		

Analyte	Result	Qualifier
Boron	25	M3

<del>-</del> -		
Lab Sample ID:	550-115113-1	<b>MSD</b>

**Matrix: Water** 

Analysis	Batch:	1655/1

ı	Allaly	/313	Dateii.	10337	۰
ı					
ı					

Analysis Batch: 165571						Prep B	Prep Batch: 164986				
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Calcium	450	M3	21.0	447	M3	mg/L		-32	70 - 130	5	20
Magnesium	220	M3	21.0	229	M3	mg/L		36	70 - 130	6	20
Potassium	21		20.0	40.5		mg/L		95	70 - 130	6	20
Sodium	1200	M3	20.0	1150	M3	mg/L		-278	70 - 130	8	20

Spike

Added

1.00

Lab Sample ID: 550-115113-1 MSD

**Matrix: Water** 

Analysis Batch: 165722

Allalysis	Daten.	103122
Analyte		

Boron		25	M3
Method	: SM 2320B - A	kalinity	

Lab Sample ID: MB 550-164955/5	Client Sample ID: Method Blank
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 164955	

	MB MB					
Analyte	Result Qualifier	RL	Unit	D Prep	ared Analyzed	Dil Fac
Alkalinity as CaCO3	ND	6.0	mg/L		12/19/18 14:01	1
Bicarbonate Alkalinity as CaCO3	ND	6.0	mg/L		12/19/18 14:01	1
Carbonate Alkalinity as CaCO3	ND	6.0	mg/L		12/19/18 14:01	1
Alkalinity, Phenolphthalein	ND	6.0	mg/L		12/19/18 14:01	1
Hydroxide Alkalinity as CaCO3	ND	6.0	mg/L		12/19/18 14:01	1

Lab Sample ID: LCS 550-164955/4

**Matrix: Water** 

Analysis Batch: 164955

7 maryolo Batom 10-1000	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Alkalinity as CaCO3	250	249		mg/L		100	90 - 110	 

**Prep Type: Total/NA** 

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

## Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: LCSD 550-164955/17

**Matrix: Water** 

**Analysis Batch: 164955** 

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

Spike LCSD LCSD %Rec. RPD Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit 250 Alkalinity as CaCO3 259 mg/L 104 90 - 110 20

Lab Sample ID: 550-115104-C-1 DU

**Matrix: Water** 

**Analysis Batch: 164955** 

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

Sample Sample DU DU **RPD** Result Qualifier Result Qualifier **RPD** Analyte Unit D Limit Alkalinity as CaCO3 24 26.1 mg/L 6 20 Bicarbonate Alkalinity as CaCO3 24 26.1 mg/L 6 20 ND ND Carbonate Alkalinity as CaCO3 mg/L NC 20 Alkalinity, Phenolphthalein ND ND mg/L NC 20 ND ND NC 20 Hydroxide Alkalinity as CaCO3 mg/L

Lab Sample ID: 550-115113-1 DU

**Matrix: Water** 

**Analysis Batch: 164955** 

Client Sample ID: FC-CCR-MW75-121518 Prep Type: Total/NA

**Client Sample ID: Duplicate** 

**Prep Type: Total/NA** 

DU DU **RPD** Sample Sample Result Qualifier Result Qualifier **RPD** Analyte Unit D Limit Alkalinity as CaCO3 87 86.6 mg/L 0.9 20 Bicarbonate Alkalinity as CaCO3 87 86.6 mg/L 0.9 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: 550-115114-A-1 DU

**Matrix: Water** 

Analysis Batch: 164955

Allalysis Datoll. 104500								
	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	250		242		mg/L		 1	20
Bicarbonate Alkalinity as CaCO3	250		242		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

## Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-164875/1

**Matrix: Water** 

**Analysis Batch: 164875** 

Client Sample ID: M	ethod Blank
Prep Ty	pe: Total/NA

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac **Total Dissolved Solids** ND 20 12/19/18 11:51 mg/L

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 550-164875/2	Client Sample ID: Lab Control Sample
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 164875	

	эріке	LUS	LUS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Total Dissolved Solids	1000	972		mg/L		97	90 - 110	

Lab Sample ID: LCSD 550-164875/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA Analysis Batch: 164875** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Total Dissolved Solids	1000	974		mg/L		97	90 - 110	0	10

Lab Sample ID: 550-115113-1 DU Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 164875** 

_	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Total Dissolved Solids	6600	D2	 6310	D2	mg/L		 4	10

Lab Sample ID: 550-115114-B-1 DU **Client Sample ID: Duplicate Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 164875** 

	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Total Dissolved Solids	5200	D2	5060	D2	mg/L		3	10

Lab Sample ID: MB 550-164877/1 **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 164877** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			12/19/18 11:56	1

MR MR

Lab Sample ID: LCS 550-164877/2 **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 164877** 

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Total Dissolved Solids	1000	966		mg/L		97	90 - 110	

Lab Sample ID: LCSD 550-164877/3 **Client Sample ID: Lab Control Sample Dup** 

**Matrix: Water** Analysis Batch: 164877

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	0	%Rec	Limits	RPD	Limit
Total Dissolved Solids	 1000	976		mg/L		98	90 - 110	1	10

Lab Sample ID: 550-115116-A-1 DU **Client Sample ID: Duplicate Matrix: Water** Prep Type: Total/NA

Analysis Batch: 164877									
	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
Total Dissolved Solids	ND		 ND		mg/L		 	NC	10

TestAmerica Phoenix

Prep Type: Total/NA

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA

Prep Type: Total/NA

Client: Arizona Public Service Company Project/Site: CCR

Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-165356/1 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 165356

Spike LCSSRM LCSSRM %Rec. Added Result Qualifier Unit D %Rec Limits **Analyte** 7.00 SU 99.9 рН 7.0 98.5 - 101.

Lab Sample ID: LCSSRM 550-165356/13 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 165356

LCSSRM LCSSRM %Rec. Spike **Analyte** Added Result Qualifier Unit D %Rec Limits 7.00 SU рН 7.0 100.0 98.5 - 101. 5

Lab Sample ID: 550-115114-B-1 DU **Client Sample ID: Duplicate Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165356** 

RPD Sample Sample DU DU Result Qualifier Result Qualifier Analyte RPD Limit Unit 7.5 H5 рН 7.5 H5 SU 0.1 Temperature 10.6 H5 11.0 H5 Degrees C 4

Lab Sample ID: LCSSRM 550-165497/1 Client Sample ID: Lab Control Sample **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165497** 

Spike LCSSRM LCSSRM %Rec. Added Analyte Result Qualifier Unit D %Rec Limits 7.00 7.0 SU 99.9 рН 98.5 - 101. 5

Lab Sample ID: LCSSRM 550-165497/13

**Matrix: Water** 

Analysis Batch: 165497

LCSSRM LCSSRM Spike %Rec. Analyte Added Result Qualifier Limits Unit D %Rec рН 7.00 7.0 SU 100.4 98.5 - 101. 5

Lab Sample ID: 550-115113-1 DU Client Sample ID: FC-CCR-MW75-121518

**Matrix: Water** 

**Analysis Batch: 165497** 

DU DU RPD Sample Sample Analyte Result Qualifier Result Qualifier Unit RPD Limit 8.4 H5 8.3 H5 SU рН 0.2 Temperature 12.6 H5 11.5 H5 Degrees C 9

Project/Site: CCR HPLC/IC

Client: Arizona Public Service Company

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batcl
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	300.0	_
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	300.0	
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	300.0	
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	300.0	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	300.0	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	300.0	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	300.0	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	300.0	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	300.0	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	300.0	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	300.0	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	300.0	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	300.0	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	300.0	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	300.0	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	300.0	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	300.0	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	300.0	
MB 550-165329/2	Method Blank	Total/NA	Water	300.0	
LCS 550-165329/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-165329/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	300.0	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	300.0	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	300.0	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	300.0	
550-115114-B-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-115114-B-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-115115-B-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-115115-B-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	

# Analysis Batch: 165473

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	300.0	_
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	300.0	
MB 550-165473/1024	Method Blank	Total/NA	Water	300.0	
LCS 550-165473/25	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-165473/26	Lab Control Sample Dup	Total/NA	Water	300.0	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	300.0	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	300.0	

## Metals

## **Prep Batch: 164986**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.7	_
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.7	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.7	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.7	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.7	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.7	

TestAmerica Phoenix

1/21/2019

Page 22 of 34

Client: Arizona Public Service Company Project/Site: CCR

# **Metals (Continued)**

## Prep Batch: 164986 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.7	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.7	
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.7	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.7	

## **Analysis Batch: 165571**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.7 Rev 4.4	164986
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164986
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164986
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986

## **Analysis Batch: 165722**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986

# **General Chemistry**

## **Analysis Batch: 164875**

La	ab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
55	50-115113-1	FC-CCR-MW75-121518	Total/NA	Water	SM 2540C	
55	50-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	SM 2540C	

TestAmerica Phoenix

Page 23 of 34 1/21/2019

Client: Arizona Public Service Company
Project/Site: CCR

TestAmerica Job ID: 550-115113-1 SDG: Cholla

holla

# **General Chemistry (Continued)**

## **Analysis Batch: 164875 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	SM 2540C	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	SM 2540C	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	SM 2540C	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	SM 2540C	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	SM 2540C	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	SM 2540C	
MB 550-164875/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-164875/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-164875/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-115113-1 DU	FC-CCR-MW75-121518	Total/NA	Water	SM 2540C	
550-115114-B-1 DU	Duplicate	Total/NA	Water	SM 2540C	

## **Analysis Batch: 164877**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	SM 2540C	<del>-</del>
MB 550-164877/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-164877/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-164877/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-115116-A-1 DU	Duplicate	Total/NA	Water	SM 2540C	

## **Analysis Batch: 164955**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	SM 2320B	
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	SM 2320B	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	SM 2320B	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	SM 2320B	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	SM 2320B	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	SM 2320B	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	SM 2320B	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	SM 2320B	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	SM 2320B	
MB 550-164955/5	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-164955/4	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-164955/17	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-115104-C-1 DU	Duplicate	Total/NA	Water	SM 2320B	
550-115113-1 DU	FC-CCR-MW75-121518	Total/NA	Water	SM 2320B	
550-115114-A-1 DU	Duplicate	Total/NA	Water	SM 2320B	

## **Analysis Batch: 165356**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	SM 4500 H+ B	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	SM 4500 H+ B	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	SM 4500 H+ B	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	SM 4500 H+ B	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	SM 4500 H+ B	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	SM 4500 H+ B	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	SM 4500 H+ B	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-165356/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-165356/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-115114-B-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	

TestAmerica Phoenix

1/21/2019

Page 24 of 34

# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

# Analysis Batch: 165497

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-165497/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-165497/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-115113-1 DU	FC-CCR-MW75-121518	Total/NA	Water	SM 4500 H+ B	

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-MW75-121518

Date Collected: 12/15/18 16:27 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-1

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 03:57	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 04:52	NEL	TAL PHX
Total/NA	Analysis	300.0		100	165473	12/27/18 00:41	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 11:56	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 02:09	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 14:35	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164875		YET	TAL PHX
					(Start) 1	2/19/18 11:51		
					(End) 1	2/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165497	12/27/18 14:17	MRR	TAL PHX

Client Sample ID: FC-CCR-MW38R-121518

Date Collected: 12/15/18 14:14

Lab Sample ID: 550-115113-2

**Matrix: Water** 

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 01:30	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 01:48	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:45	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 03:16	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 03:22	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 14:53	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164875		YET	TAL PHX
					(Start) 1	12/19/18 11:51		
					(End) 1	12/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW57-121518

Date Collected: 12/15/18 13:15

Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-3

**Matrix: Water** 

Γ	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 02:06	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 02:25	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:51	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX

TestAmerica Phoenix

Page 26 of 34

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-MW57-121518

Date Collected: 12/15/18 13:15 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-3

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	200.7 Rev 4.4			165722	12/29/18 03:28	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 15:03	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	,	2/19/18 11:51 2/20/18 09:05	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	(End) 1 165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW61-121518

Date Collected: 12/15/18 15:39

Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-4

**Matrix: Water** 

Batch Batch Dilution Batch Prepared Method **Prep Type** Type Run **Factor** Number or Analyzed Analyst Lab Total/NA 300.0 12/22/18 02:43 NEL Analysis 165329 TAL PHX Total/NA 300.0 Analysis 200 165329 12/22/18 03:02 NEL TAL PHX 100 Total/NA Analysis 300.0 TAL PHX 165473 12/26/18 23:27 NEL Total/NA Prep 200.7 164986 12/20/18 10:34 SGO TAL PHX 200.7 Rev 4.4 TAL PHX Total/NA Analysis 165571 12/27/18 12:57 SRA 1 200.7 Total/NA Prep 164986 12/20/18 10:34 SGO TAL PHX 165722 12/29/18 03:39 SRA Total/NA Analysis 200.7 Rev 4.4 1 TAL PHX Total/NA SM 2320B 1 164955 12/19/18 15:11 DGS TAL PHX Analysis TAL PHX Total/NA SM 2540C 164875 YET Analysis 1 (Start) 12/19/18 11:51 (End) 12/20/18 09:05 Total/NA Analysis SM 4500 H+ B 165356 12/26/18 14:18 MRR TAL PHX

Client Sample ID: FC-CCR-MW17R-121718

Date Collected: 12/17/18 07:47

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 07:38	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 07:56	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:03	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 03:45	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 15:19	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164877		YET	TAL PHX
					(Start) 1	12/19/18 11:56		
					(End) 1	12/20/18 10:00		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

TestAmerica Phoenix

Page 27 of 34

10

Lab Sample ID: 550-115113-5 **Matrix: Water** 

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-DMX4-121618

Date Collected: 12/16/18 12:41 Date Received: 12/18/18 12:33

Project/Site: CCR

Client: Arizona Public Service Company

Lab Sample ID: 550-115113-6

Lab Sample ID: 550-115113-7

Lab Sample ID: 550-115113-8

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	165329	12/22/18 08:15	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 08:33	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:09	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 03:51	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 03:57	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 15:30	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164875		YET	TAL PHX
					(Start) 1	12/19/18 11:51		
					(End) 1	12/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-FD02-121618

Date Collected: 12/16/18 12:41

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 08:51	NEL	TAL PH
Total/NA	Analysis	300.0		200	165329	12/22/18 09:10	NEL	TAL PH
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PH
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:20	SRA	TAL PH
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PH
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 04:03	SRA	TAL PH
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PH
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 04:09	SRA	TAL PH
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 15:40	DGS	TAL PH
Total/NA	Analysis	SM 2540C		1	164875		YET	TAL PH
					(Start) 1	12/19/18 11:51		
					(End) 1	12/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PH

Client Sample ID: FC-CCR-MW56-121618

Date Collected: 12/16/18 14:17

Date Received: 12/18/18 12:33

Γ	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 09:28	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 09:47	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:26	SRA	TAL PHX

Page 28 of 34

**Matrix: Water** 

**Matrix: Water** 

## **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-1

SDG: Cholla

Client Sample ID: FC-CCR-MW56-121618

Date Collected: 12/16/18 14:17 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115113-8

Matrix: Water

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 04:15	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 04:20	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 16:24	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	,	12/19/18 11:51 12/20/18 09:05	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW15-121618 Lab Sample ID: 550-115113-9

Date Collected: 12/16/18 09:51

Date Received: 12/18/18 12:33

Batch Dilution Batch Batch **Prepared** Method **Prep Type** Type Run Factor Number or Analyzed Analyst Lab Total/NA Analysis 300.0 2 165329 12/22/18 10:05 NEL TAL PHX Total/NA 200 Analysis 300.0 165329 12/22/18 10:23 NEL TAL PHX Total/NA 200.7 TAL PHX Prep 164986 12/20/18 10:34 SGO Total/NA Analysis 200.7 Rev 4.4 165571 12/27/18 13:32 SRA TAL PHX 1 200.7 Total/NA Prep 164986 12/20/18 10:34 SGO TAL PHX Total/NA Analysis 200.7 Rev 4.4 165722 12/29/18 04:26 SRA TAL PHX 1 Total/NA Analysis SM 2320B 164955 12/19/18 16:36 DGS TAL PHX 164875 TAL PHX Total/NA Analysis SM 2540C 1 YET (Start) 12/19/18 11:51 (End) 12/20/18 09:05

165356 12/26/18 14:18 MRR

TAL PHX

**Laboratory References:** 

Analysis

Total/NA

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

SM 4500 H+ B

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# **Accreditation/Certification Summary**

Client: Arizona Public Service Company
Project/Site: CCR
TestAmerica Job ID: 550-115113-1
SDG: Cholla

# **Laboratory: TestAmerica Phoenix**

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

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
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: 550-115113-1

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

PO#

-2

FC-CCR-MW38R-121518

12/15/2018 12/15/2018

1414 G

1627 G

FC-CCR-MW75-121518

Sample Identification

Sample Date

Sample Time

Type (C=Comp, G=Grab) Sample

Matrix

Cont.

Filtered Sample (Y/N)

Perform MS / MSD (Y / N)

200.8 (Sb, As, Ba, Cd, Cr, Co, Pb, Mo, Se, Tl)

EPA 200.7 (Li, Mg, SiO2)

EPA 300.0 (F)

3

3 4

FC-CCR-MW17R-121718

FC-CCR-DMX4-121618 FC-CCR-FD02-121618

12/16/2018

12/17/2018

747 G

12/15/2018 12/15/2018

1539 G 1315 G

FC-CCR-MW61-121518 FC-CCR-MW57-121518 Site: Cholla Project Name: CCR XXXX XXX-XXXX 928) 587-0319 Joseph City, Az 86032

Phone

TAT if different from Below

APS Cholla 4801 Cholla Lake Road

Phoenix, AZ 85040 phone 602.437.3340 fax 602.454.9303

Client Contact

928-587-0319 Doug Lavarnway

**Analysis Turnaround Time** 

Regulatory Program:

Doug Lavarnway Lab Contact:

Suite 189

4625 E Cotton Center Blvd

TestAmerica Phoenix

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TAPHX  12/17/2018 COC N Sample Sample For La Walk-ir Lab Sa Walk-ir Lab Sa Job / S  Job / S  Job / S  Job / S  Date/fi Date/fi Date/fi Date/fi	y y			p. ("C): Obs'd:		✓ Disposal by Lab	e may be asse										Car	
Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: Job / SDG No.:  Job / SDG No.:  Date/Time: Date/Time: Date/Time:	Company:	Company	Company:	Corrd: ox,	2		assessed if samples are retai	550-115113 C									Carrier:	12/17/2
	Date/Time:	Date/Time:	Date/Time:	Therm ID No.:	3.7:		ined longer than 1 month)	hain of Custody				Sample Specific Notes	Job / SDG No.:	Lab Sampling:	Walk-in Client:	Sampler:		177.1

2-2-C

Company:

Date/Time:

Received in Laboratory

Relinquished-by:

anar your

Relinquished by:

Relinquished by:

Custody Seals Intact

Yes

□ No

Company:

Date/Time:

Received by:

Cooler Terr

Date/Time:

Received by

Custody Seal No.:

Company

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.

Possible Hazard Identification:

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FC-CCR-MW15-121618 FC-CCR-MW56-121618

12/16/2018 12/16/2018 12/16/2018

951 G

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z Z z z z z z z Z

1417 G

1241 G 1241 G

18

1 5

Special Instructions/QC Requirements & Comments: Method 200.8 with collision cell

Skin Irritant

Poison B

Unknown

Return to Client

Sample Disposal ( A fe

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

000

# **Chain of Custody Record**

71	
m	M.
m	100
DE	2
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2	-
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m	

# **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-115113-1

SDG Number: Cholla

Login Number: 115113 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

Groutor: mayocon, Liou		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.





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: 550-115113-2

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

## For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Authorized for release by: 1/21/2019 1:17:31 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

**Review your project** results through Total Access

**Have a Question?** 



Visit us at:

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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	13
QC Association Summary	17
Lab Chronicle	20
Certification Summary	24
Method Summary	25
Chain of Custody	26
Receipt Checklists	28

3

4

5

7

9

10

12

13

# **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

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
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
D2	blank spike was acceptable. Sample required dilution due to high concentration of analyte.

# Glossary

Ciossary	
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)
MDI	Method Detection Limit

MDC	Minimum Detectable Co
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Coloulated

110	Not Galculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)

QC	Quality Control
----	-----------------

RER	Relative Error Ratio (Radiochemistry)

RPD	Relative Percent Difference, a measure of the relative difference between two points
-----	--

TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

1/21/2019

12

13

14

## **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

Job ID: 550-115113-2

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-115113-2

#### Comments

No additional comments.

### Receipt

The samples were received on 12/18/2018 12:33 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.2° C and 3.7° 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: FC-CCR-MW38R-121518 (550-115113-2), FC-CCR-MW57-121518 (550-115113-3), FC-CCR-MW17R-121718 (550-115113-5), FC-CCR-DMX4-121618 (550-115113-6), FC-CCR-FD02-121618 (550-115113-7), FC-CCR-MW56-121618 (550-115113-8) and FC-CCR-MW15-121618 (550-115113-9). 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

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: 550-115113-2 SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-115113-1	FC-CCR-MW75-121518	Water	12/15/18 16:27	12/18/18 12:33
550-115113-2	FC-CCR-MW38R-121518	Water	12/15/18 14:14	12/18/18 12:33
550-115113-3	FC-CCR-MW57-121518	Water	12/15/18 13:15	12/18/18 12:33
550-115113-4	FC-CCR-MW61-121518	Water	12/15/18 15:39	12/18/18 12:33
550-115113-5	FC-CCR-MW17R-121718	Water	12/17/18 07:47	12/18/18 12:33
550-115113-6	FC-CCR-DMX4-121618	Water	12/16/18 12:41	12/18/18 12:33
550-115113-7	FC-CCR-FD02-121618	Water	12/16/18 12:41	12/18/18 12:33
550-115113-8	FC-CCR-MW56-121618	Water	12/16/18 14:17	12/18/18 12:33
550-115113-9	FC-CCR-MW15-121618	Water	12/16/18 09:51	12/18/18 12:33

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115113-2

Lab Sample ID: 550-115113-1

Lab Sample ID: 550-115113-2

Lab Sample ID: 550-115113-3

Lab Sample ID: 550-115113-4

Lab Sample ID: 550-115113-5

SDG: Cholla

## Client Sample ID: FC-CCR-MW75-121518

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type	
Fluoride	1.2	D1	0.80	mg/L		300.0	Total/NA	
Lithium	0.41		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	6.9		0.21	mg/L	1	200.7 Rev 4.4	Total/NA	
Barium	0.022	D1	0.010	mg/L	20	200.8 LL	Total/NA	
Cobalt	0.046	D1	0.010	mg/L	20	200.8 LL	Total/NA	
Molybdenum	0.17	D1	0.010	mg/L	20	200.8 LL	Total/NA	
Selenium	0.026	D1 M1	0.010	mg/L	20	200.8 LL	Total/NA	

# Client Sample ID: FC-CCR-MW38R-121518

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.80	0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	680	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
SiO2, Silica	17	0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.026 D1	0.010	mg/L	20	200.8 LL	Total/NA
Cobalt	0.093 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.044 D1	0.010	mg/L	20	200.8 LL	Total/NA

## Client Sample ID: FC-CCR-MW57-121518

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.80		0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	610		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
SiO2, Silica	17		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.023	D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.022	D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW61-121518

Analyte	Result C	Qualifier	RL	Unit	Dil Fac I	Method	Prep Type
Fluoride	1.3	D1	0.80	mg/L		300.0	Total/NA
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	7.7		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.019	<b>D1</b>	0.010	mg/L	20	200.8 LL	Total/NA
Cobalt	0.022	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.10	01	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.023 [	<b>D1</b>	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW17R-121718

Analyte	Result Qua	lifier RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.41	0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	260	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	0.027 D1	0.010	mg/L	20	200.8 LL	Total/NA
Cobalt	0.091 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.019 D1	0.010	mg/L	20	200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

1/21/2019

Page 6 of 28

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

Lab Sample ID: 550-115113-6

Lab Sample ID: 550-115113-7

Lab Sample ID: 550-115113-8

Lab Sample ID: 550-115113-9

SDG: Cholla

# Client Sample ID: FC-CCR-DMX4-121618

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.67	0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	730	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	0.016 D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.013 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.027 D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-FD02-121618

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.66		0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	720		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	0.015	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.013	D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.026	D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW56-121618

Analyte	Result	Qualifier	RL	Unit	Dil Fac [	Method	Prep Type
Lithium	1.1		0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	1300	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
SiO2, Silica	20		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.029	D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.21	D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW15-121618

_						
Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.91	0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	550	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	0.022 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.016 D1	0.010	mg/L	20	200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

Client Sample ID: FC-CCR-MW75-121518

Date Collected: 12/15/18 16:27 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115113-1

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.2	D1	0.80	mg/L			12/22/18 03:57	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		12/20/18 10:34	12/27/18 11:56	1
Magnesium	220		2.0	mg/L		12/20/18 10:34	12/27/18 11:56	1
SiO2, Silica	6.9		0.21	mg/L		12/20/18 10:34	12/29/18 02:09	1
Method: 200.8 LL - Meta Analyte		Qualifier	RL	Unit	D	Prepared	Analvzed	Dil Fac
Method: 200.8 LL - Meta	als (ICP/MS)							
Analyte	Result				D	Prepared	Analyzed	Dil Fac
Analyte Antimony	Result ND	D1	0.020	mg/L	<u>D</u>	12/19/18 10:53	01/16/19 01:02	20
Analyte Antimony Arsenic	Result ND ND	D1 D1	0.020 0.010	mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40	01/16/19 01:02 01/17/19 19:18	20
Analyte Antimony Arsenic Barium	Result   ND   ND   ND   0.022	D1 D1 <b>D1</b>	0.020 0.010 0.010	mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40	01/16/19 01:02 01/17/19 19:18 01/17/19 19:18	20 20 20
Analyte Antimony Arsenic Barium Cadmium		D1 D1 <b>D1</b> D1	0.020 0.010 0.010 0.0020	mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53	01/16/19 01:02 01/17/19 19:18 01/17/19 19:18 01/16/19 01:02	20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium		D1 D1 <b>D1</b> D1 D1	0.020 0.010 0.010 0.0020 0.0020	mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53	01/16/19 01:02 01/17/19 19:18 01/17/19 19:18 01/16/19 01:02 01/16/19 01:02	20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt	Result	D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:02 01/17/19 19:18 01/17/19 19:18 01/16/19 01:02 01/16/19 01:02 01/16/19 01:02	20 20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt Lead	Result   ND   ND   ND   ND   ND   ND   ND   N	D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	D	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:02 01/17/19 19:18 01/17/19 19:18 01/16/19 01:02 01/16/19 01:02 01/16/19 01:02 01/16/19 01:02	20 20 20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt	Result	D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:02 01/17/19 19:18 01/17/19 19:18 01/16/19 01:02 01/16/19 01:02 01/16/19 01:02 01/16/19 01:02	20 20 20 20 20 20 20 20 20

Lab Sample ID: 550-115113-2 Client Sample ID: FC-CCR-MW38R-121518

0.0020

mg/L

ND D1

Date Collected: 12/15/18 14:14

Thallium

**Matrix: Water** 

12/19/18 10:53 01/16/19 01:02

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 01:30	2
Method: 200.7 Rev 4.4 - N	letals (ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.80		0.20	mg/L		12/20/18 10:34	12/27/18 12:45	1
Magnesium	680		2.0	mg/L		12/20/18 10:34	12/27/18 12:45	1
SiO2, Silica	17		0.21	mg/L		12/20/18 10:34	12/29/18 03:22	1
Method: 200.8 LL - Metals	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	(100,010)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared 19,100 to 50	Analyzed	Dil Fac
Analyte Antimony	Result ND	D1	0.020	mg/L	D	12/19/18 10:53	01/16/19 01:08	20
Analyte Antimony	Result ND ND	D1 D1	0.020 0.010	mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40	01/16/19 01:08 01/17/19 19:25	20
	Result ND	D1 D1	0.020	mg/L	<u>D</u>	12/19/18 10:53	01/16/19 01:08 01/17/19 19:25	20
Analyte Antimony Arsenic	Result   ND   ND   0.026	D1 D1	0.020 0.010	mg/L mg/L	D	12/19/18 10:53 01/17/19 05:40	01/16/19 01:08 01/17/19 19:25 01/17/19 19:25	20
Analyte Antimony Arsenic Barium	Result   ND   ND   0.026	D1 D1 <b>D1</b>	0.020 0.010 0.010	mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40	01/16/19 01:08 01/17/19 19:25 01/17/19 19:25 01/16/19 01:08	20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium	Result	D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020	mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53	01/16/19 01:08 01/17/19 19:25 01/17/19 19:25 01/16/19 01:08 01/16/19 01:08	20 20 20 20
Analyte Antimony Arsenic Barium Cadmium	Result	D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.0020	mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53	01/16/19 01:08 01/17/19 19:25 01/17/19 19:25 01/16/19 01:08 01/16/19 01:08 01/16/19 01:08	20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt Lead	Result	D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:08 01/17/19 19:25 01/17/19 19:25 01/16/19 01:08 01/16/19 01:08 01/16/19 01:08	20 20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt	Result	D1 D1 D1 D1 D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:08 01/17/19 19:25 01/17/19 19:25 01/16/19 01:08 01/16/19 01:08 01/16/19 01:08	20 20 20 20 20 20 20

1/21/2019

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

Client Sample ID: FC-CCR-MW57-121518

Date Collected: 12/15/18 13:15 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-3

**Matrix: Water** 

Method: 300.0 - Anion	s, Ion Chromatogra	ıphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 02:06	
- Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte	• • •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.80		0.20	mg/L		12/20/18 10:34	12/27/18 12:51	
Magnesium	610		2.0	mg/L		12/20/18 10:34	12/27/18 12:51	•
SiO2, Silica	17		0.21	mg/L		12/20/18 10:34	12/29/18 03:28	
Analyte Antimony	ND Result	Qualifier D1	RL 0.020	Unit mg/L	D	Prepared 12/19/18 10:53	Analyzed 01/16/19 01:11	Dil Fa
Method: 200.8 LL - Me					_	_		
•				-				
Arsenic	ND	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:27	20
Barium	0.023	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:27	20
Cadmium	ND	D1	0.0020	mg/L		12/19/18 10:53	01/16/19 01:11	20
Chromium	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:11	20
Cobalt	ND	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:11	20
Lead	ND	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:11	20
Molybdenum	ND	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:11	20
Selenium	0.022	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:11	20
Thallium	ND	D1	0.0020	mg/L		12/19/18 10:53	01/16/19 01:11	20

Client Sample ID: FC-CCR-MW61-121518 Lab Sample ID: 550-115113-4

Date Collected: 12/15/18 15:39 Date Received: 12/18/18 12:33

Method: 300.0 - Anions	s, Ion Chromatogra	ıphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.3	D1	0.80	mg/L			12/22/18 02:43	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		12/20/18 10:34	12/27/18 12:57	1
Magnesium	120		2.0	mg/L		12/20/18 10:34	12/27/18 12:57	1
SiO2, Silica	7.7		0.21	mg/L		12/20/18 10:34	12/29/18 03:39	1
- Method: 200.8 LL - Met	als (ICP/MS)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:13	20
Arsenic	ND	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:30	20
Parium	0.010	D4	0.010	ma/l		01/17/10 05:40	01/17/10 10:30	20

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:13	20
Arsenic	ND	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:30	20
Barium	0.019	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:30	20
Cadmium	ND	D1	0.0020	mg/L		12/19/18 10:53	01/16/19 01:13	20
Chromium	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:13	20
Cobalt	0.022	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:13	20
Lead	ND	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:13	20
Molybdenum	0.10	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:13	20
Selenium	0.023	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:13	20
Thallium	ND	D1	0.0020	ma/l		12/19/18 10:53	01/16/19 01:13	20

**Matrix: Water** 

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

Client Sample ID: FC-CCR-MW17R-121718

Date Collected: 12/17/18 07:47 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-5

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 07:38	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		12/20/18 10:34	12/27/18 13:03	1
Magnesium	260		2.0	mg/L		12/20/18 10:34	12/27/18 13:03	1
SiO2, Silica	14		0.21	mg/L		12/20/18 10:34	12/29/18 03:45	1
Method: 200.8 LL - Meta Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
			RL	Unit	D			Dil Fac
Antimony	ND		0.020	mg/L		12/19/18 10:53		
Antimony Arsenic	ND ND	D1 D1	0.020 0.010	mg/L mg/L		12/19/18 10:53 01/17/19 05:40		
•		D1		•			01/17/19 19:32	20
Arsenic	ND	D1 <b>D1</b>	0.010	mg/L		01/17/19 05:40 01/17/19 05:40	01/17/19 19:32	20 20
Arsenic  Barium	ND <b>0.027</b>	D1 <b>D1</b> D1	0.010 0.010	mg/L mg/L		01/17/19 05:40 01/17/19 05:40 12/19/18 10:53	01/17/19 19:32 01/17/19 19:32	20 20 20
Arsenic  Barium  Cadmium  Chromium	ND <b>0.027</b> ND	D1 D1 D1 D1	0.010 0.010 0.0020	mg/L mg/L mg/L		01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53	01/17/19 19:32 01/17/19 19:32 01/16/19 01:15	20 20 20 20
Arsenic  Barium  Cadmium	ND <b>0.027</b> ND ND	D1 D1 D1 D1	0.010 0.010 0.0020 0.020	mg/L mg/L mg/L mg/L		01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/17/19 19:32 01/17/19 19:32 01/16/19 01:15 01/16/19 01:15	20 20 20 20 20
Arsenic  Barium  Cadmium  Chromium  Cobalt  Lead	ND 0.027 ND ND 0.091	D1	0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L		01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/17/19 19:32 01/17/19 19:32 01/16/19 01:15 01/16/19 01:15 01/16/19 01:15	20 20 20 20 20 20
Arsenic  Barium  Cadmium  Chromium  Cobalt	ND 0.027 ND ND 0.091	D1 D1 D1 D1 D1 D1 D1 D1	0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L		01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/17/19 19:32 01/17/19 19:32 01/16/19 01:15 01/16/19 01:15 01/16/19 01:15	20 20 20 20 20 20 20 20 20

Client Sample ID: FC-CCR-DMX4-121618 Lab Sample ID: 550-115113-6

Date Collected: 12/16/18 12:41

Date Received: 12/18/18 12:33

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 08:15	2
Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.67		0.20	mg/L		12/20/18 10:34	12/27/18 13:09	1
Magnesium	730		2.0	mg/L		12/20/18 10:34	12/27/18 13:09	1
SiO2, Silica	11		0.21	mg/L		12/20/18 10:34	12/29/18 03:57	1
- Method: 200.8 LL - Me	tals (ICP/MS)							
Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

MICHIOG. 200.0 LL - MICH	ais (ici /ivio)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:18	20
Arsenic	ND	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:34	20
Barium	0.016	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:34	20
Cadmium	ND	D1	0.0020	mg/L		12/19/18 10:53	01/16/19 01:18	20
Chromium	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:18	20
Cobalt	ND	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:18	20
Lead	ND	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:18	20
Molybdenum	0.013	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:18	20
Selenium	0.027	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:18	20
Thallium	ND	D1	0.0020	mg/L		12/19/18 10:53	01/16/19 01:18	20

TestAmerica Phoenix

**Matrix: Water** 

1/21/2019

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

**Matrix: Water** 

Client Sample ID: FC-CCR-FD02-121618

Date Collected: 12/16/18 12:41 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115113-7

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 08:51	2
Method: 200.7 Rev 4.4 -	Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.66		0.20	mg/L		12/20/18 10:34	12/27/18 13:20	1
Magnesium	720		2.0	mg/L		12/20/18 10:34	12/27/18 13:20	1
SiO2, Silica	11		0.21	mg/L		12/20/18 10:34	12/29/18 04:09	1
Method: 200.8 LL - Meta Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
	-I- /IOD/MO\							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	
Analyte Antimony	Result ND	D1	0.020	mg/L	D	12/19/18 10:53	01/16/19 01:20	20
Analyte Antimony Arsenic	Result ND ND	D1	0.020 0.010	mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40	01/16/19 01:20 01/17/19 19:37	20
Analyte Antimony Arsenic Barium	Result ND ND 0.015	D1 D1 <b>D1</b>	0.020 0.010 0.010	mg/L mg/L mg/L	<u> </u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40	01/16/19 01:20 01/17/19 19:37 01/17/19 19:37	20 20 20
Analyte Antimony Arsenic	Result   ND   ND   ND   ND   ND   ND	D1 D1 <b>D1</b> D1	0.020 0.010 0.010 0.0020	mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40	01/16/19 01:20 01/17/19 19:37 01/17/19 19:37 01/16/19 01:20	20 20 20
Analyte Antimony Arsenic Barium	Result ND ND 0.015	D1 D1 <b>D1</b> D1	0.020 0.010 0.010	mg/L mg/L mg/L	D	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40	01/16/19 01:20 01/17/19 19:37 01/17/19 19:37	20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium	Result   ND   ND   ND   ND   ND   ND	D1 D1 <b>D1</b> D1 D1	0.020 0.010 0.010 0.0020	mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53	01/16/19 01:20 01/17/19 19:37 01/17/19 19:37 01/16/19 01:20	20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium	Result   ND   ND   ND   ND   ND   ND	D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.0020	mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53	01/16/19 01:20 01/17/19 19:37 01/17/19 19:37 01/16/19 01:20 01/16/19 01:20	20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt Lead	Result	D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	D	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:20 01/17/19 19:37 01/17/19 19:37 01/16/19 01:20 01/16/19 01:20 01/16/19 01:20	20 20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt	Result	D1 D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:20 01/17/19 19:37 01/17/19 19:37 01/16/19 01:20 01/16/19 01:20 01/16/19 01:20 01/16/19 01:20 01/16/19 01:20	20 20 20 20 20 20 20 20 20 20 20

Lab Sample ID: 550-115113-8 Client Sample ID: FC-CCR-MW56-121618

Date Collected: 12/16/18 14:17 Date Received: 12/18/18 12:33

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 09:28	2
- Method: 200.7 Rev 4.4 - Metals	(ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	1.1		0.20	mg/L		12/20/18 10:34	12/27/18 13:26	1
Magnesium	1300	D2	8.0	mg/L		12/20/18 10:34	12/29/18 04:15	4
SiO2, Silica	20		0.21	mg/L		12/20/18 10:34	12/29/18 04:20	1
Method: 200.8 LL - Metals (ICP Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
					<u>D</u>			
Antimony	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:22	20
Arsenic	ND	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:39	20
Barium	0.029	D1	0.010	mg/L		01/17/19 05:40	01/17/19 19:39	20
Cadmium	ND	D1	0.0020	mg/L		12/19/18 10:53	01/16/19 01:22	20
Chromium	ND	D1	0.020	mg/L		12/19/18 10:53	01/16/19 01:22	20
Cobalt								
	ND	D1	0.010	mg/L		12/19/18 10:53	01/16/19 01:22	20
Lead	ND ND	D1 D1	0.010 0.010	mg/L mg/L		12/19/18 10:53 12/19/18 10:53	01/16/19 01:22 01/16/19 01:22	
Lead Molybdenum								20 20 20
	ND	D1 D1	0.010	mg/L		12/19/18 10:53 12/19/18 10:53	01/16/19 01:22	20

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

Client Sample ID: FC-CCR-MW15-121618

Date Collected: 12/16/18 09:51 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115113-9

Matrix: Water

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 10:05	2
Method: 200.7 Rev 4.4 -	Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.91		0.20	mg/L		12/20/18 10:34	12/27/18 13:32	1
Magnesium	550		2.0	mg/L		12/20/18 10:34	12/27/18 13:32	1
SiO2, Silica	14		0.21	mg/L		12/20/18 10:34	12/29/18 04:26	1
Method: 200.8 LL - Meta	•	0	D.	1114	_	D	A	D!! E-
Analyte	Result	Qualifier	RL	Unit	D	Prepared 40.40.40.50	Analyzed	Dil Fac
Analyte Antimony	Result ND	D1	0.020	mg/L	D	12/19/18 10:53	01/16/19 01:25	20
Analyte Antimony Arsenic	Result ND ND	D1 D1	0.020 0.010	mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40	01/16/19 01:25 01/17/19 19:41	20
Analyte Antimony Arsenic Barium		D1 D1 <b>D1</b>	0.020 0.010 0.010	mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40	01/16/19 01:25 01/17/19 19:41 01/17/19 19:41	20 20 20
Analyte Antimony	Result ND ND	D1 D1	0.020 0.010	mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40	01/16/19 01:25 01/17/19 19:41	20
Analyte Antimony Arsenic Barium Cadmium		D1 D1 <b>D1</b> D1	0.020 0.010 0.010	mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53	01/16/19 01:25 01/17/19 19:41 01/17/19 19:41	20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium		D1 D1 <b>D1</b> D1 D1	0.020 0.010 0.010 0.0020	mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53	01/16/19 01:25 01/17/19 19:41 01/17/19 19:41 01/16/19 01:25	20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt	Result   ND   ND   ND   ND   ND   ND   ND   N	D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.0020	mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:25 01/17/19 19:41 01/17/19 19:41 01/16/19 01:25 01/16/19 01:25	20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt Lead	Result ND ND 0.022 ND ND ND	D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	D	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:25 01/17/19 19:41 01/17/19 19:41 01/16/19 01:25 01/16/19 01:25 01/16/19 01:25	20 20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium	Result   ND   ND   ND   ND   ND   ND   ND   N	D1 D1 D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 10:53 01/17/19 05:40 01/17/19 05:40 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53 12/19/18 10:53	01/16/19 01:25 01/17/19 19:41 01/17/19 19:41 01/16/19 01:25 01/16/19 01:25 01/16/19 01:25 01/16/19 01:25	20 20 20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: 550-115113-1 MS Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Client: Arizona Public Service Company

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits 8.00 Fluoride 1.2 D1 9.53 D1 mg/L 103 80 - 120

Lab Sample ID: 550-115113-1 MSD Client Sample ID: FC-CCR-MW75-121518 Prep Type: Total/NA

**Matrix: Water** 

Project/Site: CCR

**Analysis Batch: 165329** 

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Result Qualifier Added Limits Analyte Unit **RPD** Limit D %Rec Fluoride 1.2 D1 8.00 9.49 D1 mg/L 103 80 - 120 20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-164986/1-A Client Sample ID: Method Blank Prep Type: Total/NA **Matrix: Water Analysis Batch: 165722** Prep Batch: 164986

MB MB

Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac SiO2, Silica 0.21 12/20/18 10:34 12/29/18 01:49  $\overline{\mathsf{ND}}$ mg/L

Lab Sample ID: LCS 550-164986/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 165722 Prep Batch: 164986** LCS LCS Spike %Rec. Added Result Qualifier Limits Analyte Unit %Rec

SiO2. Silica 10.7 10.6 99 85 - 115 ma/L Lab Sample ID: LCSD 550-164986/3-A Client Sample ID: Lab Control Sample Dup

**Analysis Batch: 165722** 

**Matrix: Water** 

Prep Batch: 164986 LCSD LCSD **RPD** Spike %Rec. Analyte Added Result Qualifier Unit %Rec Limits RPD Limit SiO2, Silica 10.7 10.5 98 85 - 115 mg/L

Lab Sample ID: 550-115113-1 MS Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 165571 Prep Batch: 164986** 

Sample Sample Spike MS MS %Rec. Result Qualifier Added Analyte Result Qualifier Unit %Rec Limits Lithium 0.410 1.00 1.45 mg/L 104 70 - 130 Magnesium 222 21.0 243 M3 mg/L 101 70 - 130

Lab Sample ID: 550-115113-1 MS Client Sample ID: FC-CCR-MW75-121518 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 165722** Prep Batch: 164986 MS MS %Rec. Sample Sample Spike

Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits SiO2, Silica 6.93 10.7 17.9 mg/L 102 70 - 130

Prep Type: Total/NA

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

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

Lab Sample ID: 550-115113-1 MSD

**Matrix: Water** 

Analysis Batch: 165571

Client Sample ID: FC-CCR-MW75-121518

**Prep Type: Total/NA Prep Batch: 164986** 

	%Rec.		RPD	
%Rec	Limits	RPD	Limit	
98	70 - 130	4	20	

Sample Sample Spike MSD MSD Analyte **Result Qualifier** Added Result Qualifier Unit D % Beryllium 1.00 -0.0000443 0.981 mg/L Lithium 0.410 1.00 1.37 mg/L 70 - 130 20

Method: 200.8 LL - Metals (ICP/MS)

Lab Sample ID: MB 550-164866/1-A

**Matrix: Water** 

**Analysis Batch: 166805** 

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

**Prep Batch: 164866** 

	MB MI	В					
Analyte	Result Qu	ualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	0.0010	mg/L		12/19/18 10:53	01/16/19 00:55	1
Barium	ND	0.00050	mg/L		12/19/18 10:53	01/16/19 00:55	1
Cadmium	ND	0.00010	mg/L		12/19/18 10:53	01/16/19 00:55	1
Chromium	ND	0.0010	mg/L		12/19/18 10:53	01/16/19 00:55	1
Cobalt	ND	0.00050	mg/L		12/19/18 10:53	01/16/19 00:55	1
Lead	ND	0.00050	mg/L		12/19/18 10:53	01/16/19 00:55	1
Molybdenum	ND	0.00050	mg/L		12/19/18 10:53	01/16/19 00:55	1
Selenium	ND	0.00050	mg/L		12/19/18 10:53	01/16/19 00:55	1
Thallium	ND	0.00010	mg/L		12/19/18 10:53	01/16/19 00:55	1

Lab Sample ID: LCS 550-164866/2-A **Client Sample ID: Lab Control Sample Matrix: Water** 

**Analysis Batch: 166805** 

Prep Type: Total/NA **Prep Batch: 164866** 

7 maryone Datem 100000	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.105		mg/L		105	85 - 115
Cadmium	0.100	0.105		mg/L		105	85 - 115
Chromium	0.100	0.105		mg/L		105	85 - 115
Cobalt	0.100	0.104		mg/L		104	85 - 115
Lead	0.100	0.101		mg/L		101	85 - 115
Molybdenum	0.100	0.105		mg/L		105	85 - 115
Selenium	0.100	0.105		mg/L		105	85 - 115
Thallium	0.100	0.105		mg/L		105	85 <sub>-</sub> 115

Lab Sample ID: LCSD 550-164866/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** 

Analysis Ratch: 166805

**Prep Type: Total/NA** Pren Batch: 164866

						Prep Ba	itcn: 1t	94866
Spike	LCSD	LCSD				%Rec.		RPD
Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
0.100	0.104		mg/L		104	85 - 115	1	20
0.100	0.104		mg/L		104	85 - 115	1	20
0.100	0.104		mg/L		104	85 - 115	1	20
0.100	0.103		mg/L		103	85 - 115	2	20
0.100	0.102		mg/L		102	85 - 115	0	20
0.100	0.104		mg/L		104	85 - 115	1	20
0.100	0.104		mg/L		104	85 - 115	2	20
0.100	0.106		mg/L		106	85 - 115	1	20
	Added 0.100 0.100 0.100 0.100 0.100 0.100 0.100 0.100	Added Result 0.100 0.104 0.100 0.104 0.100 0.104 0.100 0.103 0.100 0.102 0.100 0.104 0.100 0.104	Added Result Qualifier  0.100 0.104  0.100 0.104  0.100 0.104  0.100 0.103  0.100 0.102  0.100 0.104  0.100 0.104	Added         Result         Qualifier         Unit           0.100         0.104         mg/L           0.100         0.104         mg/L           0.100         0.104         mg/L           0.100         0.103         mg/L           0.100         0.102         mg/L           0.100         0.104         mg/L           0.100         0.104         mg/L	Added         Result         Qualifier         Unit         D           0.100         0.104         mg/L         mg/L           0.100         0.104         mg/L         mg/L           0.100         0.103         mg/L           0.100         0.102         mg/L           0.100         0.104         mg/L           0.100         0.104         mg/L           0.100         0.104         mg/L	Added         Result 0.100         Qualifier 0.104         Unit mg/L mg/L mg/L         D mg/L mg/L         %Rec           0.100         0.104         mg/L mg/L         104           0.100         0.104         mg/L mg/L         104           0.100         0.103         mg/L mg/L         103           0.100         0.102         mg/L mg/L         102           0.100         0.104         mg/L mg/L         104           0.100         0.104         mg/L         104	Spike         LCSD         LCSD         %Rec.           Added         Result         Qualifier         Unit         D         %Rec         Limits           0.100         0.104         mg/L         104         85 - 115           0.100         0.104         mg/L         104         85 - 115           0.100         0.103         mg/L         103         85 - 115           0.100         0.102         mg/L         102         85 - 115           0.100         0.104         mg/L         104         85 - 115           0.100         0.104         mg/L         104         85 - 115           0.100         0.104         mg/L         104         85 - 115	Added         Result         Qualifier         Unit         D         %Rec         Limits         RPD           0.100         0.104         mg/L         104         85 - 115         1           0.100         0.104         mg/L         104         85 - 115         1           0.100         0.104         mg/L         104         85 - 115         1           0.100         0.103         mg/L         103         85 - 115         2           0.100         0.102         mg/L         102         85 - 115         0           0.100         0.104         mg/L         104         85 - 115         1           0.100         0.104         mg/L         104         85 - 115         2

TestAmerica Phoenix

Page 14 of 28

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2 SDG: Cholla

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

Lab Sample ID: 550-115113-1 MS **Matrix: Water** 

**Analysis Batch: 166805** 

Client Sample ID: FC-CCR-MW75-121518 Prep Type: Total/NA

**Prep Batch: 164866** 

	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	•	Qualifier	Added		Qualifier	Unit	D	%Rec	Limits
Antimony	ND	D1 -	0.100	0.0991	D1	mg/L		99	70 - 130
Cadmium	ND	D1	0.100	0.0988	D1	mg/L		98	70 - 130
Chromium	ND	D1	0.100	0.0998	D1	mg/L		100	70 - 130
Cobalt	0.046	D1	0.100	0.141	D1	mg/L		94	70 - 130
Lead	ND	D1	0.100	0.0943	D1	mg/L		94	70 - 130
Molybdenum	0.17	D1	0.100	0.270	D1	mg/L		97	70 - 130
Selenium	0.026	M1 D1	0.100	0.197	D1 M1	mg/L		171	70 - 130
Thallium	ND	D1	0.100	0.0952	D1	mg/L		95	70 - 130

Lab Sample ID: 550-115113-1 MSD

**Matrix: Water** 

**Analysis Batch: 166805** 

Client Sample ID: FC-CCR-MW75-121518

Prep Type: Total/NA

Prep Batch: 164866

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	ND	D1	0.100	0.100	D1	mg/L		100	70 - 130	1	20
Cadmium	ND	D1	0.100	0.103	D1	mg/L		102	70 - 130	4	20
Chromium	ND	D1	0.100	0.100	D1	mg/L		100	70 - 130	1	20
Cobalt	0.046	D1	0.100	0.142	D1	mg/L		95	70 - 130	1	20
Lead	ND	D1	0.100	0.0957	D1	mg/L		96	70 - 130	2	20
Molybdenum	0.17	D1	0.100	0.271	D1	mg/L		98	70 - 130	0	20
Selenium	0.026	M1 D1	0.100	0.191	D1 M1	mg/L		165	70 - 130	3	20
Thallium	ND	D1	0.100	0.0968	D1	mg/L		97	70 - 130	2	20

Lab Sample ID: MB 550-166919/1-A

**Matrix: Water** 

Analysis Batch: 167014

Client Sample ID: Method Blank

Prep Type: Total/NA

**Prep Batch: 166919** 

•	MB	MB					•	
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00050	mg/L	_	01/17/19 05:40	01/17/19 19:12	1
Barium	ND		0.00050	mg/L		01/17/19 05:40	01/17/19 19:12	1
Lead	ND		0.00050	mg/L		01/17/19 05:40	01/17/19 19:12	1

Lab Sample ID: LCS 550-166919/2-A Matrix: Water Analysis Batch: 167014	• "			Clie	ent Sai	mple ID	D: Lab Control Sample Prep Type: Total/NA Prep Batch: 166919		
	Spike	LCS	LCS				%Rec.		
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Arsenic	0.100	0.100		mg/L		100	85 - 115		
Barium	0.100	0.104		mg/L		104	85 - 115		
Lead	0.100	0.0981		mg/L		98	85 - 115		

Lab Sample ID: LCSD 550-166919/3-A Matrix: Water Analysis Batch: 167014			(	Client Sam <sub>l</sub>	ole ID: La	ab Control Prep Ty Prep Ba	pe: Tot	al/NA
	Spike	LCSD	LCSD			%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D %Red	Limits	RPD	Limit
Arsenic	0.100	0.0988		mg/L	99	85 - 115	1	20
Barium	0.100	0.106		mg/L	106	85 - 115	2	20
Lead	0.100	0.0984		mg/L	98	85 - 115	0	20

TestAmerica Phoenix

Page 15 of 28

# **QC Sample Results**

MS MS

MSD MSD

Result Qualifier

0.114

0.137

0.111

0.144

Result Qualifier

Unit

Unit

mg/L

mg/L

Spike

Added

0.100

0.100

Spike

Added

0.100

0.100

Client: Arizona Public Service Company

Project/Site: CCR

Lab Sample ID: 550-115113-1 MS

Lab Sample ID: 550-115113-1 MSD

Sample Sample

ND D1

Sample Sample

ND D1

0.022 D1

Result Qualifier

0.022 D1

Result Qualifier

**Matrix: Water** 

**Matrix: Water** 

Analyte

Arsenic

Barium

Analyte

Arsenic

Barium

Analysis Batch: 167014

**Analysis Batch: 167014** 

TestAmerica Job ID: 550-115113-2 SDG: Cholla

Client Sample ID: FC-CCR-MW75-121518

**Prep Type: Total/NA** 

**Prep Batch: 166919** 

D %Rec Limits 70 - 130 114

%Rec.

mg/L mg/L 115 70 - 130

122

Client Sample ID: FC-CCR-MW75-121518 Prep Type: Total/NA

**Prep Batch: 166919** 

5

%Rec. **RPD** D %Rec Limits RPD Limit 70 - 130 2 20 111

70 - 130

20

## **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

#### HPLC/IC

#### Analysis Batch: 165329

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	300.0	_
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	300.0	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	300.0	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	300.0	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	300.0	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	300.0	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	300.0	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	300.0	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	300.0	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	300.0	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	300.0	

#### **Metals**

#### **Prep Batch: 164866**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.8	_
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.8	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.8	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.8	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.8	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.8	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.8	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.8	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.8	
MB 550-164866/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-164866/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-164866/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.8	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.8	

#### **Prep Batch: 164986**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.7	
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.7	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.7	
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.7	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.7	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.7	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.7	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.7	
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.7	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.7	

TestAmerica Phoenix

Page 17 of 28

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115113-2 SDG: Cholla

#### **Metals (Continued)**

#### Analysis Batch: 165571

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986

#### **Analysis Batch: 165722**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.7 Rev 4.4	164986
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164986
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164986
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164986
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.7 Rev 4.4	164986

#### **Analysis Batch: 166805**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.8 LL	164866
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.8 LL	164866
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.8 LL	164866
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.8 LL	164866
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.8 LL	164866
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.8 LL	164866
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.8 LL	164866
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.8 LL	164866
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.8 LL	164866
MB 550-164866/1-A	Method Blank	Total/NA	Water	200.8 LL	164866
LCS 550-164866/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	164866
LCSD 550-164866/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	164866
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.8 LL	164866
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.8 LL	164866

#### **Prep Batch: 166919**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.8	
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.8	
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.8	

Page 18 of 28

TestAmerica Phoenix

1/21/2019

#### **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

#### **Metals (Continued)**

#### Prep Batch: 166919 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.8	
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.8	
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.8	
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.8	
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.8	
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.8	
MB 550-166919/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-166919/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-166919/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.8	
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.8	

#### **Analysis Batch: 167014**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115113-1	FC-CCR-MW75-121518	Total/NA	Water	200.8 LL	166919
550-115113-2	FC-CCR-MW38R-121518	Total/NA	Water	200.8 LL	166919
550-115113-3	FC-CCR-MW57-121518	Total/NA	Water	200.8 LL	166919
550-115113-4	FC-CCR-MW61-121518	Total/NA	Water	200.8 LL	166919
550-115113-5	FC-CCR-MW17R-121718	Total/NA	Water	200.8 LL	166919
550-115113-6	FC-CCR-DMX4-121618	Total/NA	Water	200.8 LL	166919
550-115113-7	FC-CCR-FD02-121618	Total/NA	Water	200.8 LL	166919
550-115113-8	FC-CCR-MW56-121618	Total/NA	Water	200.8 LL	166919
550-115113-9	FC-CCR-MW15-121618	Total/NA	Water	200.8 LL	166919
MB 550-166919/1-A	Method Blank	Total/NA	Water	200.8 LL	166919
LCS 550-166919/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	166919
LCSD 550-166919/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	166919
550-115113-1 MS	FC-CCR-MW75-121518	Total/NA	Water	200.8 LL	166919
550-115113-1 MSD	FC-CCR-MW75-121518	Total/NA	Water	200.8 LL	166919

TestAmerica Phoenix

1/21/2019

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

Client Sample ID: FC-CCR-MW75-121518

Date Collected: 12/15/18 16:27 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115113-1

**Matrix: Water** 

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 03:57	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 11:56	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 02:09	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:02	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:18	ARE	TAL PHX

Client Sample ID: FC-CCR-MW38R-121518 Lab Sample ID: 550-115113-2

Date Collected: 12/15/18 14:14

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 01:30	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:45	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 03:22	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:08	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:25	ARE	TAL PH

Client Sample ID: FC-CCR-MW57-121518

Date Collected: 12/15/18 13:15

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 02:06	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:51	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 03:28	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:11	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:27	ARE	TAL PHX

TestAmerica Phoenix

Page 20 of 28

Lab Sample ID: 550-115113-3 **Matrix: Water** 

Date Collected: 12/15/18 15:39

Date Received: 12/18/18 12:33

Client Sample ID: FC-CCR-MW61-121518

TestAmerica Job ID: 550-115113-2 SDG: Cholla

Lab Sample ID: 550-115113-4

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 02:43	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:57	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 03:39	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:13	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:30	ARE	TAL PHX

Lab Sample ID: 550-115113-5 Client Sample ID: FC-CCR-MW17R-121718

Date Collected: 12/17/18 07:47 **Matrix: Water** 

Date Received: 12/18/18 12:33

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 07:38	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:03	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 03:45	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:15	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:32	ARE	TAL PHX

Lab Sample ID: 550-115113-6 Client Sample ID: FC-CCR-DMX4-121618

Date Collected: 12/16/18 12:41 Date Received: 12/18/18 12:33

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed 12/22/18 08:15	Analyst NEL	Lab TAL PHX
Total/NA Total/NA Total/NA	Analysis Prep Analysis	300.0 200.7 200.7 Rev 4.4		2	164986 165571	12/22/18 08.15 12/20/18 10:34 12/27/18 13:09	SGO	TAL PHX TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	164986 165722	12/20/18 10:34 12/29/18 03:57		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.8 200.8 LL		20	164866 166805	12/19/18 10:53 01/16/19 01:18		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.8 200.8 LL		20		01/17/19 05:40 01/17/19 19:34		TAL PHX TAL PHX

**Matrix: Water** 

TestAmerica Job ID: 550-115113-2 SDG: Cholla

Client: Arizona Public Service Company

Project/Site: CCR

Lab Sample ID: 550-115113-7

Matrix: Water

Client Sample ID: FC-CCR-FD02-121618

Date Collected: 12/16/18 12:41 Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 08:51	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:20	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 04:09	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:20	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:37	ARE	TAL PHX

Lab Sample ID: 550-115113-8 Client Sample ID: FC-CCR-MW56-121618 **Matrix: Water** 

Date Collected: 12/16/18 14:17

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 09:28	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:26	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 04:15	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 04:20	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:22	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:39	ARE	TAL PHX

Client Sample ID: FC-CCR-MW15-121618 Lab Sample ID: 550-115113-9 **Matrix: Water** 

Date Collected: 12/16/18 09:51

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 10:05	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:32	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 04:26	SRA	TAL PHX
Total/NA	Prep	200.8			164866	12/19/18 10:53	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166805	01/16/19 01:25	ARE	TAL PHX
Total/NA	Prep	200.8			166919	01/17/19 05:40	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	167014	01/17/19 19:41	ARE	TAL PHX

TestAmerica Phoenix

Page 22 of 28

#### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

SDG: Cholla

#### **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: 550-115113-2
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

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#### **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115113-2

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

Suite 189

4801 Cholla Lake Road

oseph City, Az 86032

APS Cholla

4625 E Cotton Center Blvd

TestAmerica Phoenix

PO#

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3 4 Site: Cholla

Project Name: CCR xxx) xxx-xxxx 928) 587-0319

## Chain of Custody Record

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EN.	(D)
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Phoenix, AZ 85040 phone 602.437.3340 fax 602.454.9303 Special Instructions/QC Requirements & Comments: Method 200.8 with collision cell Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Possible Hazard Identification: Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Comments Section if the lab is to dispose of the sample. FC-CCR-MW38R-121518 FC-CCR-MW17R-121718 FC-CCR-MW15-121618 FC-CCR-MW56-121618 FC-CCR-MW61-121518 FC-CCR-MW57-121518 FC-CCR-MW75-121518 FC-CCR-DMX4-121618 FC-CCR-FD02-121618 Sample Identification avaryour Client Contact Phone Yes No Skin Irritant Company: Company Company: Custody Seal No.: 928-587-0319 Doug Lavarnway 12/16/2018 Sample 12/16/2018 12/16/2018 12/16/2018 12/17/2018 12/15/2018 12/15/2018 12/15/2018 12/15/2018 Poison B Regulatory Program: TAT if different from Below Analysis Turnaround Time Sample 1417 G 1241 G 1241 G 1414 G 1539 G 1315 G 1627 G 951 G 747 G Type (C=Comp, G=Grab) Sample Unknown Date/Time: 5 8 5 8 8 5 5 8 8 Date/Time: Date/Time: Matrix # of N 2 N 2 N N N N z z z Z z z z z Z Filtered Sample (Y/N) Lab Contact: Doug Lavarnway Received in aboratory by Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month) Perform MS / MSD (Y / N) Received by Received by Return to Client EPA 200.7 (Li, Mg, SiO2) 200.8 (Sb. As. Ba. Cd. Cr. Co. Pb. Mo, Se, TI) Cooler Temp. ("C): Obs'd. EPA 300.0 (F) CCR J Disposal by Lab Carrier: Company Company: 550-115113 Chain of Custody Archive for 12/17/2018 COC No. THE LEADER IN ENVIRONMENTAL TESTING 2019
TestAmerica Laboratories, Inc. 1/21 For Lab Use Only: Date/Time Date/Time: Lab Sampling: Walk-in Client: Date/Time Therm ID No. Job / SDG No. Sampler Sample Specific Notes: Months cocs Page 26 of 28

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Relinquished-by:

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Custody Seals Intact:

Relinquished by:

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Form No. CA-C-WI-002, Rev. 4.2, bated 04/02/2013

# **Chain of Custody Record**

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Phoenix, AZ 85040 phone 602 437 3340 fax 602 454 9303	Regulat	Regulatory Program:	ram:						CCR							TestAmerica Laboratories, Inc.
Client Contact	Doug Lavarnway	way			0	Doug Lavarnway	rnway			-				2/17/2	018	12/17/2018 COC No:
APS Cholla	928-587-0319				E	Lab Contact:	ct:			C	Carrier:				4	1 of 1 cocs
4801 Cholla Lake Road	Ana	Analysis Turnaround Time	around Ti	ime		к,								$\dashv$	160	1 1
Joseph City, Az 86032	TATA	TAT Adillared from Below	Defense			_			_						-	For Lab Use Only:
			1		N)	11	)	_		3	_			_		Lab Sampling
CCR					Y/	D (	SO4	)	003	aCO	_			_		r
Site: Cholla					ple (	MS	-	(pH)	s Cal	as C				-	Te I	Job / SDG No.:
7.0#			- American		am	MS.	_	нв	_	ate				_		
Sample Identification	Sample S	Sample	Type (C=Comp, G=Grab)	Matrix c	C # of of Filtered Sa	Perform M EPA 200.7 Mg)	EPA 300.0 SM 2540C	SM 4500-H SM 2320B	Alkalinity Carbonate	Bicarbona						Sample Specific Notes
- I FC-CCR-MW75-121518	12/15/2018	1627 G		W	N	×	×	×	×	×						
-2 FC-CCR-MW38R-121518	12/15/2018	1414 G		W	2 N	×	×	×	×	×						
- 3 FC-CCR-MW57-121518	12/15/2018	1315 G		W	2 N	×	×	×	×	×						
- H FC-CCR-MW61-121518	12/15/2018	1539 G		V	2	×	×	×		×						
-5 FC-CCR-MW17R-121718	12/17/2018	747 G		×	2 N	×	×	×		×						
FC-CCR-DMX4-121618	12/16/2018	1241 G		W	2 Z	×	×	×	×	×						
-7 FC-CCR-FD02-121618	12/16/2018	1241 G		W	2 N	×	×	×	×	×						
-8 FC-CCR-MW56-121618	12/16/2018	1417 G		8	2	×	×	×	×	×						
	12/16/2018	951 G		V	2	×	×	×		×						
														+		
Preservation Used: 1= lce, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	1; 5=NaOH; 6= Othe	er												H		
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.	ase List any EPA Wa	aste Codes	for the sa	mple in the	æ	Sample Disposa	Dispos		e may	be asse	ssed if	sampl	es are	retain	ed lo	( A fee may be assessed if samples are retained longer than 1 month)
✓ Non-Hazard ☐ Flammable ☐ Skin Irritant	Poison B		Unknown	WN		□ Re	Return to Client	ent		√ Dispo	J Disposal by Lab	-	Ó	Archive for	or	Months
Special Instructions/QC Requirements & Comments:								-						ا د	-	27:
Custody Seals Intact:	Custody Seal No.	No.:					C	Cooler Temp. (°C): Obs'd	mp. (°C	): Obs'c		C	Corr'd:		4	Therm ID No.
Cararan	Company:	2		Date/Time:	S.	Received by:						Company:				Date/Time:
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#### **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-115113-2

SDG Number: Cholla

Login Number: 115113 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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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: 550-115115-2

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 1/22/2019 12:38:12 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

## **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	7
QC Sample Results	9
QC Association Summary	13
Lab Chronicle	15
Certification Summary	17
Method Summary	18
Chain of Custody	19
Receipt Checklists	21

3

4

6

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12

13

14

#### **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115115-2

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.
Madala	

#### Metals

Qualifier	Qualifier Description
D2	Sample required dilution due to high concentration of analyte.
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.

#### Glossarv

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
Percent Recovery
Contains Free Liquid
Contains No Free Liquid
Duplicate Error Ratio (normalized absolute difference)
Dilution Factor
Detection Limit (DoD/DOE)
Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
Decision Level Concentration (Radiochemistry)
Estimated Detection Limit (Dioxin)
Limit of Detection (DoD/DOE)
Limit of Quantitation (DoD/DOE)
Minimum Detectable Activity (Radiochemistry)
Minimum Detectable Concentration (Radiochemistry)
Method Detection Limit

NC

ML

Not Calculated

Not Detected at the reporting limit (or MDL or EDL if shown) ND

Minimum Level (Dioxin)

**PQL** Practical Quantitation Limit

QC **Quality Control** 

RER Relative Error Ratio (Radiochemistry)

Reporting Limit or Requested Limit (Radiochemistry) RL

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin) TEQ Toxicity Equivalent Quotient (Dioxin)

TestAmerica Phoenix

Page 3 of 21

1/22/2019

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115115-2

SDG: Cholla

Job ID: 550-115115-2

Laboratory: TestAmerica Phoenix

**Narrative** 

Job Narrative 550-115115-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 12/18/2018 12:33 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.2° C and 3.7° 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: FC-CCR-DMX6-121618 (550-115115-1), FC-CCR-DMX6-121618 (550-115115-1[MS]) and FC-CCR-DMX6-121618 (550-115115-1[MSD]). 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 by method EPA 300.0 due to the nature of the sample matrix: FC-CCR-MW7-121718 (550-115115-2), FC-CCR-MW6-121618 (550-115115-3) and FC-CCR-MW16-121618 (550-115115-4). 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.

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: 550-115115-2

SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-115115-1	FC-CCR-DMX6-121618	Water	12/16/18 10:36	12/18/18 12:33
550-115115-2	FC-CCR-MW7-121718	Water	12/17/18 08:56	12/18/18 12:33
550-115115-3	FC-CCR-MW6-121618	Water	12/16/18 11:49	12/18/18 12:33
550-115115-4	FC-CCR-MW16-121618	Water	12/16/18 08:54	12/18/18 12:33

### **Detection Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115115-2

Lab Sample ID: 550-115115-1

Lab Sample ID: 550-115115-2

Lab Sample ID: 550-115115-3

Lab Sample ID: 550-115115-4

SDG: Cholla

#### Client Sample ID: FC-CCR-DMX6-121618

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	1.7	0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	560	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
SiO2, Silica	17 D2	0.86	mg/L	4	200.7 Rev 4.4	Total/NA
Barium	0.025 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.014 D1 M1	0.010	mg/L	20	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW7-121718

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.84	0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	420	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
SiO2, Silica	15	0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.015 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.022 D1	0.010	mg/L	20	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW6-121618

Analyte Lithium Magnesium	Result Qualifier 1.1 600	RL 0.20 2.0	Unit mg/L mg/L	Dil Fac 1	Method 200.7 Rev 4.4 200.7 Rev 4.4	Prep Type Total/NA Total/NA
SiO2, Silica	10	0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.020 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.015 D1	0.010	mg/L	20	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW16-121618

Analyte	Result	Qualifier	RL	Unit	Dil Fac I	) Method	Prep Type
Lithium	1.1		0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	1200	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
SiO2, Silica	12		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.026	D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.060	D1	0.010	mg/L	20	200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

1/22/2019

#### **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115115-2

SDG: Cholla

Client Sample ID: FC-CCR-DMX6-121618

Date Collected: 12/16/18 10:36 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115115-1

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/27/18 01:54	
Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	1.7		0.20	mg/L		12/20/18 10:34	12/27/18 12:31	1
Magnesium	560		2.0	mg/L		12/20/18 10:34	12/27/18 12:31	1
SiO2, Silica	17	D2	0.86	mg/L		12/20/18 10:34	12/29/18 02:56	4
Method: 200.8 LL - Met	als (ICP/MS)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.020	mg/L		12/19/18 11:06	01/14/19 21:42	20
Arsenic	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 21:42	20
	0.025	D1	0.010	mg/L		12/19/18 11:06	01/14/19 21:42	20
Barium							04/44/40 04:40	20
Cadmium Cadmium	ND	D1	0.0020	mg/L		12/19/18 11:06	01/14/19 21:42	20
		D1 D1	0.0020 0.020	mg/L mg/L			01/14/19 21:42 01/14/19 21:42	
Cadmium	ND	D1	*****	· ·		12/19/18 11:06	•	20
Cadmium Chromium	ND ND	D1 D1	0.020	mg/L		12/19/18 11:06 12/19/18 11:06	01/14/19 21:42	20
Cadmium Chromium Cobalt Lead	ND ND ND	D1 D1	0.020 0.010	mg/L mg/L		12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 21:42 01/14/19 21:42	20 20 20
Cadmium Chromium Cobalt	ND ND ND ND	D1 D1 D1 D1	0.020 0.010 0.010	mg/L mg/L mg/L		12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 21:42 01/14/19 21:42 01/14/19 21:42	20 20 20 20 20

Client Sample ID: FC-CCR-MW7-121718 Lab Sample ID: 550-115115-2

Date Collected: 12/17/18 08:56 Date Received: 12/18/18 12:33

Date Neceived. 12/10/10 12.33								
Method: 300.0 - Anions, Ion C	_							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 05:47	2

Method: 200.7 Rev 4.4 - Metals (ICP)								
Analyte	Result Qualifier	RL	Unit	D Prepared	Analyzed	Dil Fac		
Lithium	0.84	0.20	mg/L	12/20/18 10:34	12/27/18 14:02	1		
Magnesium	420	2.0	mg/L	12/20/18 10:34	12/27/18 14:02	1		
SiO2, Silica	15	0.21	mg/L	12/20/18 10:34	12/29/18 05:22	1		

- Silva, Silica	10		0.21	mg/L		12/20/10 10:04	12/20/10 00.22	
- Method: 200.8 LL - Met	tals (ICP/MS)							
Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.020	mg/L		12/19/18 11:06	01/14/19 21:57	20
Arsenic	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 21:57	20
Barium	0.015	D1	0.010	mg/L		12/19/18 11:06	01/14/19 21:57	20
Cadmium	ND	D1	0.0020	mg/L		12/19/18 11:06	01/14/19 21:57	20
Chromium	ND	D1	0.020	mg/L		12/19/18 11:06	01/14/19 21:57	20
Cobalt	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 21:57	20
Lead	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 21:57	20
Molybdenum	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 21:57	20
Selenium	0.022	D1	0.010	mg/L		12/19/18 11:06	01/16/19 23:16	20
Thallium	ND	D1	0.0020	mg/L		12/19/18 11:06	01/14/19 21:57	20

**Matrix: Water** 

TestAmerica Phoenix

#### **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115115-2

SDG: Cholla

Client Sample ID: FC-CCR-MW6-121618

Date Collected: 12/16/18 11:49 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115115-3

Matrix: Water

Method: 300.0 - Anions, Ion C Analyte	_	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 06:24	2
Method: 200.7 Rev 4.4 - Meta	Is (ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	1.1		0.20	mg/L		12/20/18 10:34	12/27/18 14:08	1
Magnesium	600		2.0	mg/L		12/20/18 10:34	12/27/18 14:08	1
SiO2, Silica	10		0.21	mg/L		12/20/18 10:34	12/29/18 05:34	1
Method: 200.8 LL - Metals (IC Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Mothod: 200 8 LT - Motale (IC	·D/MQ\							
Analyte	Result				<u>D</u>			
Analyte Antimony	Result	D1	0.020	mg/L	D	12/19/18 11:06	01/14/19 22:00	20
Analyte Antimony Arsenic	Result ND ND	D1	0.020 0.010	mg/L mg/L	<u>D</u>	12/19/18 11:06 12/19/18 11:06	01/14/19 22:00 01/14/19 22:00	20 20
Analyte Antimony Arsenic Barium	Result ND ND 0.020	D1 D1 D1	0.020 0.010 0.010	mg/L mg/L mg/L	<u>D</u>	12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 22:00 01/14/19 22:00 01/14/19 22:00	20 20 20
Analyte Antimony Arsenic	Result ND ND O.020 ND	D1 D1 D1	0.020 0.010 0.010 0.0020	mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00	20 20 20
Analyte Antimony Arsenic Barium Cadmium	Result ND ND 0.020 ND ND	D1 D1 D1 D1 D1 D1	0.020 0.010 0.010	mg/L mg/L mg/L	<u>D</u>	12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 22:00 01/14/19 22:00 01/14/19 22:00	20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium	Result ND ND 0.020 ND ND ND	D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.0020	mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00	20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt	Result ND ND 0.020 ND ND ND	D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00	20 20 20 20 20 20
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt Lead	Result ND ND 0.020 ND ND ND ND	D1 D1 D1 D1 D1 D1 D1 D1 D1	0.020 0.010 0.010 0.0020 0.020 0.010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06 12/19/18 11:06	01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00 01/14/19 22:00	20 20 20 20 20 20 20

Client Sample ID: FC-CCR-MW16-121618

Date Collected: 12/16/18 08:54 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115115-4

Matrix: Water

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 13:09	2
Method: 200.7 Rev 4.4 - I	Metals (ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	1.1		0.20	mg/L		12/20/18 10:34	12/27/18 14:14	1
Magnesium	1200	D2	8.0	mg/L		12/20/18 10:34	12/29/18 05:40	4
SiO2, Silica	12		0.21	mg/L		12/20/18 10:34	12/29/18 05:46	1
Method: 200.8 LL - Metal	s (ICP/MS)							
Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.020	mg/L		12/19/18 11:06	01/14/19 22:02	20
Arsenic	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 22:02	20
Barium	0.026	D1	0.010	mg/L		12/19/18 11:06	01/14/19 22:02	20
Cadmium	ND	D1	0.0020	mg/L		12/19/18 11:06	01/14/19 22:02	20
Chromium	ND	D1	0.020	mg/L		12/19/18 11:06	01/14/19 22:02	20
Cobalt	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 22:02	20
	ND	D1	0.010	mg/L		12/19/18 11:06	01/14/19 22:02	20
Lead		D1	0.010	mg/L		12/19/18 11:06	01/14/19 22:02	20
Lead Molybdenum	ND	וט	0.010					
	ND 0.060	= :	0.010	mg/L		12/19/18 11:06	01/16/19 23:21	20

TestAmerica Job ID: 550-115115-2

SDG: Cholla

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

Lab Sample ID: 550-115115-1 MS Client Sample ID: FC-CCR-DMX6-121618 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165473** 

Client: Arizona Public Service Company

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits 8.00 Fluoride ND 7.91 D1 mg/L 93 80 - 120

Lab Sample ID: 550-115115-1 MSD Client Sample ID: FC-CCR-DMX6-121618 Prep Type: Total/NA

**Matrix: Water** 

Magnesium

SiO2, Silica

Project/Site: CCR

Analysis Batch: 165473

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	ND		8.00	7.98	D1	mg/L		94	80 - 120	1	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-164986/1-A Client Sample ID: Method Blank Prep Type: Total/NA **Matrix: Water Analysis Batch: 165571** Prep Batch: 164986

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium 0.20 <u>12/20/18 10:34</u> <u>12/27/18 11:36</u>  $\overline{\mathsf{ND}}$ mg/L ND 2.0 mg/L 12/20/18 10:34 12/27/18 11:36 Magnesium

Lab Sample ID: MB 550-164986/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 165722** Prep Batch: 164986

RL Unit **Analyte** Result Qualifier Prepared Analyzed Dil Fac

MB MB

SiO2, Silica 0.21 12/20/18 10:34 12/29/18 01:49  $\overline{\mathsf{ND}}$ mg/L Lab Sample ID: LCS 550-164986/2-A **Client Sample ID: Lab Control Sample** 

**Matrix: Water** Prep Type: Total/NA **Prep Batch: 164986 Analysis Batch: 165571** Spike LCS LCS %Rec. Added Result Qualifier Limits Analyte Unit D %Rec Lithium 1.00 1.03 mg/L 103 85 - 115

21.0

10.7

Lab Sample ID: LCS 550-164986/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 165722 Prep Batch: 164986** Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit D %Rec Limits

21.2

10.6

mg/L

mg/L

101

99

85 - 115

85 - 115

Lab Sample ID: LCSD 550-164986/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA Analysis Batch: 165571 Prep Batch: 164986 Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit **Analyte** Unit D %Rec Lithium 1.00 1.02 mg/L 102 85 - 115 20 21.0 20.9 100 85 - 115 20 Magnesium mg/L 2

TestAmerica Phoenix

Page 9 of 21 1/22/2019

TestAmerica Job ID: 550-115115-2

Client Sample ID: FC-CCR-DMX6-121618

SDG: Cholla

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

Client: Arizona Public Service Company

Lab Sample ID: 550-115115-1 MS

Project/Site: CCR

Lab Sample ID: LCSD 550-164986/3-A	Sample ID: LCSD 550-164986/3-A						Client Sample ID: Lab Control Sample Dup					
Matrix: Water							Prep Ty	e: Tot	al/NA			
Analysis Batch: 165722							Prep Ba	itch: 10	64986			
	Spike	LCSD	LCSD				%Rec.		RPD			
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit			
SiO2, Silica	10.7	10.5		mg/L		98	85 - 115	1	20			

Matrix: Water Analysis Batch: 165571	Sample	Sample	Spike	MS	MS				Prep Type: Total/NA Prep Batch: 164986 %Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Lithium	1.67		1.00	2.54		mg/L		87	70 - 130
Magnesium	559		21.0	556	M3	ma/L		-12	70 - 130

Lab Sample ID: 550-115115	-1 MS					Client S	amp	ole ID: F	C-CCR-D	MX6-121618
Matrix: Water									<b>Prep Ty</b>	pe: Total/NA
Analysis Batch: 165722									Prep Ba	atch: 164986
-	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
SiO2, Silica	17.1		10.7	28.5		mg/L		107	70 - 130	

Lab Sample ID: 550-115115 Matrix: Water	-1 MSD					Client	Samp	ole ID: F	C-CCR-D Prep Ty		
Analysis Batch: 165571									Prep Ba	itch: 10	64986
•	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	1.67		1.00	2.59		mg/L		92	70 - 130	2	20
Magnesium	559		21.0	559	M3	mg/L		0.3	70 - 130	0	20

Lab Sample ID: 550-115115	5-1 MSD					Client	Samp	le ID: F	C-CCR-D	MX6-12	21618
Matrix: Water									Prep Ty	pe: Tot	al/NA
Analysis Batch: 165722									Prep Ba	atch: 16	34986
_	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
SiO2. Silica	17.1		10.7	28.1		ma/L		103	70 - 130	2	20

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

Lab Sample ID: MB 550-164867 Matrix: Water Analysis Batch: 166694	//1-A					Ī	ole ID: Method Prep Type: To Prep Batch:	: Total/NA	
	MB	MB							
Analyte	Result	Qualifier	RL	Un	it D	Prepared	Analyzed	Dil Fac	
Antimony	ND		0.0010	mg	J/L	12/19/18 11:06	01/14/19 21:35	1	
Arconic	ND		0.00050	mo	1/1	12/10/18 11:06	01/14/10 21:35	1	

Arsenic ND 0.00050 mg/L 12/19/18 11:06 01/14/19 21:35 Barium ND 0.00050 mg/L 12/19/18 11:06 01/14/19 21:35 Cadmium ND 0.00010 12/19/18 11:06 01/14/19 21:35 mg/L ND Chromium 0.0010 mg/L 12/19/18 11:06 01/14/19 21:35 Cobalt ND 0.00050 mg/L 12/19/18 11:06 01/14/19 21:35 Lead ND mg/L 0.00050 12/19/18 11:06 01/14/19 21:35 Molybdenum ND 0.00050 mg/L 12/19/18 11:06 01/14/19 21:35 Thallium ND 0.00010 mg/L 12/19/18 11:06 01/14/19 21:35

TestAmerica Phoenix

Page 10 of 21

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115115-2

Client Sample ID: Lab Control Sample Dup

104

102

85 - 115

85 - 115

SDG: Cholla

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

Lab Sample ID: MB 550-164867/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 166913** Prep Batch: 164867

MB MB

Analyte Result Qualifier RL Unit Analyzed Dil Fac Prepared 0.00050 12/19/18 11:06 01/16/19 22:54 Selenium  $\overline{\mathsf{ND}}$ mg/L

Lab Sample ID: LCS 550-164867/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 166694** Prep Batch: 164867

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Antimony	0.100	0.107		mg/L		107	85 - 115	
Arsenic	0.100	0.102		mg/L		102	85 - 115	
Barium	0.100	0.100		mg/L		100	85 - 115	
Cadmium	0.100	0.107		mg/L		107	85 - 115	
Chromium	0.100	0.104		mg/L		104	85 - 115	
Cobalt	0.100	0.103		mg/L		103	85 - 115	
Lead	0.100	0.101		mg/L		101	85 - 115	
Molybdenum	0.100	0.105		mg/L		105	85 - 115	
Thallium	0.100	0.104		mg/L		104	85 - 115	

Lab Sample ID: LCS 550-164867/2-A **Client Sample ID: Lab Control Sample** Prep Type: Total/NA

**Matrix: Water** 

Molvbdenum

Thallium

**Analysis Batch: 166913** 

Prep Batch: 164867 LCS LCS Spike %Rec. Added Result Qualifier Unit D %Rec Limits

**Analyte** 0.100 85 - 115 Selenium 0.102 mg/L 102

Lab Sample ID: LCSD 550-164867/3-A **Matrix: Water** 

Prep Type: Total/NA **Prep Batch: 164867 Analysis Batch: 166694** Spike LCSD LCSD %Rec. **RPD** Result Qualifier Limits **Analyte** Added Unit %Rec RPD Limit Antimony 0.100 0.105 mg/L 105 85 - 115 20 Arsenic 0.100 0.103 85 - 115 mg/L 103 20 Barium 0.100 0.0958 96 85 - 115 20 mg/L Cadmium 0.100 0.104 104 85 - 115 20 mg/L Chromium 0.100 0.104 mg/L 104 85 - 115 20 Cobalt 0.100 0.103 mg/L 103 85 - 115 20 0.100 0.0999 100 85 - 115 20 Lead mg/L

Lab Sample ID: LCSD 550-164867/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 166913** Prep Batch: 164867 Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier D %Rec Limits RPD Limit **Analyte** Unit 0.100 0.104 104 85 - 115 Selenium mg/L

0.104

0.102

mg/L

mg/L

0.100

0.100

TestAmerica Phoenix

20

20

2

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115115-2

SDG: Cholla

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

Lab Sample ID: 550-115115 Matrix: Water Analysis Batch: 166694	trix: Water alysis Batch: 166694 Sample Sample Spike MS MS								C-CCR-DMX6-121618 Prep Type: Total/NA Prep Batch: 164867
Analyte	•	•	Spike Added	_	_	Unit	D	%Rec	%Rec. Limits
Antimony	ND		0.100	0.123	- Guainici	mg/L		123	70 - 130
Arsenic	ND	D1	0.100	0.125		mg/L		125	70 - 130
Barium	0.025	D1	0.100	0.122		mg/L		97	70 - 130
Cadmium	ND	D1	0.100	0.115		mg/L		114	70 - 130
Chromium	ND	D1	0.100	0.118		mg/L		118	70 - 130
Cobalt	ND	D1	0.100	0.117		mg/L		113	70 - 130
Lead	ND	D1	0.100	0.105		mg/L		105	70 - 130
Molybdenum	ND	D1	0.100	0.129		mg/L		123	70 - 130
Thallium	ND	D1	0.100	0.107		mg/L		107	70 - 130

Lab Sample ID: 550-115115-1 MS						Client Sample ID: FC-CCR-DMX6-121618				
Matrix: Water									Prep Typ	oe: Total/NA
Analysis Batch: 166913									Prep Ba	tch: 164867
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Selenium	0.014	M1 D1	0.100	0.234	M1	mg/L		220	70 - 130	

Matrix: Water Analysis Batch: 166694 Sample Sample Spike MSD MSD								Client Sample ID: FC-CC Prep Pre %Re						
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit			
Antimony	ND	D1	0.100	0.117		mg/L		117	70 - 130	5	20			
Arsenic	ND	D1	0.100	0.126		mg/L		126	70 - 130	1	20			
Barium	0.025	D1	0.100	0.118		mg/L		93	70 - 130	3	20			
Cadmium	ND	D1	0.100	0.107		mg/L		106	70 - 130	7	20			
Chromium	ND	D1	0.100	0.113		mg/L		113	70 - 130	5	20			
Cobalt	ND	D1	0.100	0.112		mg/L		108	70 - 130	5	20			
Lead	ND	D1	0.100	0.0991		mg/L		99	70 - 130	6	20			
Molybdenum	ND	D1	0.100	0.118		mg/L		113	70 - 130	8	20			
Thallium	ND	D1	0.100	0.101		mg/L		101	70 - 130	5	20			

Lab Sample ID: 550-115115-1 MSD Matrix: Water						Client Sample ID: FC-CCR-DMX6-12161 Prep Type: Total/N/					
Analysis Batch: 166913					MSD		Prep Batch: 1648				
Analyte	•	Qualifier	Added	_	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Selenium	0.014	M1 D1	0.100	0.194	M1	mg/L		180	70 - 130	19	20

## **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115115-2

SDG: Cholla

#### HPLC/IC

#### **Analysis Batch: 165329**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-2	FC-CCR-MW7-121718	Total/NA	Water	300.0	
550-115115-3	FC-CCR-MW6-121618	Total/NA	Water	300.0	
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	300.0	

#### **Analysis Batch: 165473**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-1	FC-CCR-DMX6-121618	Total/NA	Water	300.0	
550-115115-1 MS	FC-CCR-DMX6-121618	Total/NA	Water	300.0	
550-115115-1 MSD	FC-CCR-DMX6-121618	Total/NA	Water	300.0	

#### Metals

#### Prep Batch: 164867

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-1	FC-CCR-DMX6-121618	Total/NA	Water	200.8	
550-115115-2	FC-CCR-MW7-121718	Total/NA	Water	200.8	
550-115115-3	FC-CCR-MW6-121618	Total/NA	Water	200.8	
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	200.8	
MB 550-164867/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-164867/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-164867/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-115115-1 MS	FC-CCR-DMX6-121618	Total/NA	Water	200.8	
550-115115-1 MSD	FC-CCR-DMX6-121618	Total/NA	Water	200.8	

#### **Prep Batch: 164986**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-1	FC-CCR-DMX6-121618	Total/NA	Water	200.7	_
550-115115-2	FC-CCR-MW7-121718	Total/NA	Water	200.7	
550-115115-3	FC-CCR-MW6-121618	Total/NA	Water	200.7	
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	200.7	
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-115115-1 MS	FC-CCR-DMX6-121618	Total/NA	Water	200.7	
550-115115-1 MSD	FC-CCR-DMX6-121618	Total/NA	Water	200.7	

#### **Analysis Batch: 165571**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-1	FC-CCR-DMX6-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-2	FC-CCR-MW7-121718	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-3	FC-CCR-MW6-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	200.7 Rev 4.4	164986
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164986
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164986
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-1 MS	FC-CCR-DMX6-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-1 MSD	FC-CCR-DMX6-121618	Total/NA	Water	200.7 Rev 4.4	164986

1/22/2019

Page 13 of 21

## **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115115-2

SDG: Cholla

#### **Metals (Continued)**

#### **Analysis Batch: 165722**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-1	FC-CCR-DMX6-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-2	FC-CCR-MW7-121718	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-3	FC-CCR-MW6-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	200.7 Rev 4.4	164986
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164986
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164986
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-1 MS	FC-CCR-DMX6-121618	Total/NA	Water	200.7 Rev 4.4	164986
550-115115-1 MSD	FC-CCR-DMX6-121618	Total/NA	Water	200.7 Rev 4.4	164986

#### **Analysis Batch: 166694**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-1	FC-CCR-DMX6-121618	Total/NA	Water	200.8 LL	164867
550-115115-2	FC-CCR-MW7-121718	Total/NA	Water	200.8 LL	164867
550-115115-3	FC-CCR-MW6-121618	Total/NA	Water	200.8 LL	164867
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	200.8 LL	164867
MB 550-164867/1-A	Method Blank	Total/NA	Water	200.8 LL	164867
LCS 550-164867/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	164867
LCSD 550-164867/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	164867
550-115115-1 MS	FC-CCR-DMX6-121618	Total/NA	Water	200.8 LL	164867
550-115115-1 MSD	FC-CCR-DMX6-121618	Total/NA	Water	200.8 LL	164867

#### **Analysis Batch: 166913**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115115-1	FC-CCR-DMX6-121618	Total/NA	Water	200.8 LL	164867
550-115115-2	FC-CCR-MW7-121718	Total/NA	Water	200.8 LL	164867
550-115115-3	FC-CCR-MW6-121618	Total/NA	Water	200.8 LL	164867
550-115115-4	FC-CCR-MW16-121618	Total/NA	Water	200.8 LL	164867
MB 550-164867/1-A	Method Blank	Total/NA	Water	200.8 LL	164867
LCS 550-164867/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	164867
LCSD 550-164867/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	164867
550-115115-1 MS	FC-CCR-DMX6-121618	Total/NA	Water	200.8 LL	164867
550-115115-1 MSD	FC-CCR-DMX6-121618	Total/NA	Water	200.8 LL	164867

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115115-2

SDG: Cholla

Client Sample ID: FC-CCR-DMX6-121618

Date Collected: 12/16/18 10:36 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115115-1

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165473	12/27/18 01:54	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:31	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 02:56	SRA	TAL PHX
Total/NA	Prep	200.8			164867	12/19/18 11:06	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166694	01/14/19 21:42	ARE	TAL PHX
Total/NA	Prep	200.8			164867	12/19/18 11:06	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166913	01/16/19 23:01	ARE	TAL PHX

Client Sample ID: FC-CCR-MW7-121718

Date Collected: 12/17/18 08:56

Date Received: 12/18/18 12:33

Lab Sample ID: 550-115115-2

Lab Sample ID: 550-115115-3

Matrix: Water

Prep Type Total/NA	Batch Type Analysis	Batch Method 300.0	Run	Dilution Factor 2	Batch Number 165329	Prepared or Analyzed 12/22/18 05:47	Analyst NEL	Lab
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	164986 165571	12/20/18 10:34 12/27/18 14:02		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	164986 165722	12/20/18 10:34 12/29/18 05:22		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.8 200.8 LL		20	164867 166694	12/19/18 11:06 01/14/19 21:57		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.8 200.8 LL		20	164867 166913	12/19/18 11:06 01/16/19 23:16		TAL PHX TAL PHX

Client Sample ID: FC-CCR-MW6-121618

Date Collected: 12/16/18 11:49

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 06:24	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 14:08	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 05:34	SRA	TAL PHX
Total/NA	Prep	200.8			164867	12/19/18 11:06	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166694	01/14/19 22:00	ARE	TAL PHX
Total/NA	Prep	200.8			164867	12/19/18 11:06	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166913	01/16/19 23:18	ARE	TAL PHX

TestAmerica Phoenix

Page 15 of 21

#### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

Date Received: 12/18/18 12:33

TestAmerica Job ID: 550-115115-2

SDG: Cholla

Client Sample ID: FC-CCR-MW16-121618

Lab Sample ID: 550-115115-4 Date Collected: 12/16/18 08:54 **Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 13:09	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 14:14	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 05:40	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 05:46	SRA	TAL PHX
Total/NA	Prep	200.8			164867	12/19/18 11:06	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166694	01/14/19 22:02	ARE	TAL PHX
Total/NA	Prep	200.8			164867	12/19/18 11:06	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	166913	01/16/19 23:21	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: 550-115115-2
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

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#### **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115115-2

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

1/22/2019

## **Chain of Custody Record**

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	Relinquished by:	1	Custody Seals Intact:	pecial instructions/QC R	✓ Non-Hazard	Possible Hazard Identification: Are any samples from a listed EF Comments Section if the lab is to	Preservation Used: 1= ice,	roperation Heads 4- Inc					-4 FC-CCI	-3 FC-CC	-2 Fc-cc	-( FC-CC	Sampl	PO#	Site: Cholla	Project Name: CCR	(XXX) XXX-XXXX	928) 587-0319	4801 Cholla Lake Road	APS Cholla	CII	Phoenix, AZ 85040 phone 602.437.3340 fax 602.454.9303
	,	avarvan	☐ Yes ☐ No	Special Instructions/QC Requirements & Comments:	] Flammable ☐ Skin Irritant	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.	2= HCI; 3= HZSO4; 4=HNO3;	101					FC-CCR-MW16-121618	FC-CCR-MW6-121618	FC-CCR-MW7-121718	FC-CCR-DMX6-121618	Sample Identification				FAX	Phone			Client Contact	2.454.9303
Company	Company	Company:	Custody Seal No.		Poison B	ease List any EPA V	3; 5=NaOH; 6= Other						12/16/2018	12/16/2018	12/17/2018	12/16/2018	Sample Date				1	TAT	Ar	928-587-0319	Doug Lavarnway	Regul
		18	No.:			Vaste Code	ner						854	1149	856	1036	Sample Time					TAT if different from Below	Analysis Tur		nway	Regulatory Program:
		7 -			Unknown	s for the sar							G	G	G	G	Type (C=Comp, G=Grab)				Dolon	Rainw	Turnaround Time			gram:
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Received in Laboratory by:	Received by	Received by			□ Re	Sample Disposa		F					×	×	×	×	Perform N EPA 200.7 Mg)	_	_	_		_	ĸ.	Lab Contact:	Doug Lavarnway	
3	d by:	d by			Return to Client	Dispo							×	×	×	×	EPA 300.0	(CI	, F,	SO4	)			ct:	rnwa	
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Date/Time	Date/Time:	Date/Time:	Therm ID No.:	37:	Months	il ( A fee may be assessed if samples are retained longer than 1 month)											Sample Specific Notes		Job / SDG No	-	Lab Sampling	Walk in Client	Sampler	, ,	$\overline{a}$	TestAmerica Laboratories, Inc.
L .33											ge 20						Notes:							COCs		atories, Inc. 1/22

#### **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-115115-2

SDG Number: Cholla

Login Number: 115115 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

Question	A	Commont
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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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: 550-99692-1

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 3/28/2018 9:44:26 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

## **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	14
QC Association Summary	19
Lab Chronicle	22
Certification Summary	25
Method Summary	26
Chain of Custody	27
Receipt Checklists	28

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13

#### **Definitions/Glossary**

Client: Arizona Public Service Company

**Qualifier Description** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

#### **Qualifiers**

#### **HPLC/IC** Qualifier

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
D1	Sample required dilution due to matrix.

#### Glossary

**RER** 

**RPD** TEF

**TEQ** 

RL

Elisted under the "D" column to designate that the result is reported on a dry weight basis
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)
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

Page 3 of 28

## **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

Job ID: 550-99692-1

**Laboratory: TestAmerica Phoenix** 

Narrative

Job Narrative 550-99692-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 3/19/2018 6:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.5° C, 2.8° C and 3.8° 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.

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# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99692-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-99692-1	FC-CCR-MW66-31618	Water	03/16/18 12:52	03/19/18 06:55
550-99692-2	FC-CCR-MW67-31618	Water	03/16/18 16:53	03/19/18 06:55
550-99692-3	FC-CCR-MW68-31618	Water	03/16/18 16:20	03/19/18 06:55
550-99692-4	FC-CCR-MW69-31618	Water	03/16/18 15:45	03/19/18 06:55
550-99692-5	FC-CCR-MW70-31618	Water	03/16/18 13:41	03/19/18 06:55
550-99692-6	FC-CCR-MW71-31618	Water	03/16/18 17:40	03/19/18 06:55
550-99692-7	FC-CCR-MW72-31618	Water	03/16/18 14:33	03/19/18 06:55
550-99692-8	FC-CCR-MW73-31618	Water	03/16/18 18:18	03/19/18 06:55
550-99692-9	FC-CCR-FD01-31618	Water	03/16/18 12:52	03/19/18 06:55

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

Lab Sample ID: 550-99692-1

Lab Sample ID: 550-99692-2

Lab Sample ID: 550-99692-3

Lab Sample ID: 550-99692-4

Lab Sample ID: 550-99692-5

<del></del>							
Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	41	D1	8.0	mg/L		300.0	Total/NA
Lithium	0.38		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0050	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.020	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cobalt	0.0085	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.022	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Thallium	0.00054	D1	0.00040	ma/L	4	200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW66-31618

Client Sample ID: FC-CCR-MW67-3167	18
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Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	31	D2	4.0	mg/L		300.0	Total/NA
Lithium	0.55		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0046	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.019	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cobalt	0.0072	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.044	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.0064	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Thallium	0.00063	D1	0.00040	mg/L	4	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW68-31618

CII	ent Samp	ie ib. F	S-CCK-I	41 4 4 G G - C	1010

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	14	D1	4.0	mg/L	10	300.0	Total/NA
Lithium	0.40		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0075	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.0072	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Molybdenum	0.0064	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.27	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Thallium	0.00048	D1	0.00040	mg/L	4	200.8 LL	Total/NA

## Client Sample ID: FC-CCR-MW69-31618

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_			
Analyte		Resul	t Qualif

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	29	D2	4.0	mg/L	10	- :	300.0	Total/NA
Lithium	0.52		0.20	mg/L	1	:	200.7 Rev 4.4	Total/NA
Arsenic	0.0089	D1	0.0020	mg/L	4	:	200.8 LL	Total/NA
Barium	0.014	D1	0.0020	mg/L	4		200.8 LL	Total/NA
Cobalt	0.0054	D1	0.0020	mg/L	4	:	200.8 LL	Total/NA
Molybdenum	0.014	D1	0.0020	mg/L	4	:	200.8 LL	Total/NA
Selenium	0.011	D1	0.0020	mg/L	4		200.8 LL	Total/NA

## Client Sample ID: FC-CCR-MW70-31618

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Analyte	Result Qualifi

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	2.2	D1	1.6	mg/L	4	300.0	Total/NA
Lithium	0.32		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0088	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.0093	D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cobalt	0.0054	D1	0.0020	mg/L	4	200.8 LL	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

3/28/2018

Page 6 of 28

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

Lab	Sample	ID:	550-99692-5

Lab Sample ID: 550-99692-9

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Molybdenum	0.0048	D1	0.0020	mg/L	4	_	200.8 LL	 Total/NA
Selenium	0.20	D1	0.0020	mg/L	4		200.8 LL	Total/NA

# C

Client Sample ID: FC-CCR-MW70-31618 (Continued)

Client Sample ID: FC-CCR-MW71-31618	Lab Sample ID: 550-99692-6

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.37	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.010 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.011 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.28 D1	0.0020	mg/L	4	200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW72-31618	Lab Sample ID: 550-99692-7

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.37	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0067 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.0082 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cobalt	0.0025 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.11 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Thallium	0.0010 D1	0.00040	mg/L	4	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW73-31618

# Lab Sample ID: 550-99692-8

Analyte	Result Qualifie	er RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.25	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0034 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Barium	0.020 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Cobalt	0.0057 D1	0.0020	mg/L	4	200.8 LL	Total/NA
Selenium	0.017 D1	0.0020	mg/L	4	200.8 LL	Total/NA

### Client Sample ID: FC-CCR-FD01-31618

#### Analyte Result Qualifier RL Unit Dil Fac D Method **Prep Type** Fluoride 38 D2 4.0 mg/L 10 300.0 Total/NA 200.7 Rev 4.4 Lithium 0.39 0.20 mg/L Total/NA 1 Arsenic 200.8 LL Total/NA 0.0067 D1 0.0020 mg/L 4 Barium 4 Total/NA 0.021 D1 0.0020 mg/L 200.8 LL Cobalt 0.0088 D1 0.0020 mg/L 4 200.8 LL Total/NA Molybdenum 0.022 D1 0.0020 mg/L 200.8 LL Total/NA Thallium 0.00048 D1 0.00040 mg/L 200.8 LL Total/NA

This Detection Summary does not include radiochemical test results.

3/28/2018

Date Collected: 03/16/18 12:52

Client Sample ID: FC-CCR-MW66-31618

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

Lab Sample ID: 550-99692-1

03/23/18 16:39 03/24/18 22:06

**Matrix: Water** 

Method: 300.0 - Anions, lo Analyte		pny Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	41	D1	8.0	mg/L			03/19/18 15:51	20
Method: 200.7 Rev 4.4 - N	letals (ICP)							
Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		03/21/18 05:52	03/22/18 03:27	1
Lithium	0.38		0.20	mg/L		03/21/18 05:52	03/23/18 00:50	•
Antimony	ND 0.0050	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:34	
Method: 200.8 LL - Metals Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0050	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:34	2
Barium	0.020	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:34	2
Cadmium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:34	
Chromium	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:34	4
Cobalt	0.0085	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:34	4
Lead	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:34	
	0.022	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:34	4
Molybdenum		D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:34	2
<b>Molybdenum</b> Selenium	ND	וט	0.00=0					

Client Sample ID: FC-CCR-MW67-31618 Lab Sample ID: 550-99692-2 Date Collected: 03/16/18 16:53 **Matrix: Water** 

0.00020

mg/L

ND

Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion Chromatography

Hg

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	31	D2	4.0	mg/L			03/19/18 16:46	10
_ Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		03/21/18 05:52	03/22/18 03:33	1
Lithium	0.55		0.20	mg/L		03/21/18 05:52	03/23/18 00:56	1
_ Method: 200.8 LL - Met	als (ICP/MS)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:41	4
Arsenic	0.0046	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:41	4
Dorium	0.040	D4	0.0020	ma/l		02/24/49 00:00	02/26/10 10:41	4

Anumony	שוו	וט	0.0040	IIIg/L	03/21/10 09.00 03/20/10 10.41	4
Arsenic	0.0046	D1	0.0020	mg/L	03/21/18 09:00 03/26/18 18:41	4
Barium	0.019	D1	0.0020	mg/L	03/21/18 09:00 03/26/18 18:41	4
Cadmium	ND	D1	0.00040	mg/L	03/21/18 09:00 03/26/18 18:41	4
Chromium	ND	D1	0.0040	mg/L	03/21/18 09:00 03/26/18 18:41	4
Cobalt	0.0072	D1	0.0020	mg/L	03/21/18 09:00 03/26/18 18:41	4
Lead	ND	D1	0.0020	mg/L	03/21/18 09:00 03/26/18 18:41	4
Molybdenum	0.044	D1	0.0020	mg/L	03/21/18 09:00 03/26/18 18:41	4
Selenium	0.0064	D1	0.0020	mg/L	03/21/18 09:00 03/26/18 18:41	4
Thallium	0.00063	D1	0.00040	mg/L	03/21/18 09:00 03/26/18 18:41	4

TestAmerica Phoenix

3/28/2018

Page 8 of 28

03/21/18 09:00 03/26/18 18:44

03/21/18 09:00 03/26/18 18:44

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW67-31618 Lab Sample ID: 550-99692-2

Date Collected: 03/16/18 16:53 **Matrix: Water** 

Date Received: 03/19/18 06:55

Method: 245.1 - Mercury (CVAA)							
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	0.00020	mg/L	_	03/23/18 16:39	03/24/18 22:08	1

Client Sample ID: FC-CCR-MW68-31618 Lab Sample ID: 550-99692-3

Date Collected: 03/16/18 16:20 Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion C	hromatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	14 D1	4.0	mg/L			03/19/18 17:04	10

Method: 200.7 Rev 4.4 - Metals (ICP)									
	Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Beryllium	ND		0.0010	mg/L	_	03/21/18 05:52	03/22/18 03:39	1
	_Lithium	0.40		0.20	mg/L		03/21/18 05:52	03/23/18 01:02	1

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:44	4
Arsenic	0.0075	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:44	4
Barium	0.0072	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:44	4
Cadmium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:44	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:44	4
Cobalt	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:44	4
Lead	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:44	4
Molybdenum	0.0064	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:44	4

Method: 245.1 - Mercury (CVAA	<b>(</b> )							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/23/18 16:39	03/24/18 22:09	1

0.0020

0.00040

mg/L

mg/L

0.27 D1

0.00048 D1

Lab Sample ID: 550-99692-4 Client Sample ID: FC-CCR-MW69-31618

Date Collected: 03/16/18 15:45 Date Received: 03/19/18 06:55

**Selenium** 

**Thallium** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	29	D2	4.0	mg/L			03/20/18 20:32	10
-								
Method: 200.7 Rev 4	.4 - Metals (ICP)							
Method: 200.7 Rev 4 Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	• •	Qualifier	RL 0.0010	Unit mg/L	D		Analyzed 03/22/18 03:45	Dil Fac

Method: 200.8 LL - Me	tals (ICP/MS)							
Analyte	Result Qu	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND D1	1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:46	4
Arsenic	0.0089 D1	1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:46	4
Barium	0.014 D1	1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:46	4
Cadmium	ND D1	İ	0.00040	mg/L		03/21/18 09:00	03/26/18 18:46	4

TestAmerica Phoenix

3/28/2018

**Matrix: Water** 

Page 9 of 28

**Matrix: Water** 

Project/Site: CCR

Client Sample ID: FC-CCR-MW69-31618

Date Collected: 03/16/18 15:45 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99692-4

. Matrix: Water

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:46	4
Cobalt	0.0054	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:46	4
Lead	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:46	4
Molybdenum	0.014	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:46	4
Selenium	0.011	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:46	4
Thallium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:46	4

 Method: 245.1 - Mercury (CVAA)
 Result
 Qualifier
 RL
 Unit
 D
 Prepared
 Analyzed
 Dil Fac

 Hg
 ND
 0.00020
 mg/L
 03/23/18 16:39
 03/24/18 22:11
 1

Client Sample ID: FC-CCR-MW70-31618 Lab Sample ID: 550-99692-5

Date Collected: 03/16/18 13:41 Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion Chromatography								
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
Fluoride	2.2 D1	1.6	mg/L			03/20/18 20:50	4	

Method: 200.7 Rev 4.4 - Metals (ICP)								
	Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Beryllium	ND	0.0010	mg/L		03/21/18 05:52	03/22/18 03:51	1
	Lithium	0.32	0.20	mg/L		03/21/18 05:52	03/23/18 01:14	1

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:48	4
Arsenic	0.0088	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:48	4
Barium	0.0093	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:48	4
Cadmium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:48	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:48	4
Cobalt	0.0054	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:48	4
Lead	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:48	4
Molybdenum	0.0048	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:48	4
Selenium	0.20	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:48	4
Thallium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:48	4

Method: 245.1 - Mercury (CVAA	<b>(</b> )							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/23/18 16:39	03/24/18 22:16	1

Client Sample ID: FC-CCR-MW71-31618

Date Collected: 03/16/18 17:40

Lab Sample ID: 550-99692-6

Matrix: Water

Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion Chromatography								
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
Fluoride	ND D1 D5	4.0	mg/L			03/19/18 19:13	10	

Client: Arizona Public Service Company

Date Received: 03/19/18 06:55

Project/Site: CCR

Thallium

Client Sample ID: FC-CCR-MW71-31618 Lab Sample ID: 550-99692-6

Date Collected: 03/16/18 17:40

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		03/21/18 05:52	03/22/18 03:57	1
Lithium	0.37		0.20	mg/L		03/21/18 05:52	03/23/18 01:20	1
- Method: 200.8 LL - Me	etals (ICP/MS)							
Analyte	,	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:51	4
Arsenic	0.010	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:51	4
Barium	0.011	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:51	4
Cadmium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:51	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:51	4
Cobalt	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:51	4
Lead	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:51	4
Molybdenum	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:51	4
Selenium	0.28	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:51	4

Method: 245.1 - Mercury (CVAA)								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L	_	03/23/18 16:39	03/24/18 22:13	1

0.00040

mg/L

ND D1

Client Sample ID: FC-CCR-MW72-31618

Date Collected: 03/16/18 14:33 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99692-7

03/21/18 09:00 03/26/18 18:51

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	4.0	mg/L			03/19/18 19:31	10
Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		03/21/18 05:52	03/22/18 04:03	1
Lithium	0.37		0.20	mg/L		03/21/18 05:52	03/23/18 01:26	1
- Method: 200.8 LL - Me	tals (ICP/MS)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:57	4
Arsenic	0.0067	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:57	4
Barium	0.0082	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:57	4
Cadmium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:57	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 18:57	4
Cobalt	0.0025	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:57	4
Lead	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:57	4
Molybdenum	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:57	4
Selenium	0.11	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 18:57	4
Thallium	0.0010	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 18:57	4
Method: 245.1 - Mercu	iry (CVAA)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/23/18 16:39	03/24/18 22:14	1

TestAmerica Phoenix

# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

Client Sample ID: FC-CCR-MW73-31618 Lab Sample ID: 550-99692-8 Date Collected: 03/16/18 18:18 **Matrix: Water** 

Date Received: 03/19/18 06:55

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	4.0	mg/L			03/19/18 19:50	10
Method: 200.7 Rev 4.4 -	Metals (ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0010	mg/L		03/21/18 05:52	03/22/18 04:09	1
Lithium	0.25		0.20	mg/L		03/21/18 05:52	03/23/18 01:32	1
Method: 200.8 LL - Meta	Is (ICP/MS)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 19:00	
Arsenic	0.0034	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:00	4
Barium	0.020	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:00	4
Cadmium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 19:00	4
Chromium	ND	D1	0.0040	mg/L		03/21/18 09:00	03/26/18 19:00	4
Cobalt	0.0057	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:00	4
Lead	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:00	4
Molybdenum	ND	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:00	4
Selenium	0.017	D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:00	4
Thallium	ND	D1	0.00040	mg/L		03/21/18 09:00	03/26/18 19:00	4
Method: 245.1 - Mercury	(CVAA)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		03/23/18 16:39	03/24/18 22:17	1

Client Sample ID: FC-CCR-FD01-31618 Lab Sample ID: 550-99692-9

Date Collected: 03/16/18 12:52 Date Received: 03/19/18 06:55

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	38	D2	4.0	mg/L			03/20/18 21:09	10
Method: 200.7 Rev 4.4 - Metals	(ICP)							

Method: 200.7 Rev 4.4 - Meta	Is (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND ND	0.0010	mg/L		03/21/18 05:52	03/22/18 04:14	1
Lithium	0.39	0.20	mg/L		03/21/18 05:52	03/23/18 01:37	1

_ Lithium _	0.39	0.20	IIIg/L		03/21/10 05.52	03/23/10 01.37	'
– Method: 200.8 LL - Meta	Is (ICP/MS)						
Analyte	Result Qu	ualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND D1	0.0040	mg/L		03/21/18 09:00	03/26/18 19:02	4
Arsenic	0.0067 D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:02	4
Barium	0.021 D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:02	4
Cadmium	ND D1	0.00040	mg/L		03/21/18 09:00	03/26/18 19:02	4
Chromium	ND D1	0.0040	mg/L		03/21/18 09:00	03/26/18 19:02	4
Cobalt	0.0088 D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:02	4
Lead	ND D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:02	4
Molybdenum	0.022 D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:02	4
Selenium	ND D1	0.0020	mg/L		03/21/18 09:00	03/26/18 19:02	4
_Thallium	0.00048 D1	0.00040	mg/L		03/21/18 09:00	03/26/18 19:02	4

TestAmerica Phoenix

Page 12 of 28

**Matrix: Water** 

# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

Client Sample ID: FC-CCR-FD01-31618 Lab Sample ID: 550-99692-9

Date Collected: 03/16/18 12:52 Date Received: 03/19/18 06:55 Matrix: Water

ate Received: 03/19/18 06:55

 Method: 245.1 - Mercury (CVAA)

 Analyte
 Result
 Qualifier
 RL
 Unit
 D
 Prepared
 Analyzed
 Dil Fac

 Hg
 ND
 0.00020
 mg/L
 03/23/18 16:39
 03/24/18 22:19
 1

5

\_\_\_\_\_

9

11

12

14

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-142194/2 Client Sample ID: Method Blank Prep Type: Total/NA **Matrix: Water** 

Analysis Batch: 142194

MB MB Analyte Result Qualifier RL Unit Analyzed Dil Fac D Prepared 0.40 Fluoride ND mg/L 03/19/18 13:23

Lab Sample ID: LCS 550-142194/5 Client Sample ID: Lab Control Sample **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 142194** 

Spike LCS LCS %Rec. Added Limits Analyte Result Qualifier Unit %Rec Fluoride 4.00 4.24 mg/L 106 90 - 110

Lab Sample ID: LCSD 550-142194/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 142194

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit Analyte Unit D %Rec Fluoride 4.00 4.25 mg/L 106

Client Sample ID: FC-CCR-MW66-31618 Lab Sample ID: 550-99692-1 MS Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 142194** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride 41 D1 80.0 124 D1 105 80 - 120 mg/L

Lab Sample ID: 550-99692-1 MSD Client Sample ID: FC-CCR-MW66-31618 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142194** 

Spike MSD MSD %Rec. RPD Sample Sample Added Analyte Result Qualifier Result Qualifier Unit %Rec Limits RPD Limit Fluoride 41 D1 80.0 119 D1 97 80 - 120 mg/L

Lab Sample ID: MB 550-142283/2 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142283** 

Analyte Result Qualifier RL Unit Prepared D Analyzed Dil Fac Fluoride 0.40 ND mg/L 03/20/18 15:19

MB MB

Lab Sample ID: LCS 550-142283/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142283** 

Spike LCS LCS %Rec. Added Result Qualifier Analyte Unit %Rec Limits Fluoride 4.00 4.27 107 90 - 110

Lab Sample ID: LCSD 550-142283/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 142283** 

LCSD LCSD RPD Spike %Rec. Added Limits Limit Analyte Result Qualifier Unit D %Rec RPD Fluoride 4.00 4.28 mg/L 107

TestAmerica Phoenix

**Client Sample ID: Matrix Spike** 

**Prep Type: Total/NA** 

Prep Type: Total/NA

Client: Arizona Public Service Company

Project/Site: CCR

Lab Sample ID: 550-99663-A-5 MS

**Matrix: Water** 

Analyte

Fluoride

Analyte

Fluoride

Analyte

Beryllium

**Analysis Batch: 142283** 

Sample Sample Result Qualifier 7 7

Spike Added 4.00

Result Qualifier 11 4

MS MS

Unit mg/L

D

%Rec. %Rec Limits 93

**Client Sample ID: Matrix Spike Duplicate** 

%Rec.

80 - 120

Lab Sample ID: 550-99663-A-5 MSD

**Matrix: Water** 

**Analysis Batch: 142283** 

Sample Sample Result Qualifier

7.7

Spike Added 4.00

MSD MSD Result Qualifier 11.5

Unit mg/L

D %Rec 95

Limits RPD 80 - 120 n

**RPD** 

Limit

20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-142358/1-A

**Matrix: Water** 

Analysis Batch: 142510

MB MB

Result Qualifier  $\overline{\mathsf{ND}}$ 

RL 0.0010 Unit mg/L

Prepared 03/21/18 05:52 03/22/18 03:07

Analyzed Dil Fac

Lab Sample ID: MB 550-142358/1-A

**Matrix: Water** 

**Analysis Batch: 142638** 

MR MR

Analyte Result Qualifier Lithium  $\overline{\mathsf{ND}}$ 

RL 0.20

Spike

Added

1.00

Spike

Added

1 00

Spike

Added

1.00

Unit mg/L

LCS LCS

LCS LCS

LCSD LCSD

1.03

Result Qualifier

0.988

Result Qualifier

Unit

mg/L

Unit

mg/L

1.02

Result Qualifier

Prepared 03/21/18 05:52 03/23/18 00:12

D

Analyzed Dil Fac

Lab Sample ID: LCS 550-142358/2-A **Matrix: Water** 

Beryllium

Beryllium

**Analysis Batch: 142510** 

Analyte

Lab Sample ID: LCS 550-142358/2-A **Matrix: Water** 

**Analysis Batch: 142638** 

Analyte Lithium

Lab Sample ID: LCSD 550-142358/3-A **Matrix: Water** 

Analysis Batch: 142510

Analyte

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

Prep Batch: 142358

Client Sample ID: Method Blank

Prep Type: Total/NA Prep Batch: 142358

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA Prep Batch: 142358

%Rec. Limits

Unit %Rec mg/L 102 85 - 115

%Rec

99

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA **Prep Batch: 142358** 

%Rec. Limits 85 - 115

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA Prep Batch: 142358 %Rec.

RPD Limits RPD Limit %Rec 103 85 - 115 20

Client: Arizona Public Service Company

Project/Site: CCR

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

Lab Sample ID: LCSD 550-142358/3-A				Client Sa	mple	ID: Lat	Control	Sample	e Dup
Matrix: Water							Prep Ty	pe: Tot	al/NA
Analysis Batch: 142638							Prep Ba	tch: 1	<b>42358</b>
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	1.00	1.01		mg/L		101	85 - 115	2	20

Lab Sample ID: 550-99692-	1 MS					Clien	t Sam	ple ID:	FC-CCR-MW66-31618
Matrix: Water									Prep Type: Total/NA
Analysis Batch: 142510									Prep Batch: 142358
-	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		1.00	0.980		mg/L		98	70 - 130

Lab Sample ID: 550-99692-	1 MS					Clien	t Sam	ple ID:	FC-CCR-MW66-316	18
Matrix: Water									Prep Type: Total/I	NA
Analysis Batch: 142638									Prep Batch: 1423	58
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Lithium	0.38		1.00	1.41		mg/L		103	70 - 130	

Lab Sample ID: 550-99692-	1 MSD					Client	Sam	ple ID:	FC-CCR-I	MW66-3	31618
Matrix: Water									Prep Ty	pe: Tot	al/NA
Analysis Batch: 142510									Prep Ba	tch: 14	12358
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		1.00	0.959		mg/L		96	70 - 130	2	20

Lab Sample ID: 550-99692	-1 MSD					Clien	t Sam	ple ID:	FC-CCR-N	/W66-3	31618
Matrix: Water									Prep Typ	e: Tot	al/NA
Analysis Batch: 142638									Prep Ba	itch: 14	12358
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lithium	0.38		1.00	1.43		mg/L		106	70 - 130	2	20

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

Lab Sample ID: MB 550-142370/1-A

Matrix: Water Analysis Batch: 142932							Prep Type: To Prep Batch:	
,	MB	MB					•	
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0010	mg/L		03/21/18 09:00	03/27/18 09:43	1
Arsenic	ND		0.00050	mg/L		03/21/18 09:00	03/27/18 09:43	1
Barium	ND		0.00050	mg/L		03/21/18 09:00	03/27/18 09:43	1
Cadmium	ND		0.00010	mg/L		03/21/18 09:00	03/27/18 09:43	1
Chromium	ND		0.0010	mg/L		03/21/18 09:00	03/27/18 09:43	1
Cobalt	ND		0.00050	mg/L		03/21/18 09:00	03/27/18 09:43	1
Lead	ND		0.00050	mg/L		03/21/18 09:00	03/27/18 09:43	1
Molybdenum	ND		0.00050	mg/L		03/21/18 09:00	03/27/18 09:43	1
Selenium	ND		0.00050	mg/L		03/21/18 09:00	03/27/18 09:43	1
Thallium	ND		0.00010	ma/L		03/21/18 09:00	03/27/18 09:43	1

TestAmerica Phoenix

**Client Sample ID: Method Blank** 

Page 16 of 28

3/28/2018

Client: Arizona Public Service Company

Project/Site: CCR

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

Lab Sample ID: LCS 550-142370/2-A			Client Sample ID: Lab Control Samp						
Matrix: Water							Prep Type: Total/NA		
Analysis Batch: 142932							<b>Prep Batch: 142370</b>		
•	Spike	LCS	LCS				%Rec.		
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Antimony	0.100	0.0954		mg/L		95	85 - 115		
Arsenic	0.100	0.0963		mg/L		96	85 <sub>-</sub> 115		
Barium	0.100	0.0955		ma/l		96	85 _ 115		

, inary to	714404	rtoourt quannor	· · · · · ·	2 /0.100	
Antimony	0.100	0.0954	mg/L	95	85 - 115
Arsenic	0.100	0.0963	mg/L	96	85 - 115
Barium	0.100	0.0955	mg/L	96	85 - 115
Cadmium	0.100	0.0961	mg/L	96	85 - 115
Chromium	0.100	0.0981	mg/L	98	85 - 115
Cobalt	0.100	0.0972	mg/L	97	85 - 115
Lead	0.100	0.0966	mg/L	97	85 - 115
Molybdenum	0.100	0.0955	mg/L	96	85 - 115
Selenium	0.100	0.0965	mg/L	96	85 - 115
Thallium	0.100	0.0954	ma/L	95	85 - 115

Lab Sample ID: LCSD 550-142370/3-A **Client Sample ID: Lab Control Sample Dup** Prep Type: Total/NA Matrix: Water **Analysis Batch: 142932** Prep Batch: 142370

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.0949		mg/L		95	85 - 115	1	20
Arsenic	0.100	0.0941		mg/L		94	85 - 115	2	20
Barium	0.100	0.0947		mg/L		95	85 - 115	1	20
Cadmium	0.100	0.0949		mg/L		95	85 - 115	1	20
Chromium	0.100	0.0959		mg/L		96	85 - 115	2	20
Cobalt	0.100	0.0949		mg/L		95	85 - 115	2	20
Lead	0.100	0.0949		mg/L		95	85 - 115	2	20
Molybdenum	0.100	0.0940		mg/L		94	85 - 115	2	20
Selenium	0.100	0.0937		mg/L		94	85 - 115	3	20
Thallium	0.100	0.0949		mg/L		95	85 - 115	1	20

Lab Sample ID: 550-99692-1 MS Client Sample ID: FC-CCR-MW66-31618 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 142908 Prep Batch: 142370

Analysis Baten. 142000	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	ND	D1	0.100	0.0976	D1	mg/L		97	70 - 130
Arsenic	0.0050	D1	0.100	0.114	D1	mg/L		109	70 - 130
Barium	0.020	D1	0.100	0.119	D1	mg/L		99	70 - 130
Cadmium	ND	D1	0.100	0.0935	D1	mg/L		94	70 - 130
Chromium	ND	D1	0.100	0.102	D1	mg/L		102	70 - 130
Cobalt	0.0085	D1	0.100	0.105	D1	mg/L		96	70 - 130
Lead	ND	D1	0.100	0.0890	D1	mg/L		89	70 - 130
Molybdenum	0.022	D1	0.100	0.127	D1	mg/L		104	70 - 130
Selenium	ND	D1	0.100	0.130	D1	mg/L		129	70 - 130
Thallium	0.00054	D1	0.100	0.0907	D1	mg/L		90	70 - 130

Lab Sample ID: 550-99692- Matrix: Water	1 MSD					Clien	t Sam	ple ID:	FC-CCR-I		
Analysis Batch: 142908			• "						Prep Ba	•	2370
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	ND	D1	0.100	0.0995	D1	ma/l		99	70 130		20

TestAmerica Phoenix

Page 17 of 28

Client: Arizona Public Service Company

Project/Site: CCR

Hg

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

Lab Sample ID: 550-99692- Matrix: Water	1 MSD					Clien	t Sam	ple ID:	FC-CCR-I		
Analysis Batch: 142908	Sample	Sample	Spike	MSD	MSD				Prep Ba %Rec.		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Arsenic	0.0050	D1	0.100	0.118	D1	mg/L		113	70 - 130	4	20
Barium	0.020	D1	0.100	0.121	D1	mg/L		101	70 - 130	2	20
Cadmium	ND	D1	0.100	0.0950	D1	mg/L		95	70 - 130	2	20
Chromium	ND	D1	0.100	0.104	D1	mg/L		104	70 - 130	1	20
Cobalt	0.0085	D1	0.100	0.106	D1	mg/L		98	70 - 130	2	20
Lead	ND	D1	0.100	0.0900	D1	mg/L		90	70 - 130	1	20
Molybdenum	0.022	D1	0.100	0.127	D1	mg/L		105	70 - 130	1	20
Selenium	ND	D1	0.100	0.130	D1	mg/L		128	70 - 130	0	20
Thallium	0.00054	D1	0.100	0.0916	D1	mg/L		91	70 - 130	1	20

Method: 245.1 - Mercury (CVAA)

Lab Sample ID: MB 550-142 Matrix: Water Analysis Batch: 142779	2716/1-A						ole ID: Metho Prep Type: T Prep Batch:	otal/NA
	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

0.00020

mg/L

ND

Lab Sample ID: LCS 550-142716/2-A				Clie	nt Sai	mple ID	: Lab Control Sample
Matrix: Water							Prep Type: Total/NA
Analysis Batch: 142779							<b>Prep Batch: 142716</b>
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Hg	0.0100	0.0102		mg/L		102	85 <sub>-</sub> 115

Lab Sample ID: LCSD 550-142716/3-A Matrix: Water			C	Client S	Sample	ID: Lat	Control Prep Ty		•
Analysis Batch: 142779							Prep Ba	•	
•	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	0.0100	0.0104		mg/L		104	85 - 115	2	20

Lab Sample ID: 550-99692-	1 MS					Clien	t Sam	ple ID:	FC-CCR-M	W66-31618
Matrix: Water									Prep Typ	e: Total/NA
Analysis Batch: 142779									Prep Bat	tch: 142716
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Hg	ND		0.0100	0.00710		mg/L		71	70 - 130	

Lab Sample ID: 550-99692-	·1 MSD					Client	Sam	ple ID:	FC-CCR-N	MW66-3	31618
Matrix: Water									Prep Typ	pe: Tota	al/NA
Analysis Batch: 142779									Prep Ba	itch: 14	2716
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Hg	ND		0.0100	0.00743		mg/L		74	70 - 130	4	20

TestAmerica Phoenix

Page 18 of 28

03/23/18 16:39 03/24/18 21:59

3/28/2018

Client: Arizona Public Service Company Project/Site: CCR

HPLC/IC

Analysis Batch: 142194

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	300.0	_
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	300.0	
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	300.0	
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	300.0	
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	300.0	
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	300.0	
MB 550-142194/2	Method Blank	Total/NA	Water	300.0	
LCS 550-142194/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-142194/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	300.0	
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	300.0	

**Analysis Batch: 142283** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	300.0	
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	300.0	
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	300.0	
MB 550-142283/2	Method Blank	Total/NA	Water	300.0	
LCS 550-142283/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-142283/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-99663-A-5 MS	Matrix Spike	Total/NA	Water	300.0	
550-99663-A-5 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

Metals

**Prep Batch: 142358** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	200.7	
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	200.7	
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	200.7	
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	200.7	
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	200.7	
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	200.7	
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	200.7	
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	200.7	
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	200.7	
MB 550-142358/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-142358/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-142358/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	200.7	
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	200.7	

Prep Batch: 142370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	200.8	
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	200.8	
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	200.8	
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	200.8	
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	200.8	
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	200.8	

TestAmerica Phoenix

Page 19 of 28 3/28/2018

Client: Arizona Public Service Company Project/Site: CCR

# **Metals (Continued)**

#### Prep Batch: 142370 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	200.8	
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	200.8	
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	200.8	
MB 550-142370/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-142370/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-142370/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	200.8	
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	200.8	

### **Analysis Batch: 142510**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	200.7 Rev 4.4	142358
MB 550-142358/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	142358
LCS 550-142358/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	142358
LCSD 550-142358/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	200.7 Rev 4.4	142358

## **Analysis Batch: 142638**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	200.7 Rev 4.4	142358
MB 550-142358/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	142358
LCS 550-142358/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	142358
LCSD 550-142358/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	200.7 Rev 4.4	142358
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	200.7 Rev 4.4	142358

### **Prep Batch: 142716**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	245.1	
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	245.1	
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	245.1	
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	245.1	
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	245.1	
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	245.1	
550-99692-3 550-99692-4 550-99692-5	FC-CCR-MW68-31618 FC-CCR-MW69-31618 FC-CCR-MW70-31618	Total/NA Total/NA Total/NA	Water Water Water	245.1 245.1 245.1	

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Client: Arizona Public Service Company

Project/Site: CCR

# **Metals (Continued)**

#### Prep Batch: 142716 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	245.1	
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	245.1	
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	245.1	
MB 550-142716/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-142716/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-142716/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	245.1	
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	245.1	

## **Analysis Batch: 142779**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	245.1	142716
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	245.1	142716
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	245.1	142716
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	245.1	142716
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	245.1	142716
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	245.1	142716
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	245.1	142716
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	245.1	142716
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	245.1	142716
MB 550-142716/1-A	Method Blank	Total/NA	Water	245.1	142716
LCS 550-142716/2-A	Lab Control Sample	Total/NA	Water	245.1	142716
LCSD 550-142716/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	142716
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	245.1	142716
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	245.1	142716

## **Analysis Batch: 142908**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	200.8 LL	142370
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	200.8 LL	142370
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	200.8 LL	142370
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	200.8 LL	142370
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	200.8 LL	142370
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	200.8 LL	142370
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	200.8 LL	142370
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	200.8 LL	142370
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	200.8 LL	142370
550-99692-1 MS	FC-CCR-MW66-31618	Total/NA	Water	200.8 LL	142370
550-99692-1 MSD	FC-CCR-MW66-31618	Total/NA	Water	200.8 LL	142370

#### **Analysis Batch: 142932**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-142370/1-A	Method Blank	Total/NA	Water	200.8 LL	142370
LCS 550-142370/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	142370
LCSD 550-142370/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	142370

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Page 21 of 28

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-31618 Lab Sample ID: 550-99692-1

Date Collected: 03/16/18 12:52 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			142194	03/19/18 15:51	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 03:27	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 00:50	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 18:34	TEK	TAL PHX
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142779	03/24/18 22:06	EXZ	TAL PHX

Client Sample ID: FC-CCR-MW67-31618

Lab Sample ID: 550-99692-2 Date Collected: 03/16/18 16:53 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			142194	03/19/18 16:46	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 03:33	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 00:56	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 18:41	TEK	TAL PHX
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142779	03/24/18 22:08	EXZ	TAL PHX

Client Sample ID: FC-CCR-MW68-31618 Lab Sample ID: 550-99692-3

Date Collected: 03/16/18 16:20 **Matrix: Water** 

Date Received: 03/19/18 06:55

Prep Type Total/NA	Batch Type Analysis	Batch Method 300.0	Run	Dilution Factor 10	Batch Number 142194	Prepared or Analyzed 03/19/18 17:04	Analyst NBL	Lab TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1		03/21/18 05:52 03/22/18 03:39		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1		03/21/18 05:52 03/23/18 01:02		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.8 200.8 LL		4		03/21/18 09:00 03/26/18 18:44		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	245.1 245.1		1	142716 142779	03/23/18 16:39 03/24/18 22:09		TAL PHX TAL PHX

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Page 22 of 28

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW69-31618

Lab Sample ID: 550-99692-4 Date Collected: 03/16/18 15:45

Matrix: Water

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	142283	03/20/18 20:32	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 03:45	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 01:08	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 18:46	TEK	TAL PHX
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142779	03/24/18 22:11	EXZ	TAL PHX

Lab Sample ID: 550-99692-5 Client Sample ID: FC-CCR-MW70-31618

Date Collected: 03/16/18 13:41 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		4	142283	03/20/18 20:50	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 03:51	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 01:14	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 18:48	TEK	TAL PHX
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142779	03/24/18 22:16	EXZ	TAL PHX

Lab Sample ID: 550-99692-6 Client Sample ID: FC-CCR-MW71-31618

Date Collected: 03/16/18 17:40 **Matrix: Water** Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	142194	03/19/18 19:13	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 03:57	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 01:20	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 18:51	TEK	TAL PH
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PH
Total/NA	Analysis	245.1		1	142779	03/24/18 22:13	EXZ	TAL PH

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW72-31618

Lab Sample ID: 550-99692-7 Date Collected: 03/16/18 14:33 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0	-	10	142194	03/19/18 19:31	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 04:03	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 01:26	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 18:57	TEK	TAL PHX
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142779	03/24/18 22:14	EXZ	TAL PHX

Lab Sample ID: 550-99692-8 Client Sample ID: FC-CCR-MW73-31618

Date Collected: 03/16/18 18:18 **Matrix: Water** 

Date Received: 03/19/18 06:55

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	142194	03/19/18 19:50	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 04:09	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 01:32	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 19:00	TEK	TAL PHX
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142779	03/24/18 22:17	EXZ	TAL PHX

Lab Sample ID: 550-99692-9 Client Sample ID: FC-CCR-FD01-31618

Date Collected: 03/16/18 12:52 Date Received: 03/19/18 06:55

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		10	142283	03/20/18 21:09	NBL	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142510	03/22/18 04:14	ARE	TAL PHX
Total/NA	Prep	200.7			142358	03/21/18 05:52	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	142638	03/23/18 01:37	ARE	TAL PHX
Total/NA	Prep	200.8			142370	03/21/18 09:00	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		4	142908	03/26/18 19:02	TEK	TAL PHX
Total/NA	Prep	245.1			142716	03/23/18 16:39	EXZ	TAL PHX
Total/NA	Analysis	245.1		1	142779	03/24/18 22:19	EXZ	TAL PHX

**Laboratory References:** 

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

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Page 24 of 28

**Matrix: Water** 

# **Accreditation/Certification Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

# **Laboratory: TestAmerica Phoenix**

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

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
Arizona	State Program	9	AZ0728	06-09-18

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# **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-1

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

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TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3

Phoenix, AZ 85040

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THE LEADER IN ENVIRONMENTAL TESTING	TestAmerica	

# Chain of Custody Record 99 692

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Client Contact	Project Manager: Doug Lavarnway	anager: Do	ug Lavarı	nway	Site	Ç0	tact	Site Contact: Doug Lavarnway	g La	varn	way				3/18	/2018	CO	3/18/2018 COC No.					
NPS Four Corners	Tel/Fax: 928-587-0319	-587-0319			Lat	0	ntact	Lab Contact: Ken Baker	Bak	er		Carrier:	. <del></del>				П		of		COCs		
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FC-CCR-MW69-31618 4	3/16/2018	1545	G	W 4	Z	×	×	•	×	x :	x												
FC-CCR-MW70-31618	3/16/2018	1341	G	W 4	Z	x	×		×	x ;	x			_									
FC-CCR-MW71-31618 ( <sub>Q</sub>	3/16/2018	1740	G	W 4	z	×	×		×	x :	х		_			<b>-</b>			<del></del>				
FC-CCR-MW72-31618	3/16/2018	1433	G	W 4	z	×	^ ×		×	×	×												
FC-CCR-MW73-31618	3/16/2018	1818	ဂ	W 4	Z	×	×		×	×	×												
FC-CCR-FD01-31618	3/16/18	1252	G	W 4	Z	×	^ ×		×	×	×		550-99	550-99692 Chain of Custody	ain of (	Custo	)dy		=	1			
																+	<u> </u>						
reservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6=	3; 5=NaOH; 6	= Other																					
Skin Irritani		Postan B	Unknown			Sam	<b>و</b> ريٍ	<b>le Disposal ( A f</b> Return To Client	osal To C	lient	ee may be	assessed if san	i <b>f samp</b> 3∨ Lab	les are	retained long	ive F	or or	r than	1 mon	onth) Months			-
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# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-99692-1

Login Number: 99692 List Source: TestAmerica Phoenix

List Number: 1

Creator: Vilaboy, Monica

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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: 550-99692-2

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 4/23/2018 3:05:11 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

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Total Access

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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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Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	7
Tracer Carrier Summary	12
QC Sample Results	13
QC Association Summary	16
Lab Chronicle	17
Certification Summary	20
Method Summary	21
Chain of Custody	22
Receipt Checklists	24

# **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-2

# Qualifiers

#### Rad

TEF

TEQ

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.
X	Carrier is outside acceptance limits.

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

TestAmerica Phoenix

4/23/2018

Page 3 of 25

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-2

Job ID: 550-99692-2

Laboratory: TestAmerica Phoenix

Narrative

Job Narrative 550-99692-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 3/19/2018 6:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.5° C, 2.8° C and 3.8° C.

#### RAD

Method(s) 903.0: Radium-226 Prep Batch 160-357667:

The following samples have barium carrier recoveries above the 110% QC limit; (550-99692-5: 114%, and 550-99692-9: 114%). A native barium correction was applied, however, there could be other salt-like compounds present in the samples that can interfere with the barium sulfate recovery (see prep NCM 136002). The LCS (laboratory control sample) has an acceptable spike recovery demonstrating acceptable sample preparation and instrument performance. The samples have been truncated to 100% to reduce any potential bias a high carrier recovery may have. The data have been reported with this narrative.

FC-CCR-MW70-31618 (550-99692-5) and FC-CCR-FD01-31618 (550-99692-9)

Method(s) 904.0: Radium-228 Prep Batch 160-357670:

The following samples have barium carrier recoveries above the 110% QC limit; (550-99692-5: 114%, and 550-99692-9: 114%). A native barium correction was applied, however, there could be other salt-like compounds present in the samples that can interfere with the barium sulfate recovery (see prep NCM 136001). The LCS (laboratory control sample) has an acceptable spike recovery demonstrating acceptable sample preparation and instrument performance. The samples have been truncated to 100% to reduce any potential bias a high carrier recovery may have. The data have been reported with this narrative.

FC-CCR-MW70-31618 (550-99692-5) and FC-CCR-FD01-31618 (550-99692-9)

Method(s) PrecSep\_0: Radium-228 Prep Batch 160-357670:

The barium carrier recovery is outside the <> upper control limit (110%) for the following samples: FC-CCR-MW70-31618 (550-99692-5) and FC-CCR-FD01-31618 (550-99692-9). The QC samples associated with the batch have acceptable carrier recovery indicating the presence of matrix interference. The pellets were noted as larger during the out of ingrowth process.

Method(s) PrecSep-21: Radium-226 Prep Batch 160-357667:

The barium carrier recovery is outside the <> upper control limit (110%) for the following samples: FC-CCR-MW70-31618 (550-99692-5) and FC-CCR-FD01-31618 (550-99692-9). The QC samples associated with the batch have acceptable carrier recovery indicating the presence of matrix interference. The pellets were noted as larger during the out of ingrowth process.

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

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TestAmerica Phoenix 4/23/2018

# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99692-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-99692-1	FC-CCR-MW66-31618	Water	03/16/18 12:52	03/19/18 06:55
550-99692-2	FC-CCR-MW67-31618	Water	03/16/18 16:53	03/19/18 06:55
550-99692-3	FC-CCR-MW68-31618	Water	03/16/18 16:20	03/19/18 06:55
550-99692-4	FC-CCR-MW69-31618	Water	03/16/18 15:45	03/19/18 06:55
550-99692-5	FC-CCR-MW70-31618	Water	03/16/18 13:41	03/19/18 06:55
550-99692-6	FC-CCR-MW71-31618	Water	03/16/18 17:40	03/19/18 06:55
550-99692-7	FC-CCR-MW72-31618	Water	03/16/18 14:33	03/19/18 06:55
550-99692-8	FC-CCR-MW73-31618	Water	03/16/18 18:18	03/19/18 06:55
550-99692-9	FC-CCR-FD01-31618	Water	03/16/18 12:52	03/19/18 06:55

# **Detection Summary**

Client: Arizona Public Service Company Project/Site: CCR	TestAmerica Job ID: 550-99692-2
Client Sample ID: FC-CCR-MW66-31618	Lab Sample ID: 550-99692-1
No Detections.	
Client Sample ID: FC-CCR-MW67-31618	Lab Sample ID: 550-99692-2
No Detections.	
Client Sample ID: FC-CCR-MW68-31618	Lab Sample ID: 550-99692-3
No Detections.	
Client Sample ID: FC-CCR-MW69-31618	Lab Sample ID: 550-99692-4
No Detections.	
Client Sample ID: FC-CCR-MW70-31618	Lab Sample ID: 550-99692-5
No Detections.	
Client Sample ID: FC-CCR-MW71-31618	Lab Sample ID: 550-99692-6
No Detections.	
Client Sample ID: FC-CCR-MW72-31618	Lab Sample ID: 550-99692-7
No Detections.	
Client Sample ID: FC-CCR-MW73-31618	Lab Sample ID: 550-99692-8
No Detections.	
Client Sample ID: FC-CCR-FD01-31618	Lab Sample ID: 550-99692-9
No Detections.	

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-31618

Date Collected: 03/16/18 12:52 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99692-1

Matrix: Water

Method: 903.0 -	Radium-226	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.26		0.171	0.205	1.00	0.0602	pCi/L	03/26/18 13:00	04/17/18 05:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110					03/26/18 13:00	04/17/18 05:59	1

Method: 904.0 -	Radium-228	(GFPC)	Count	Total						
Analyte	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.59		0.285	0.321	1.00	0.294	pCi/L	03/26/18 13:36	04/03/18 14:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110					03/26/18 13:36	04/03/18 14:53	1
Y Carrier	92.7		40 - 110					03/26/18 13:36	04/03/18 14:53	1

Method: Ra226_Ra2	228 Pos -	Combine	d Radium-2	226 and Ra	adium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	2.86		0.332	0.381	5.00	0.294	pCi/L		04/18/18 12:22	1

Client Sample ID: FC-CCR-MW67-31618

Lab Sample ID: 550-99692-2

Date Collected: 03/16/18 16:53

Matrix: Water

Date Received: 03/19/18 06:55

	Radium-226	(GFPC)								
		` ,	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.586		0.125	0.136	1.00	0.0870	pCi/L	03/26/18 13:00	04/17/18 05:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/26/18 13:00	04/17/18 05:59	1

Method: 904.0 - I	Radium-228	(GFPC)	Count	Total						
Analyte	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.50		0.290	0.321	1.00	0.312	pCi/L	03/26/18 13:36	04/03/18 14:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110					03/26/18 13:36	04/03/18 14:53	1
Y Carrier	92.3		40 - 110					03/26/18 13:36	04/03/18 14:53	1

Method: Ra226_Ra2	228 Pos -	Combined	d Radium-2	226 and Ra	dium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	2.08		0.316	0.349	5.00	0.312	pCi/L		04/18/18 12:22	1

TestAmerica Phoenix

Page 7 of 25

4/23/2018

Project/Site: CCR

Client Sample ID: FC-CCR-MW68-31618

Date Collected: 03/16/18 16:20 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99692-3

Matrix: Water

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.403		0.106	0.112	1.00	0.0806	pCi/L	03/26/18 13:00	04/17/18 05:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier			40 - 110					03/26/18 13:00	04/17/18 05:59	1

Method: 904.0 - I	Radium-228	(GFPC)								
Analyte	Pocult	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Allalyte		Qualifier								Diriac
Radium-228	1.17		0.286	0.306	1.00	0.347	pCi/L	03/26/18 13:36	04/03/18 14:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110					03/26/18 13:36	04/03/18 14:53	1
Y Carrier	90.1		40 - 110					03/26/18 13:36	04/03/18 14:53	1

Method: Ra226_Ra	228 Pos -	Combine	d Radium-2	226 and Ra	adium-228	3				
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	1.57		0.305	0.326	5.00	0.347	pCi/L		04/18/18 12:22	1

Client Sample ID: FC-CCR-MW69-31618

Lab Sample ID: 550-99692-4

Matrix: Water

Date Received: 03/19/18 06:55

Method: 903.0 -	Radium-226	(GFPC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.35		0.181	0.218	1.00	0.0811	pCi/L	03/26/18 13:00	04/17/18 05:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110					03/26/18 13:00	04/17/18 05:59	1

Method: 904.0 - I	Radium-228	(GFPC)								
Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.82		0.352	0.437	1.00	0.277	pCi/L	03/26/18 13:36	04/03/18 14:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110					03/26/18 13:36	04/03/18 14:53	1
Y Carrier	90.1		40 - 110					03/26/18 13:36	04/03/18 14:53	1

Method: Ra226_Ra	228 Pos -	Combine	d Radium-2	26 and Ra	dium-228	3				
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	4.18		0.396	0.488	5.00	0.277	pCi/L		04/18/18 12:22	1

TestAmerica Phoenix

Page 8 of 25

4/23/2018

Project/Site: CCR

Client Sample ID: FC-CCR-MW70-31618

Date Collected: 03/16/18 13:41 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99692-5

Matrix: Water

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.455		0.117	0.124	1.00	0.0931	pCi/L	03/26/18 13:00	04/17/18 05:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	114	X	40 - 110					03/26/18 13:00	04/17/18 05:59	1

Method: 904.0 -	Radium-228	(GFPC)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.45		0.265	0.297	1.00	0.271	pCi/L	03/26/18 13:36	04/03/18 14:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	114	X	40 - 110					03/26/18 13:36	04/03/18 14:53	1
Y Carrier	92.7		40 - 110					03/26/18 13:36	04/03/18 14:53	1

Method: Ra226_Ra	228 Pos -	Combine	d Radium-2	226 and Ra	adium-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	2.10		0.323	0.359	5.00	0.308	pCi/L		04/18/18 12:22	1

Client Sample ID: FC-CCR-MW71-31618

Lab Sample ID: 550-99692-6

Matrix: Water

Date Received: 03/19/18 06:55

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Radium-226	0.493		0.108	0.117	1.00	0.0581	pCi/L	03/26/18 13:00	04/17/18 05:59	-
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	109		40 - 110					03/26/18 13:00	04/17/18 05:59	-

Method: 904.0 - I	Radium-228	(GFPC)	Count	Total						
Analyte	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.688		0.230	0.238	1.00	0.304			04/03/18 14:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	109		40 - 110					03/26/18 13:36	04/03/18 14:54	1
Y Carrier	90.5		40 - 110					03/26/18 13:36	04/03/18 14:54	1

Method: Ra226_Ra2	228 Pos -	Combine	d Radium-2	226 and Ra	dium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	1.18		0.254	0.265	5.00	0.304	pCi/L	<del></del> , .	04/18/18 12:22	1

TestAmerica Phoenix

Page 9 of 25

4/23/2018

Project/Site: CCR

Client Sample ID: FC-CCR-MW72-31618

Date Collected: 03/16/18 14:33 Date Received: 03/19/18 06:55 Lab Sample ID: 550-99692-7

Matrix: Water

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.602		0.122	0.134	1.00	0.0723	pCi/L	03/26/18 13:00	04/17/18 05:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	106		40 - 110					03/26/18 13:00	04/17/18 05:59	1

Method: 904.0 -		(011 0)	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.27		0.339	0.398	1.00	0.326	pCi/L	03/26/18 13:36	04/03/18 14:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	106		40 - 110					03/26/18 13:36	04/03/18 14:54	1
Y Carrier	93.5		40 - 110					03/26/18 13:36	04/03/18 14:54	1

Method: Ra226_Ra	228 Pos -	Combined	d Radium-2	226 and Ra	dium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	2.87	-	0.360	0.420	5.00	0.326	pCi/L		04/18/18 12:22	1

Client Sample ID: FC-CCR-MW73-31618

Date Collected: 03/16/18 18:18

Lab Sample ID: 550-99692-8

Matrix: Water

Date Received: 03/19/18 06:55

Method: 903.0 -	Radium-226	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.739		0.134	0.149	1.00	0.0656	pCi/L	03/26/18 13:00	04/17/18 06:00	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier			40 - 110					03/26/18 13:00	04/17/18 06:00	

Method: 904.0 - R	Radium-228	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.32		0.345	0.405	1.00	0.338	pCi/L	03/26/18 13:36	04/03/18 14:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	106		40 - 110					03/26/18 13:36	04/03/18 14:54	1
Y Carrier	92.7		40 - 110					03/26/18 13:36	04/03/18 14:54	1

Method: Ra226_Ra228 Pos - Combined Radium-226 and Radium-228											
			Count	Total							
			Uncert.	Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac	
Radium 226 and 228	3.06		0.370	0.432	5.00	0.338	pCi/L		04/18/18 12:22	1	

TestAmerica Phoenix

# **Client Sample Results**

Client: Arizona Public Service Company

Date Collected: 03/16/18 12:52

Date Received: 03/19/18 06:55

Project/Site: CCR

TestAmerica Job ID: 550-99692-2

Lab Sample ID: 550-99692-9

Client Sample ID: FC-CCR-FD01-31618

**Matrix: Water** 

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analvzed	Dil Fac
Radium-226	1.42		0.190	0.229	1.00	0.0704			04/17/18 06:00	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	114	X	40 - 110					03/26/18 13:00	04/17/18 06:00	1

Method: 904.0 -	Radium-228	(GFPC)								
		` ,	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.23		0.317	0.377	1.00	0.291	pCi/L	03/26/18 13:36	04/03/18 14:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	114	X	40 - 110					03/26/18 13:36	04/03/18 14:54	1
Y Carrier	92.3		40 - 110					03/26/18 13:36	04/03/18 14:54	1

Method: Ra226_Ra2	228 Pos -	Combine	d Radium-2	226 and Ra	adium-228					
_			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	3.96		0.409	0.488	5.00	0.332	pCi/L		04/18/18 12:22	1

TestAmerica Job ID: 550-99692-2

Client: Arizona Public Service Company

Project/Site: CCR

Method: 903.0 - Radium-226 (GFPC)

**Matrix: Water** Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ba Carrier	
Lab Sample ID	Client Sample ID	(40-110)	
440-206741-A-1-B MSD	Matrix Spike Duplicate	92.9	
460-152183-F-1-M DU	Duplicate	98.5	
460-152183-J-1-A MS	Matrix Spike	98.8	
550-99692-1	FC-CCR-MW66-31618	109	
550-99692-2	FC-CCR-MW67-31618	104	
550-99692-3	FC-CCR-MW68-31618	103	
550-99692-4	FC-CCR-MW69-31618	109	
550-99692-5	FC-CCR-MW70-31618	114 X	
550-99692-6	FC-CCR-MW71-31618	109	
550-99692-7	FC-CCR-MW72-31618	106	
550-99692-8	FC-CCR-MW73-31618	106	
550-99692-9	FC-CCR-FD01-31618	114 X	
LCS 160-357667/1-A	Lab Control Sample	98.8	
	Method Blank	109	

Method: 904.0 - Radium-228 (GFPC)

Prep Type: Total/NA **Matrix: Water** 

				Percent Yield (Acceptance Limits)
		Ba Carrier	Y Carrier	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
440-206741-A-1-D MSD	Matrix Spike Duplicate	92.9	87.5	
460-152183-F-1-N DU	Duplicate	98.5	90.5	
460-152183-J-1-B MS	Matrix Spike	98.8	91.6	
550-99692-1	FC-CCR-MW66-31618	109	92.7	
550-99692-2	FC-CCR-MW67-31618	104	92.3	
550-99692-3	FC-CCR-MW68-31618	103	90.1	
550-99692-4	FC-CCR-MW69-31618	109	90.1	
550-99692-5	FC-CCR-MW70-31618	114 X	92.7	
550-99692-6	FC-CCR-MW71-31618	109	90.5	
550-99692-7	FC-CCR-MW72-31618	106	93.5	
550-99692-8	FC-CCR-MW73-31618	106	92.7	
550-99692-9	FC-CCR-FD01-31618	114 X	92.3	
LCS 160-357670/1-A	Lab Control Sample	98.8	89.3	
MB 160-357670/19-A	Method Blank	109	89.3	

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

TestAmerica Job ID: 550-99692-2

Client Sample ID: Method Blank

Client: Arizona Public Service Company

Project/Site: CCR

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-357667/19-A

**Matrix: Water** 

**Matrix: Water** 

**Analysis Batch: 361426** 

Cheft Sample ID. Method Diank
Prep Type: Total/NA
Drop Ratch: 257667

Prep Batch: 35/66/

	MB	MB	Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.007862	U	0.0388	0.0388	1.00	0.0769 pCi/L	03/26/18 13:00	04/17/18 06:00	1

Total

Count

MB MB

**%Yield Qualifier** Carrier Limits 40 - 110 Ba Carrier 109

**Client Sample ID: Lab Control Sample** 

03/26/18 13:00 04/17/18 06:00

Prepared

Prep Type: Total/NA

**Prep Batch: 357667** 

Analyzed

Analysis Batch: 361425 Total Spike LCS LCS %Rec. Uncert. Analyte Added Result Qual  $(2\sigma + / -)$ RL**MDC** Unit %Rec Limits Radium-226 11.8 11.57 1.17 1.00 0.0731 pCi/L 98 68 - 137

LCS LCS

Lab Sample ID: LCS 160-357667/1-A

Carrier %Yield Qualifier Limits Ba Carrier 98.8 40 - 110

Lab Sample ID: 440-206741-A-1-B MSD **Client Sample ID: Matrix Spike Duplicate** 

**Matrix: Water** 

**Analysis Batch: 361425** 

Prep Type: Total/NA

**Prep Batch: 357667** 

Sample Sample Spike MSD MSD Uncert. %Rec. **RER** Analyte Result Qual Added Result Qual  $(2\sigma + / -)$ RL **MDC** Unit %Rec Limits RER Limit Radium-226 0.0263 U 1.00 75 - 138 11.8 1.05 0.0737 pCi/L 85 0.05 10.10

Total

Total

MSD MSD

Carrier %Yield Qualifier Limits Ba Carrier 92.9 40 - 110

Lab Sample ID: 460-152183-J-1-A MS

**Matrix: Water** 

**Analysis Batch: 361426** 

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

**Prep Batch: 357667** 

Sample Sample Spike MS MS Uncert. %Rec. %Rec Result Qual Added  $(2\sigma + / -)$ RL Analyte Result Qual **MDC** Unit Limits 0.0469 U Radium-226 11.8 10.03 1.03 1.00 0.0743 pCi/L 85 75 - 138

MS MS

Carrier %Yield Qualifier Limits 98.8 Ba Carrier 40 - 110

Lab Sample ID: 460-152183-F-1-M DU **Client Sample ID: Duplicate** 

**Matrix: Water** 

**Analysis Batch: 361425** 

Prep Type: Total/NA **Prep Batch: 357667** Total

Sample Sample DU DU Uncert. **RER** Analyte Result Qual Result Qual  $(2\sigma + / -)$ RL **MDC** Unit RER Limit Radium-226 0.0469 U 0.04038 U 0.0486 1.00 0.0789 pCi/L 0.06

TestAmerica Phoenix

Page 13 of 25

Dil Fac

Client: Arizona Public Service Company

Project/Site: CCR

#### Method: 903.0 - Radium-226 (GFPC) (Continued)

Lab Sample ID: 460-152183-F-1-M DU

**Matrix: Water** 

**Analysis Batch: 361425** 

DU DU

Carrier %Yield Qualifier Limits Ba Carrier 40 - 110 98.5

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

**Prep Batch: 357667** 

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-357670/19-A

**Matrix: Water** 

**Analysis Batch: 358655** 

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

Prep Batch: 357670

Count Total MB MB Uncert. Uncert.

Analyte Result Qualifier  $(2\sigma + / -)$  $(2\sigma + / -)$ Radium-228 0.2098

Ū 0.207 0.206

Spike

Added

40 - 110

8.43

RL 1.00

**MDC** Unit 0.334 pCi/L

Prepared 03/26/18 13:36 04/03/18 14:54

Analyzed

Analyzed

Dil Fac

Dil Fac

ΜB ΜB Carrier %Yield Qualifier Limits Prepared

LCS LCS

Result Qual

7.164

Ba Carrier 109 40 - 110 Y Carrier 89.3 40 - 110

03/26/18 13:36 04/03/18 14:54

**Client Sample ID: Lab Control Sample** 

03/26/18 13:36 04/03/18 14:54

Prep Type: Total/NA

**Prep Batch: 357670** 

Lab Sample ID: LCS 160-357670/1-A **Matrix: Water** 

Analyte

Radium-228

Y Carrier

Analysis Batch: 358655

Total

Uncert.  $(2\sigma + / -)$ 

0.866

RL

1.00

MDC Unit 0.319 pCi/L %Rec 85

%Rec. Limits

56 - 140

LCS LCS %Yield Qualifier Carrier I imits Ba Carrier 98.8 40 - 110

Lab Sample ID: 440-206741-A-1-D MSD

89.3

**Matrix: Water** 

**Analysis Batch: 358655** 

**Client Sample ID: Matrix Spike Duplicate** 

Prep Type: Total/NA

**Prep Batch: 357670** 

Total Sample Sample Spike MSD MSD Uncert. %Rec. **RER** RL Limit Analyte Result Qual Added Result Qual  $(2\sigma + / -)$ **MDC** Unit %Rec Limits RER 0.00415 U Radium-228 8.43 8.755 1.03 1.00 0.352 pCi/L 104 45 - 150 1.01

MSD MSD

Carrier %Yield Qualifier Limits Ba Carrier 92.9 40 - 110

87.5 40 - 110 Y Carrier

Lab Sample ID: 460-152183-J-1-B MS

**Matrix: Water** 

Analysis Batch: 358655

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

**Prep Batch: 357670** 

Total Sample Sample Spike MS MS Uncert. %Rec. Analyte Result Qual Added Result Qual  $(2\sigma + / -)$ RL **MDC** Unit %Rec Limits Radium-228 0.184 U 8.42 0.896 1.00 45 - 150 7.468 0.357 pCi/L 86

TestAmerica Phoenix

# **QC Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

	MS	MS	
Carrier	%Yield	Qualifier	Limits
Ba Carrier	98.8		40 - 110
Y Carrier	91.6		40 - 110

Lab Sample ID: 460-152183-F-1-N DU

**Matrix: Water** 

Analysis Batch: 358655

Client Sample ID: Duplicate

TestAmerica Job ID: 550-99692-2

Prep Type: Total/NA Prep Batch: 357670

					Total						
	Sample	Sample	DU	DU	Uncert.						RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Radium-228	0.184	U	0.08239	U	0.205	1.00	0.353	pCi/L		0.26	1

 Carrier
 %Yield Plant
 Qualifier Plant
 Limits Plant

 Ba Carrier
 98.5
 40 - 110

 Y Carrier
 90.5
 40 - 110

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# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-2

#### Rad

**Prep Batch: 357667** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	PrecSep-21	
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	PrecSep-21	
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	PrecSep-21	
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	PrecSep-21	
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	PrecSep-21	
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	PrecSep-21	
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	PrecSep-21	
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	PrecSep-21	
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	PrecSep-21	
MB 160-357667/19-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-357667/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
440-206741-A-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	PrecSep-21	
460-152183-J-1-A MS	Matrix Spike	Total/NA	Water	PrecSep-21	
460-152183-F-1-M DU	Duplicate	Total/NA	Water	PrecSep-21	

#### **Prep Batch: 357670**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-99692-1	FC-CCR-MW66-31618	Total/NA	Water	PrecSep_0	
550-99692-2	FC-CCR-MW67-31618	Total/NA	Water	PrecSep_0	
550-99692-3	FC-CCR-MW68-31618	Total/NA	Water	PrecSep_0	
550-99692-4	FC-CCR-MW69-31618	Total/NA	Water	PrecSep_0	
550-99692-5	FC-CCR-MW70-31618	Total/NA	Water	PrecSep_0	
550-99692-6	FC-CCR-MW71-31618	Total/NA	Water	PrecSep_0	
550-99692-7	FC-CCR-MW72-31618	Total/NA	Water	PrecSep_0	
550-99692-8	FC-CCR-MW73-31618	Total/NA	Water	PrecSep_0	
550-99692-9	FC-CCR-FD01-31618	Total/NA	Water	PrecSep_0	
MB 160-357670/19-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-357670/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
440-206741-A-1-D MSD	Matrix Spike Duplicate	Total/NA	Water	PrecSep_0	
460-152183-J-1-B MS	Matrix Spike	Total/NA	Water	PrecSep_0	
460-152183-F-1-N DU	Duplicate	Total/NA	Water	PrecSep 0	

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Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-31618 Lab Sample ID: 550-99692-1

Date Collected: 03/16/18 12:52 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 05:59	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:53	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Lab Sample ID: 550-99692-2 Client Sample ID: FC-CCR-MW67-31618

Date Collected: 03/16/18 16:53 **Matrix: Water** 

Date Received: 03/19/18 06:55

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 05:59	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:53	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-MW68-31618

Lab Sample ID: 550-99692-3 Date Collected: 03/16/18 16:20 **Matrix: Water** 

Date Received: 03/19/18 06:55

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 05:59	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:53	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-MW69-31618 Lab Sample ID: 550-99692-4

Date Collected: 03/16/18 15:45 Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 05:59	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:53	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

TestAmerica Phoenix

Page 17 of 25

**Matrix: Water** 

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW70-31618

Lab Sample ID: 550-99692-5 Date Collected: 03/16/18 13:41 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 05:59	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:53	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-MW71-31618

Lab Sample ID: 550-99692-6 Date Collected: 03/16/18 17:40

**Matrix: Water** 

Date Received: 03/19/18 06:55

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 05:59	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:54	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-MW72-31618

Lab Sample ID: 550-99692-7 Date Collected: 03/16/18 14:33

**Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21	_		357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 05:59	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:54	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Client Sample ID: FC-CCR-MW73-31618

Lab Sample ID: 550-99692-8 Date Collected: 03/16/18 18:18 **Matrix: Water** 

Date Received: 03/19/18 06:55

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 06:00	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:54	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

Page 18 of 25

#### **Lab Chronicle**

Client: Arizona Public Service Company

Date Collected: 03/16/18 12:52

Date Received: 03/19/18 06:55

Client Sample ID: FC-CCR-FD01-31618

Project/Site: CCR

TestAmerica Job ID: 550-99692-2

Lab Sample ID: 550-99692-9

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			357667	03/26/18 13:00	TJT	TAL SL
Total/NA	Analysis	903.0		1	361426	04/17/18 06:00	RTM	TAL SL
Total/NA	Prep	PrecSep_0			357670	03/26/18 13:36	TJT	TAL SL
Total/NA	Analysis	904.0		1	358655	04/03/18 14:54	RTM	TAL SL
Total/NA	Analysis	Ra226_Ra228 Pos		1	361565	04/18/18 12:22	RTM	TAL SL

#### **Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

## **Accreditation/Certification Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-2

#### **Laboratory: TestAmerica Phoenix**

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

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
Arizona	State Program	9	AZ0728	06-09-18

#### Laboratory: TestAmerica St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	<b>Expiration Date</b>
Alaska	State Program	10	MO00054	06-30-18 *
Arizona	State Program	9	AZ0813	12-08-18
California	State Program	9	2886	06-30-18 *
Connecticut	State Program	1	PH-0241	03-31-19
Florida	NELAP	4	E87689	06-30-18 *
Illinois	NELAP	5	200023	11-30-18
lowa	State Program	7	373	12-01-18
Kansas	NELAP	7	E-10236	10-31-18
Kentucky (DW)	State Program	4	90125	12-31-18
L-A-B	DoD ELAP		L2305	04-06-19
Louisiana	NELAP	6	04080	06-30-18
Louisiana (DW)	NELAP	6	LA180017	12-31-18
Maryland	State Program	3	310	09-30-18
Michigan	State Program	5	9005	06-30-18
Missouri	State Program	7	780	06-30-18
Nevada	State Program	9	MO000542018-1	07-31-18
New Jersey	NELAP	2	MO002	06-30-18 *
New York	NELAP	2	11616	03-31-19
North Dakota	State Program	8	R207	06-30-18
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-18
Pennsylvania	NELAP	3	68-00540	02-28-19
South Carolina	State Program	4	85002001	06-30-18
Texas	NELAP	6	T104704193-17-11	07-31-18
US Fish & Wildlife	Federal		058448	08-31-18
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542016-8	07-31-18
Virginia	NELAP	3	460230	06-14-18 *
Washington	State Program	10	C592	08-30-18
West Virginia DEP	State Program	3	381	08-31-18 *

TestAmerica Phoenix

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<sup>\*</sup> Accreditation/Certification renewal pending - accreditation/certification considered valid.

# **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-2

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228 Pos	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

#### **Protocol References:**

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

#### **Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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TestAmerica Phoenix 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

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bhone 602.437.3340 fax 623.445.6192																(			Te	stAn	neric	a La	bora	torie	TestAmerica Laboratories, Inc.	•
Client Contact	Project M	Project Manager: Doug Lavarnway	ug Lavarı	ıway	Site	Соп	tact	Dou	lg La	vari	Site Contact: Doug Lavarnway	_					3/18	/201	$\frac{8}{C}$	3/18/2018 COC No.	0					
APS Four Corners	Tel/Fax: 928-587-0319	8-587-0319			Lab	Cor	itact	Lab Contact: Ken Baker	Ba	er		C <sub>2</sub> 1	Carrier:						П	- <b> </b>	9			COCs	s	Ш
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Preservation Used: 1= lce, 2= HCl; 3= H2SO4; 4=HNO	4=HNO3; 5=NaOH; 6=	6= Other			Ш	lacksquare	<u> </u>		$\vdash$									-	Н							
Possible Hazard Identification  Non-Hazard Flammable Skin Irritant	tant	Polsari B	Unknown	nwo		⊓än	ام کود	le Disposal ( A f Return To Client	osa.	lien (A	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client  Return To Client  Archive For	assessed if san	sed if al By	sam, Lab	ples	are r	retained long	ive f	<b>် ၁၈</b>	er th	an 1	_ Mon	<b>onth)</b> Months	-		
Special Instructions/QC Requirements & Comments:	ents:																									
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Ver: 09/20/2016

Company

Chain of Custody Record

4625 East Cotton Ctr Blvd Suite 189 **TestAmerica Phoenix** 

**TestAmerica** 

O - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate V - MCAA W - pH 4-5 Z - other (specify) Special Instructions/Note: N - None O - AsNaO2 P - Na2O4S M - Hexane U - Acetone Preservation Codes G - Amchlor H - Ascorbic Acid C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH COC No. 550-20534.1 Page: Page 1 of 1 550-99692-1 I - Ice J - DI Water K - EDTA L - EDA A - HCL B - NaOH 2 N 2 N 7 2 2 Total Number of containers State of Origin Analysis Requested Arizona Accreditations Required (See note) ken baker@testamericainc.com State Program - Arizona × × × × × 904.0/PrecSep\_0 Radium-228 (GFPC) × × × × × × × 03.0/PrecSep\_21 Radium-226 (GFPC) Lab PM Baker, Ken Perform MS/MSD (Yes or No) Field Filtered Sample (Yes or No.) BT=Tissue, A"Air Water Water Water Matrix Preservation Code Water Water Water Water Sample (C=comp, G=grab) Type Arizona 13:41 Sample Arizona 16:53 Arizona 16:20 Arizona 15:45 Arizona 17:40 Arizona 14:33 Time TAT Requested (days): Due Date Requested: 3/28/2018 Sample Date 3/16/18 3/16/18 3/16/18 3/16/18 3/16/18 3/16/18 3/16/18 55009706 roject # #OM Phone: Client Information (Sub Contract Lab) Phone (602) 437-3340 Fax (602) 454-9303 Sample Identification - Client ID (Lab ID) 314-298-8566(Tel) 314-298-8757(Fax) FC-CCR-MW67-31618 (550-99692-2) FC-CCR-MW70-31618 (550-99692-5) FC-CCR-MW71-31618 (550-99692-6) FC-CCR-MW72-31618 (550-99692-7) FC-CCR-MW68-31618 (550-99692-3) FC-CCR-MW69-31618 (550-99692-4) FC-CCR-MW66-31618 (550-99692-1) TestAmerica Laboratories, Inc. APS - Four Comers CCR 13715 Rider Trail North Arizona Public Service Shipping/Receiving Client Contact City. Earth City MO, 63045 State, Zip.

currently maintain accreditation in the State of Origin listed above for analysis/fests/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 Chair of Custody attention to said complicance to TestAmerica Laboratories, inc. Months Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)

Return To Client Disposal By Lab Archive For Month Special Instructions/QC Requirements Return To Client Primary Deliverable Rank: 2 Deliverable Requested: I, II, III, IV, Other (specify) Possible Hazard Identification

tote: 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

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Water Water

Arizona 18:18

3/16/18

FC-CCR-MW73-31618 (550-99692-8)

FC-CCR-FD01-31618 (550-99692-9)

Arizona 12:52 Arizona Method of Shipment Cooler Temperature(s) "C and Other Remarks: Par Muchan Received by: Received by Company Date Jate/Time Custody Seal No.: Empty Kit Relinquished by Custody Seals Intact: A Yes A No nquished by: nquished by

# Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-99692-2

Login Number: 99692 List Source: TestAmerica Phoenix

List Number: 1

Creator: Vilaboy, Monica

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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Client: Arizona Public Service Company

Job Number: 550-99692-2

Login Number: 99692
List Source: TestAmerica St. Louis
List Number: 2
List Creation: 03/20/18 04:55 PM

Creator: Taylor, Kristene N

Creator: Taylor, Kristene N		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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	3.3,21.0
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?	False	
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").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



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: 550-99692-3

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Daken

Authorized for release by: 6/12/2018 1:13:25 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99692-3

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	
Sample Summary	5
Certification Summary	
Method Summary	7
Subcontract Data	
Chain of Custody	
Receipt Checklists	19

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## **Definitions/Glossary**

Client: Arizona Public Service Company

Method Detection Limit Minimum Level (Dioxin)

Practical Quantitation Limit

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)
Toxicity Equivalent Quotient (Dioxin)

Not Detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Not Calculated

**Quality Control** 

Project/Site: CCR

TestAmerica Job ID: 550-99692-3

# Glossary

MDL

ML NC

ND

**PQL** 

QC

RER

RL RPD

TEF

TEQ

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)

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TestAmerica Phoenix

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-3

Job ID: 550-99692-3

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-99692-3

#### Comments

No additional comments.

#### Receipt

The samples were received on 3/19/2018 6:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.5° C, 2.8° C and 3.8° C.

#### 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.

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# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-99692-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-99692-1	FC-CCR-MW66-31618	Water	03/16/18 12:52	03/19/18 06:55
550-99692-2	FC-CCR-MW67-31618	Water	03/16/18 16:53	03/19/18 06:55
550-99692-3	FC-CCR-MW68-31618	Water	03/16/18 16:20	03/19/18 06:55
550-99692-4	FC-CCR-MW69-31618	Water	03/16/18 15:45	03/19/18 06:55
550-99692-5	FC-CCR-MW70-31618	Water	03/16/18 13:41	03/19/18 06:55
550-99692-6	FC-CCR-MW71-31618	Water	03/16/18 17:40	03/19/18 06:55
550-99692-7	FC-CCR-MW72-31618	Water	03/16/18 14:33	03/19/18 06:55
550-99692-8	FC-CCR-MW73-31618	Water	03/16/18 18:18	03/19/18 06:55
550-99692-9	FC-CCR-FD01-31618	Water	03/16/18 12:52	03/19/18 06:55

# **Accreditation/Certification Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-99692-3

## **Laboratory: TestAmerica Phoenix**

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

Authority	Program	<b>EPA Region</b>	Identification Number	<b>Expiration Date</b>
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: 550-99692-3

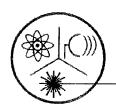
Method	Method Description	Protocol	Laboratory
Subcontract	Radium 226/228	None	Radiation

**Protocol References:** 

None = None

**Laboratory References:** 

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225



# 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: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW66-31618 (550-99692-1)	< 1.5	< 1.5	< 1.5

Date of Analysis	6/1/2018	6/1/2018	6/1/2018

Jeremy Russell, BSE

6/11/2018 Date

Laboratory License Number AZ0462

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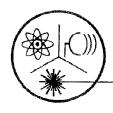
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Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW67-31618 (550-99692-2)	< 1.2	$0.9 \pm 0.1$	$0.9 \pm 0.1$

Date of Analysis	6/1/2018	6/1/2018	6/1/2018

Jeremy Russell, BSE

6/11/2018 Date

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: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW68-31618 (550-99692-3)	< 1.2	$1.0 \pm 0.1$	$1.0 \pm 0.1$

Date of Analysis	6/1/2018	6/1/2018	6/1/2018

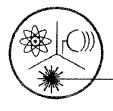
6/11/2018

Jeremy Russell, BSE

Date

(480) 897-9459

FAX (480) 892-5446



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. + CHANDLER, ARIZONA 85225-1121 Website: www.radsafe.com

Radiochemical Activity in Water (pCi/L)

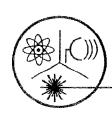
TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW69-31618 (550-99692-4)	1.6 ± 0.1	3.8 ± 0.1	5.4 ± 0.1

Date of Analysis	6/1/2018	6/1/2018	6/1/2018

6/11/2018 Jeremy Russell, BSE Date



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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: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW70-31618 (550-99692-5)	< 1.1	$2.6 \pm 0.1$	$2.6 \pm 0.1$

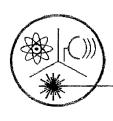
Date of Analysis	6/1/2018	6/1/2018	6/1/2018
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6/11/2018

Jeremy Russell, BSE

Date

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# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. CHANDLER, ARIZONA 85225-1121

Website: www.radsafe.com

# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW71-31618 (550-99692-6)	< 1.0	0.8 ± 0.1	0.8 ± 0.1

Date of Analysis	6/1/2018	6/1/2018	6/1/2018
		L	

6/11/2018 Date

L'aboratory License Number AZ0462

Jeremy Russell, BSE

# Radiation Safety Engineering, Inc.

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(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: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

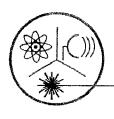
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW72-31618 (550-99692-7)	< 1.0	1.9 ± 0.1	$1.9 \pm 0.1$

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	Date of Analysis	6/1/2018	6/1/2018	6/1/2018

6/11/2018

Jeremy Russell, BSE

Date



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(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: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW73-31618 (550-99692-8)	< 1.0	$2.6 \pm 0.1$	$2.6 \pm 0.1$

1				
	Date of Analysis	6/1/2018	6/1/2018	6/1/2018

6/11/2018

Jeremy Russell, BSE

Date

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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: March 16, 2018 Sample Received: May 30, 2018 Analysis Completed: June 11, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD01-31618 (550-99692-9)	1.4 ± 0.1	2.6 ± 0.1	$4.0 \pm 0.1$

		<u> </u>	<u> </u>
Date of Analysis	6/1/2018	6/1/2018	6/1/2018

6/11/2018

Jeremy Russell, BSE

Date

# Test-mericon services

# Chain of Custody Record

4625 East Cotton Cir Blvd Suite 189 **TestAmerica Phoenix** 

4023 Edit Cotton Cti biva Sulte 189 Phoenix, AZ 85040 Phone (803) 437 3440 Env. (603) 454 0303	Chain	Chain of Custody Record	y Re	ord							とうり	フンプラードラー
	Sampler		II ah Pis				Caci	Carrier Translead Modes	Sole).		21.000	
ormation (Sub Contract Lab)			Baker, Ken	en			3	a stacking	40(s).		550-21277.1	
Client Contact: Shipping/Receiving	Phone:		E-Mait: Ken,bak	er@testa	E-Mait. Ken.baker@testamericainc.com	     E	State of Ol Arizona	State of Origin: Arizona			Page Page 1 of 1	
Company: Radiation Safely Eng., Inc.			Acc Acc	reditations F	Accreditations Required (See note) State Program - Arizona	ote):					Job#	
196	Due Date Requestod:				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Lotton O viorden		7			Preservation Codes:	98;
	TAT Requested (days):					and and	- Column				A - HCL B - NaOH	М - Нехапе N - None
State, Zip: AZ, 85225											C - Zn Acetate D - Nitric Acid E - NaHSO4	0 - AshaO2 P - Na2O4S Q - Na2SO3
	PO#.			8ZZ,							F - MeOH G - Anothlor	R - Na2S2O3 S - H2SO4
Email:	WO#:		ON 10								H - Ascorbic Acid I - Ice J - Di Water	i - i SP Dodecanydrate U - Acetone V - MCAA
Project Name: APS - Four Corners CCR.	Project #: 55009706		Sə), e	V						វេទសន់វ	K-EDTA L-EDA	W-pH4-5 Z-other(specify)
Site: Arizona Public Service	SSOW#.		lgms2							ot con	Other	
		Sample Type	Matrix (Waxater, Utered	MiSM mre S muibsA						Number		
Sample Identification - Cllent ID (Lab ID)	Sample Date Time	(C=comp, ⇔ G=grab)   BT=T								latoT	Special In	Special Instructions/Note:
	$\langle \chi \rangle$	Preservation Code:	ode:	×						X		
FC-CCR-MW66-31618 (550-99692-1)	3/16/18 12:52 Arizona		Water	×						) <u> </u>	Job 3	
FC-CCR-MW67-31618 (550-99692-2)	3/16/18 46:53 Arizona		Water	×						` <b>,</b> -	Job 3	
FC-CCR-MW68-31618 (550-99692-3)	3/16/18 16:20 Arizona		Water	×							Job 3	
FC-CCR-MW69-31618 (550-99692-4)	3/16/18 15:45 Arizona		Water	×						-	Job 3	
FC-CCR-MW70-31618 (550-99692-5)	3/16/18 13:41 Arizona		Water	×							Job 3	
FC-CCR-MW71-31618 (550-99692-6)	3/16/18 17:40 Arizona		Water	×						σ.	Job 3	
FC-CCR-MW72-31618 (550-99692-7)	3/16/18 14:33 Arizona		Water	×						٦	Job 3	
FC-CCR-MW73-31618 (550-99692-8)	3/16/18 18:18 Arizona		Water	×						+;	Job 3	
FC-CCR-FD01-31618 (550-99692-9)	3/16/18 12:52 Arizona		Water	×						-	Job 3	
Note: Since laboratory accreditations are subject to change. TostAmerica 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 taboratory does not	ies, Inc. places the ownership of	method, analyte & accred	ditation com	niance upon	out subconfrac	f laboratorie	. This sam	ofe shipmen	t is forwarde	d under ci	arin-of-custody. If the	Jaboratory does not

currently maintain accreditation in the State of Origin listed above for analysississimative the samples must be shipped back to the TestAmerica laborations will be provided. Any changes to accreditation is taken a correction swill be provided. Any changes to accreditation status should be brought to TestAmerica Laborations. Inc. Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month) Possible Hazard Identification

Unconfirmed			Return To Client	Disposal By Lab	Archive For	Months
Deliverable Requested: I, II, III, IV, Other (specify)			Requi			
Empty Kit Relinquished by:	-	Date:	Тіте:	Method of Shipment:		observed substitution for the first substitution of the substituti
Relinquished by Cart 1000 5 30	5 30 18 Date/Time:	Company	Repaired by:	Date/Time;	1 3 / 30 / 18	Company
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Relinquished by:	Dale/Time:	Company	Received by:	Date/Time:		Company
Custody Seals Intact: Custody Seal No.:			Cooler Temperature(s) <sup>o</sup> C and Other Kemarks	emarks:		
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Ver; 09/20/2016

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N. 1												MICTICA LADOLA	atories, Inc.
OJect Man	Project Manager: Doug Lavarnway	avarnwa		e Contac	Site Contact: Doug Lavarnway	Lavarny	/ay			3/18/2	018 COC 1	3/18/2018 COC No:	
Tel/Fax: 928-587-0319	37-0319		La	b Contac	Lab Contact: Ken Baker	aker		Carrier:				of1	COCs
Anal	lysis Turnarou	nd Time		_		_			-		Job N	0.	
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3/16/2018 1	252 G	W	4	×		×							
3/16/2018 1	653 <b>G</b>	w	4 Z	x		x							
3/16/2018 1	620 <b>G</b>	w	4 Z	×		×							
3/16/2018 1	545 <b>G</b>	w	4	×		×							
3/16/2018 1	341 G	w	4 Z	×		×							
3/16/2018 1	740 G	w	4 Z	×		×		ļ					
3/16/2018 1	433 G	w	4 Z	×		×							
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3/16/18 1	252 G	w	4 2	×		×			550-99692	Chain of Cu	ıstody		
=NaOH; 6= 0	Other												
Po	son B	Unknown		Sample	Return To	al (A fo		<b>assessed</b> Яsposal E	l <b>if samples</b> By Lab	are retaine	d longer ti	han 1 month)  Months	S
Special Instructions/QC Requirements & Comments:									<b>-</b>	,			
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Company:	7ps	Date/Ti	me 3%		J by:				Company:		Date/T	îme:	
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# **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-99692-3

Login Number: 99692 List Source: TestAmerica Phoenix

List Number: 1

Creator: Vilaboy, Monica

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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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: 550-103741-1

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 6/20/2018 10:29:54 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	9
QC Sample Results	15
QC Association Summary	23
Lab Chronicle	27
Certification Summary	32
Method Summary	33
Chain of Custody	34
Receipt Checklists	35

4

5

7

9

10

12

# **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

**Qualifier Description** 

TestAmerica Job ID: 550-103741-1

SDG: Cholla

#### Qualifiers

#### **HPLC/IC** Qualifier

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.
D2	Sample required dilution due to high concentration of analyte.

#### **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

TEQ

Toxicity Equivalent Quotient (Dioxin)

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)

### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1

SDG: Cholla

Job ID: 550-103741-1

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-103741-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 6/4/2018 1:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.8° C, 2.0° C, 2.0° 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 nature of the sample matrix: FC-CCR-MW-71-6218 (550-103741-7), FC-CCR-MW-72-6218 (550-103741-8) and FC-CCR-MW-73-6218 (550-103741-9). The analyte was not detected in the diluted samples. 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.

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: CCR TestAmerica Job ID: 550-103741-1 SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-103741-1	FC-CCR-MW-66-53118	Water	05/31/18 14:14	06/04/18 13:25
550-103741-2	FC-CCR-MW-67-6218	Water	06/02/18 09:25	06/04/18 13:25
550-103741-3	FC-CCR-MW-68-6218	Water	06/02/18 08:57	06/04/18 13:25
550-103741-4	FC-CCR-MW-69-6218	Water	06/02/18 08:16	06/04/18 13:25
550-103741-5	FC-CCR-FD02-6218	Water	06/02/18 08:16	06/04/18 13:25
550-103741-6	FC-CCR-MW-70-53118	Water	05/31/18 14:52	06/04/18 13:25
550-103741-7	FC-CCR-MW-71-6218	Water	06/02/18 10:25	06/04/18 13:25
550-103741-8	FC-CCR-MW-72-6218	Water	06/02/18 11:07	06/04/18 13:25
550-103741-9	FC-CCR-MW-73-6218	Water	06/02/18 11:45	06/04/18 13:25

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-1

SDG: Cholla

## Client Sample ID: FC-CCR-MW-66-53118

Lab Sample ID: 550-103741-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	1800	D2	400	mg/L	200	300.0	Total/NA
Fluoride	25	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200	300.0	Total/NA
Boron	150	D2 M3	0.25	mg/L	5	200.7 Rev 4.4	Total/NA
Calcium	440	M3	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	2800	D2 M3	10	mg/L	5	200.7 Rev 4.4	Total/NA
Potassium	39		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	630	M3	0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	300		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	300		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	19000	D2	100	mg/L	1	SM 2540C	Total/NA
pН	7.2	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.2	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW-67-6218

Lab Sample ID: 550-103741-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac [	Method	Prep Type
Chloride	2000	D2	400	mg/L	200	300.0	Total/NA
Fluoride	25	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	15000	D2	400	mg/L	200	300.0	Total/NA
Boron	200	D2	0.25	mg/L	5	200.7 Rev 4.4	Total/NA
Calcium	430		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	3500	D2	10	mg/L	5	200.7 Rev 4.4	Total/NA
Potassium	43		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	940		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	350		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	350		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	23000	D2	200	mg/L	1	SM 2540C	Total/NA
рН	7.1	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.1	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW-68-6218

Lab Sample ID: 550-103741-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	1500	D2	400	mg/L	200	300.0	Total/NA
Fluoride	12	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	10000	D2	400	mg/L	200	300.0	Total/NA
Boron	130	D2	0.25	mg/L	5	200.7 Rev 4.4	Total/NA
Calcium	430		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	2300	D2	10	mg/L	5	200.7 Rev 4.4	Total/NA
Potassium	17		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
Alkalinity as CaCO3	570		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	570		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	17000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	6.9	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.0	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

Client Sample ID: FC-CCR-MW-69-6218

Lab Sample ID: 550-103741-4

This Detection Summary does not include radiochemical test results.

Page 6 of 35

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1

Lab Sample ID: 550-103741-4

Lab Sample ID: 550-103741-5

Lab Sample ID: 550-103741-6

SDG: Cholla

## Client Sample ID: FC-CCR-MW-69-6218 (Continued)

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1400	D2	400	mg/L	200	_	300.0	Total/NA
Fluoride	21	D1	0.80	mg/L	2		300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200		300.0	Total/NA
Boron	120	D2	0.10	mg/L	2		200.7 Rev 4.4	Total/NA
Calcium	430		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	2600	D2	8.0	mg/L	4		200.7 Rev 4.4	Total/NA
Potassium	38		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	680		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	360		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	360		6.0	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	18000	D2	100	mg/L	1		SM 2540C	Total/NA
pН	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	20.0	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-FD02-6218

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	1300	D2	400	mg/L	200	300.0	Total/NA
Fluoride	21	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200	300.0	Total/NA
Boron	130	D2	0.10	mg/L	2	200.7 Rev 4.4	Total/NA
Calcium	430		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	2500	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
Potassium	38		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	680		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	350		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	350		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	18000	D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.3	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.4	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW-70-53118

Sherit Gample 1B. 1 G-GGN		Lab Gampie ib. 000-1007					
- Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	1100	D2	400	mg/L	200	300.0	Total/NA
Fluoride	1.8	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	6500	D2	400	mg/L	200	300.0	Total/NA
Boron	100	D2	0.10	mg/L	2	200.7 Rev 4.4	Total/NA
Calcium	490		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	1300	D2	4.0	mg/L	2	200.7 Rev 4.4	Total/NA
Potassium	17		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	780		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	520		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	520		6.0	mg/L	1	SM 2320B	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	20.2	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW-71-6218

Lab Sample ID: 550-103741-7

This Detection Summary does not include radiochemical test results.

Page 7 of 35

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1

Lab Sample ID: 550-103741-7

Lab Sample ID: 550-103741-8

Lab Sample ID: 550-103741-9

SDG: Cholla

## Client Sample ID: FC-CCR-MW-71-6218 (Continued)

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	520	D2	400	mg/L	200	300.0	Total/NA
Sulfate	10000	D2	400	mg/L	200	300.0	Total/NA
Boron	0.55		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	420		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	2000	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
Potassium	27		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	1000		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	430		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	430		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	15000	D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.1	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.2	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW-72-6218

Analyte	Result	Qualifier	RL	Unit	Dil Fac [	Method	Prep Type
Chloride	450	D2	400	mg/L	200	300.0	Total/NA
Sulfate	11000	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	410		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	2300	D2	10	mg/L	5	200.7 Rev 4.4	Total/NA
Potassium	26		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	670		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	610		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	610		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	16000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.0	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	20.3	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

## Client Sample ID: FC-CCR-MW-73-6218

			.p.c .z. cc				
- Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	550	D2	400	mg/L	200	300.0	Total/NA
Sulfate	7100	D2	400	mg/L	200	300.0	Total/NA
Boron	1.6		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	460		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	710		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	34		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	1600		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	800		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	800		6.0	mg/L	1	SM 2320B	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	20.2	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Arizona Public Service Company TestAmerica Job ID: 550-103741-1 Project/Site: CCR

SDG: Cholla

Client Sample ID: FC-CCR-MW-66-53118 Lab Sample ID: 550-103741-1 Date Collected: 05/31/18 14:14 **Matrix: Water** 

Date Received: 06/04/18 13:25

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1800	D2	400	mg/L			06/07/18 23:52	200
Fluoride	25	D1	0.80	mg/L			06/07/18 23:24	2
Sulfate	12000	D2	400	mg/L			06/07/18 23:52	200
Method: 200.7 Rev 4.4 - Metals (	(ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	150	D2 M3	0.25	mg/L		06/05/18 11:56	06/07/18 19:44	5
Calcium	440	M3	2.0	mg/L		06/05/18 11:56	06/06/18 19:57	1
Magnesium	2800	D2 M3	10	mg/L		06/05/18 11:56	06/07/18 19:44	5
Potassium	39		0.50	mg/L		06/05/18 11:56	06/07/18 19:50	1
Sodium	630	M3	0.50	mg/L		06/05/18 11:56	06/07/18 19:50	1
Method: 245.1 - Mercury (CVAA	)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		06/05/18 14:38	06/08/18 16:00	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	300		6.0	mg/L			06/06/18 14:59	1
Bicarbonate Alkalinity as CaCO3	300		6.0	mg/L			06/06/18 14:59	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 14:59	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 14:59	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 14:59	1
<b>Total Dissolved Solids</b>	19000	D2	100	mg/L			06/05/18 08:44	1
pH	7.2	H5	1.7	SU			06/05/18 11:50	1
		H5	0.1	Degrees C			06/05/18 11:50	

Lab Sample ID: 550-103741-2 Client Sample ID: FC-CCR-MW-67-6218 **Matrix: Water** 

Date Collected: 06/02/18 09:25 Date Received: 06/04/18 13:25

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2000	D2	400	mg/L			06/08/18 01:41	200
Fluoride	25	D1	0.80	mg/L			06/08/18 01:14	2
Sulfate	15000	D2	400	mg/L			06/08/18 01:41	200
Method: 200.7 Rev 4.4 -	Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	200	D2	0.25	mg/L		06/05/18 11:56	06/07/18 20:14	5
Calcium	430		2.0	mg/L		06/05/18 11:56	06/06/18 20:21	1
Magnesium	3500	D2	10	mg/L		06/05/18 11:56	06/07/18 20:14	5
Potassium	43		0.50	mg/L		06/05/18 11:56	06/07/18 20:19	1
Sodium	940		0.50	mg/L		06/05/18 11:56	06/07/18 20:19	1
- Method: 245.1 - Mercury	(CVAA)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		06/05/18 14:38	06/08/18 16:01	1

6/20/2018

2

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW-67-6218

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Lab Sample ID: 550-103741-2

Matrix: Water

Date	Conected.	00/02/10	09.23
<b>Date</b>	Received:	06/04/18	13:25

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	350		6.0	mg/L			06/06/18 15:19	1
Bicarbonate Alkalinity as CaCO3	350		6.0	mg/L			06/06/18 15:19	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:19	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 15:19	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:19	1
<b>Total Dissolved Solids</b>	23000	D2	200	mg/L			06/05/18 08:44	1
pH	7.1	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.1	H5	0.1	Degrees C			06/05/18 11:50	1

Client Sample ID: FC-CCR-MW-68-6218

Date Collected: 06/02/18 08:57 Date Received: 06/04/18 13:25 Lab Sample ID: 550-103741-3

Matrix: Water

Date Received. 00/04/10 13:23

Method: 300.0 - Anions, Ion Ch	romatogra	ıphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1500	D2	400	mg/L			06/08/18 02:36	200
Fluoride	12	D1	0.80	mg/L			06/08/18 02:09	2
Sulfate	10000	D2	400	mg/L			06/08/18 02:36	200

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	130	D2	0.25	mg/L		06/05/18 11:56	06/07/18 20:25	5
Calcium	430		2.0	mg/L		06/05/18 11:56	06/06/18 20:27	1
Magnesium	2300	D2	10	mg/L		06/05/18 11:56	06/07/18 20:25	5
Potassium	17		0.50	mg/L		06/05/18 11:56	06/07/18 20:31	1
Sodium	650		0.50	mg/L		06/05/18 11:56	06/07/18 20:31	1

Method: 245.1 - Mercury (CVA)	<b>A</b> )						
Analyte	Result Qualifier	r RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	0.00020	mg/L		06/05/18 14:38	06/08/18 16:03	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	570		6.0	mg/L			06/06/18 15:30	1
Bicarbonate Alkalinity as CaCO3	570		6.0	mg/L			06/06/18 15:30	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:30	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 15:30	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:30	1
<b>Total Dissolved Solids</b>	17000	D2	100	mg/L			06/05/18 08:44	1
pH	6.9	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.0	H5	0.1	Degrees C			06/05/18 11:50	1

Client Sample ID: FC-CCR-MW-69-6218

Date Collected: 06/02/18 08:16 Date Received: 06/04/18 13:25

Lab Sample	D: 550-103741-4	
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**Matrix: Water** 

M	ethod: 300.0 - Anions, Ion	Chromatogra	phy						
Ar	nalyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Cł	nloride	1400	D2	400	mg/L			06/08/18 03:31	200
Fi	uoride	21	D1	0.80	mg/L			06/08/18 03:04	2
Sı	ılfate	12000	D2	400	mg/L			06/08/18 03:31	200

## **Client Sample Results**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-1

SDG: Cholla

Method: 200.7 Rev 4.4 - Metals ( Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	120	<b>D2</b>	0.10	mg/L		06/05/18 11:56	06/07/18 20:37	
Calcium	430		2.0	mg/L		06/05/18 11:56	06/06/18 20:33	1
Magnesium	2600	D2	8.0	mg/L		06/05/18 11:56	06/12/18 12:26	4
Potassium	38		0.50	mg/L		06/05/18 11:56	06/07/18 20:48	1
Sodium	680		0.50	mg/L		06/05/18 11:56	06/07/18 20:48	1
Method: 245.1 - Mercury (CVAA	)							
Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		06/05/18 14:38	06/08/18 16:04	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	360		6.0	mg/L			06/06/18 15:40	1
Bicarbonate Alkalinity as CaCO3	360		6.0	mg/L			06/06/18 15:40	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:40	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 15:40	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:40	1
Total Dissolved Solids	18000	D2	100	mg/L			06/05/18 08:44	1
Hq	7.3	H5	1.7	SU			06/05/18 11:50	1

Client Sample ID: FC-CCR-FD02-6218 Lab Sample ID: 550-103741-5

Date Collected: 06/02/18 08:16 Matrix: Water

Date Received: 06/04/18 13:25

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1300	D2	400	mg/L			06/08/18 05:21	200
Fluoride	21	D1	0.80	mg/L			06/08/18 04:53	2
Sulfate	12000	D2	400	mg/L			06/08/18 05:21	200
Method: 200.7 Rev 4.4 - Metals	(ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	130	D2	0.10	mg/L		06/05/18 11:56	06/07/18 20:54	2
Calcium	430		2.0	mg/L		06/05/18 11:56	06/06/18 20:39	1
Magnesium	2500	D2	8.0	mg/L		06/05/18 11:56	06/12/18 12:31	4
Potassium	38		0.50	mg/L		06/05/18 11:56	06/07/18 21:00	1
Sodium	680		0.50	mg/L		06/05/18 11:56	06/07/18 21:00	1
Method: 245.1 - Mercury (CVAA Analyte		Qualifier	RL 0.00020	Unit mg/L	_ <b>D</b>	Prepared 06/05/18 14:38	Analyzed 06/08/18 16:06	Dil Fac
Hg	ND		0.00020	mg/L		06/05/18 14:38	06/08/18 16:06	1
<b>General Chemistry</b>								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	350		6.0	mg/L			06/06/18 15:50	1
Bicarbonate Alkalinity as CaCO3	350		6.0	mg/L			06/06/18 15:50	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:50	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 15:50	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 15:50	1
Total Dissolved Solids	18000	D2	100	mg/L			06/05/18 08:44	1
		H5	1.7	SU			06/05/18 11:50	1
pH	7.3	113	1.7	00			00/00/10 11:00	

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Client: Arizona Public Service Company

Project/Site: CCR

Lab Sample ID: 550-103741-6

06/05/18 11:50

06/05/18 11:50

**Matrix: Water** 

Lab Sample ID: 550-103741-7

**Matrix: Water** 

Client Sample ID: FC-CCR-MW-70-53118
Date Collected: 05/31/18 14:52

Date Received: 06/04/18 13:25

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1100	D2	400	mg/L			06/08/18 06:15	200
Fluoride	1.8	D1	0.80	mg/L			06/08/18 05:48	2
Sulfate	6500	D2	400	mg/L			06/08/18 06:15	200
Method: 200.7 Rev 4.4 - Metals (	(ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	100	D2	0.10	mg/L		06/05/18 11:56	06/07/18 21:06	2
Calcium	490		2.0	mg/L		06/05/18 11:56	06/06/18 20:50	1
Magnesium	1300	D2	4.0	mg/L		06/05/18 11:56	06/07/18 21:06	2
Potassium	17		0.50	mg/L		06/05/18 11:56	06/07/18 21:12	1
Sodium	780		0.50	mg/L		06/05/18 11:56	06/07/18 21:12	1
- Method: 245.1 - Mercury (CVAA	)							
Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		06/05/18 14:38	06/08/18 16:08	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	520		6.0	mg/L			06/06/18 16:39	1
Bicarbonate Alkalinity as CaCO3	520		6.0	mg/L			06/06/18 16:39	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 16:39	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 16:39	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 16:39	1
<b>Total Dissolved Solids</b>	11000	D2	100	mg/L			06/05/18 08:44	1

1.7

0.1

SU

Degrees C

Client Sample ID: FC-CCR-MW-71-6218

20.2 H5

Date Collected: 06/02/18 10:25

Date Received: 06/04/18 13:25

pН

**Temperature** 

Method: 300.0 - Anion: Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	520	D2	400	mg/L			06/05/18 10:39	200
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 10:12	2
Sulfate	10000	D2	400	mg/L			06/05/18 10:39	200
- 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		06/05/18 11:56	06/07/18 21:24	1
Calcium	420		2.0	mg/L		06/05/18 11:56	06/06/18 20:56	1
Magnesium	2000	D2	8.0	mg/L		06/05/18 11:56	06/12/18 12:37	4
Potassium	27		0.50	mg/L		06/05/18 11:56	06/07/18 21:24	1
Sodium	1000		0.50	mg/L		06/05/18 11:56	06/07/18 21:24	1
- Method: 245.1 - Mercu	ry (CVAA)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L		06/05/18 14:38	06/08/18 16:09	1

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW-71-6218 Date Collected: 06/02/18 10:25

Date Received: 06/04/18 13:25

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Lab Sample ID: 550-103741-7

Matrix: Water	

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	430		6.0	mg/L			06/06/18 16:49	1
Bicarbonate Alkalinity as CaCO3	430		6.0	mg/L			06/06/18 16:49	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 16:49	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 16:49	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 16:49	1
<b>Total Dissolved Solids</b>	15000	D2	100	mg/L			06/05/18 08:44	1
pH	7.1	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.2	H5	0.1	Degrees C			06/05/18 11:50	1

Client Sample ID: FC-CCR-MW-72-6218 Lab Sample ID: 550-103741-8

Date Collected: 06/02/18 11:07 **Matrix: Water** 

Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Chromatography										
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac		
Chloride	450	D2	400	mg/L			06/05/18 11:34	200		
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 11:07	2		
Sulfate	11000	D2	400	mg/L			06/05/18 11:34	200		

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.21		0.050	mg/L		06/05/18 11:56	06/07/18 21:35	1
Calcium	410		2.0	mg/L		06/05/18 11:56	06/06/18 21:02	1
Magnesium	2300	D2	10	mg/L		06/05/18 11:56	06/07/18 21:30	5
Potassium	26		0.50	mg/L		06/05/18 11:56	06/07/18 21:35	1
Sodium	670		0.50	mg/L		06/05/18 11:56	06/07/18 21:35	1

Method: 245.1 - Mercury (CVA)	<b>A</b> )						
Analyte	Result Qualifier	r RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND	0.00020	mg/L		06/05/18 14:38	06/08/18 16:11	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	610		6.0	mg/L			06/06/18 17:01	1
Bicarbonate Alkalinity as CaCO3	610		6.0	mg/L			06/06/18 17:01	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 17:01	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 17:01	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 17:01	1
Total Dissolved Solids	16000	D2	100	mg/L			06/05/18 08:44	1
pH	7.0	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.3	H5	0.1	Degrees C			06/05/18 11:50	1

Client Sample ID: FC-CCR-MW-73-6218 Lab Sample ID: 550-103741-9

Date Collected: 06/02/18 11:45 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Chromatography									
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
Chloride	550	D2	400	mg/L			06/05/18 12:29	200	
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 12:01	2	
Sulfate	7100	D2	400	mg/L			06/05/18 12:29	200	

TestAmerica Phoenix

6/20/2018

**Matrix: Water** 

Page 13 of 35

## **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Method: 200.7 Rev 4.4 - Metals (I Analyte	•	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.6		0.050	mg/L	_	06/05/18 11:56	06/07/18 21:41	1
Calcium	460		2.0	mg/L		06/05/18 11:56	06/06/18 21:08	1
Magnesium	710		2.0	mg/L		06/05/18 11:56	06/06/18 21:08	1
Potassium	34		0.50	mg/L		06/05/18 11:56	06/07/18 21:41	1
Sodium	1600		0.50	mg/L		06/05/18 11:56	06/07/18 21:41	1
– Method: 245.1 - Mercury (CVAA)								
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hg	ND		0.00020	mg/L	_	06/05/18 14:38	06/08/18 16:12	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	800		6.0	mg/L	_		06/10/18 12:30	1
Bicarbonate Alkalinity as CaCO3	800		6.0	mg/L			06/10/18 12:30	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/10/18 12:30	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1
Total Dissolved Solids	12000	D2	100	mg/L			06/05/18 08:44	1
pH	6.9	H5	1.7	SU			06/05/18 11:50	1
Temperature	20.2	H5	0.1	Degrees C			06/05/18 11:50	1

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-148810/2

**Matrix: Water** 

Analysis Batch: 148810

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

MR MR

Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			06/04/18 14:33	1
Fluoride	ND		0.40	mg/L			06/04/18 14:33	1
Sulfate	ND		2.0	mg/L			06/04/18 14:33	1

Lab Sample ID: LCS 550-148810/5

**Matrix: Water** 

**Analysis Batch: 148810** 

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

7 <b>,</b> 0.0	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	20.0	20.4		mg/L		102	90 - 110	
Fluoride	4.00	4.18		mg/L		104	90 - 110	
Sulfate	20.0	20.8		mg/L		104	90 - 110	

Lab Sample ID: LCSD 550-148810/6

**Matrix: Water** 

**Analysis Batch: 148810** 

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

**Client Sample ID: Matrix Spike Duplicate** 

Client Sample ID: Matrix Spike

Prep Type: Total/NA

**Prep Type: Total/NA** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	 20.0	20.4		mg/L		102	90 - 110	0	20
Fluoride	4.00	4.18		mg/L		105	90 - 110	0	20
Sulfate	20.0	20.8		mg/L		104	90 - 110	0	20

Lab Sample ID: 550-103742-C-1 MS ^200

**Matrix: Water** 

**Analysis Batch: 148810** 

_	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	580	D2	4000	4920	D2	mg/L		108	80 - 120	
Fluoride	ND	D1	800	873	D1	mg/L		109	80 - 120	
Sulfate	6400	D2	4000	10700	D2	mg/L		108	80 - 120	

Lab Sample ID: 550-103742-C-1 MSD ^200

**Matrix: Water** 

Analysis Ratch: 148810

Analysis Batch: 148810												
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	580	D2	4000	4910	D2	mg/L		108	80 - 120	0	20	
Fluoride	ND	D1	800	865	D1	mg/L		108	80 - 120	1	20	
Sulfate	6400	D2	4000	10700	D2	mg/L		109	80 - 120	0	20	

Lab Sample ID: MB 550-149123/2

**Matrix: Water** 

**Analysis Batch: 149123** 

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chloride 2.0 mg/L ND 06/07/18 15:38 Fluoride ND 0.40 mg/L 06/07/18 15:38 1 Sulfate ND 2.0 mg/L 06/07/18 15:38

TestAmerica Phoenix

Page 15 of 35

20 **Client Sample ID: Method Blank** 

Prep Type: Total/NA

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

## Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 550-149123/5

**Matrix: Water** 

Analysis Batch: 149123

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

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit D %Rec Limits Chloride 20.0 20.3 mg/L 102 90 - 110 Fluoride 4.00 4.18 104 90 - 110 mg/L Sulfate 20.0 20.8 90 - 110 mg/L 104

Lab Sample ID: LCSD 550-149123/6

**Matrix: Water** 

**Analysis Batch: 149123** 

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

Client Sample ID: FC-CCR-MW-66-53118

Client Sample ID: FC-CCR-MW-66-53118

**Prep Type: Total/NA** 

Prep Type: Total/NA

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	20.0	20.3		mg/L		102	90 - 110	0	20
Fluoride	4.00	4.18		mg/L		105	90 - 110	0	20
Sulfate	20.0	20.8		mg/L		104	90 - 110	0	20

Lab Sample ID: 550-103741-1 MS

**Matrix: Water** 

Analysis Batch: 149123

7 maryolo Batom 140120	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	1800	D2	4000	6160	D2	mg/L		110	80 - 120	
Fluoride	ND	D1	800	871	D1	mg/L		106	80 - 120	
Sulfate	12000	D2	4000	16200	D2	mg/L		109	80 - 120	

Lab Sample ID: 550-103741-1 MSD

**Matrix: Water** 

Analysis Batch: 149123

Alialysis Datcii. 173123											
_	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	1800	D2	4000	6120	D2	mg/L		108	80 - 120	1	20
Fluoride	ND	D1	800	864	D1	mg/L		105	80 - 120	1	20
Sulfate	12000	D2	4000	16000	D2	mg/L		105	80 - 120	1	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-148863/1-A

**Matrix: Water** 

**Analysis Batch: 149071** 

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

**Prep Batch: 148863** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L		06/05/18 11:56	06/06/18 19:37	1
Calcium	ND		2.0	mg/L		06/05/18 11:56	06/06/18 19:37	1
Magnesium	ND		2.0	mg/L		06/05/18 11:56	06/06/18 19:37	1

MB MB

MR MR

Lab Sample ID: MB 550-148863/1-A

**Matrix: Water** 

Analysis Batch: 149141

Prep Type: Total/NA

**Prep Batch: 148863** 

Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.050	mg/L	_	06/05/18 11:56	06/07/18 19:12	1
Magnesium	ND		2.0	mg/L		06/05/18 11:56	06/07/18 19:12	1

TestAmerica Phoenix

Page 16 of 35

6/20/2018

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

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

MR MR

Lab Sample ID: MB 550-148863/1-A

**Matrix: Water** 

**Analysis Batch: 149141** 

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

**Prep Batch: 148863** 

Analyte	Result Qualifi	ier RL	Unit	D	Prepared	Analyzed	Dil Fac
Potassium	ND	0.50	mg/L		06/05/18 11:56	06/07/18 19:12	1
Sodium	ND	0.50	mg/L		06/05/18 11:56	06/07/18 19:12	1

Lab Sample ID: LCS 550-148863/2-A **Client Sample ID: Lab Control Sample** 

**Matrix: Water** 

**Analysis Batch: 149071** 

**Prep Type: Total/NA Prep Batch: 148863** 

LCS LCS Spike %Rec. Added **Analyte** Result Qualifier Unit D %Rec Limits 1.00 Boron 0.906 mg/L 91 85 - 115 Calcium 21.0 20.2 mg/L 96 85 - 115 21.0 85 - 115 Magnesium 19.7 mg/L 94

Lab Sample ID: LCS 550-148863/2-A **Client Sample ID: Lab Control Sample** 

**Matrix: Water** 

**Analysis Batch: 149141** 

Prep Type: Total/NA

**Prep Batch: 148863** 

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit %Rec Limits 1.00 0.935 Boron mg/L 85 - 115 21.0 20.1 Magnesium mg/L 96 85 - 115 Potassium 20.0 18.8 mg/L 94 85 - 115 20.0 93 Sodium 18.6 mg/L 85 - 115

Lab Sample ID: LCSD 550-148863/3-A Client Sample ID: Lab Control Sample Dup

Spike

LCSD LCSD

**Matrix: Water** 

**Analysis Batch: 149071** 

Prep Type: Total/NA **Prep Batch: 148863** 

%Rec. **RPD** Limits RPD Limit 85 - 115 2 20

Analyte Added Result Qualifier Unit D %Rec Boron 1.00 0.927 mg/L 93 Calcium 21.0 20.4 mg/L 97 85 - 115 20 20.0 21.0 95 85 - 115 20 Magnesium mg/L

Lab Sample ID: LCSD 550-148863/3-A Client Sample ID: Lab Control Sample Dup

**Matrix: Water** 

Analysis Batch: 149141

Prep Type: Total/NA

**Prep Batch: 148863** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	0.957		mg/L		96	85 - 115	2	20
Magnesium	21.0	20.5		mg/L		97	85 - 115	2	20
Potassium	20.0	19.1		mg/L		96	85 - 115	2	20
Sodium	20.0	18.7		mg/L		93	85 - 115	1	20

Lab Sample ID: 550-103741-1 MS Client Sample ID: FC-CCR-MW-66-53118

**Matrix: Water** 

**Analysis Batch: 149071** 

Prep Type: Total/NA **Prep Batch: 148863** %Rec.

MS MS Sample Sample Spike Added Analyte Result Qualifier Result Qualifier Unit %Rec Limits 440 M3 21.0 Calcium 428 M3 -40 70 - 130 mg/L

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

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

Lab Sample ID: 550-103741-1 MS	Client Sample ID: FC-CCR-MW-66-53118
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 149141	Prep Batch: 148863

**Analysis Batch: 149141** 

Sample Sample Spike MS MS %Rec. Result Qualifier Added Result Qualifier Unit D %Rec Limits Analyte 1.00 150 M3 D2 141 M3 -916 70 - 130 Boron mg/L 2800 M3 D2 21.0 2630 M3 -730 70 - 130 Magnesium mg/L

Lab Sample ID: 550-103741-1 MS Client Sample ID: FC-CCR-MW-66-53118 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149141 Prep Batch: 148863** Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Potassium 39 20.0 58.6 mg/L 96 70 - 130 630 M3 20.0 622 M3 Sodium mg/L -21 70 - 130

Lab Sample ID: 550-103741-1 MSD Client Sample ID: FC-CCR-MW-66-53118 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149071 Prep Batch: 148863** Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier Limits **RPD** Limit Analyte Unit %Rec Calcium 440 M3 21.0 424 M3 mg/L -59 70 - 130 20

Lab Sample ID: 550-103741-1 MSD Client Sample ID: FC-CCR-MW-66-53118 **Matrix: Water** Prep Type: Total/NA Analysis Batch: 149141 Prep Batch: 148863 Sample Sample Spike MSD MSD **RPD** %Rec

Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits RPD Limit Boron 150 M3 D2 1.00 150 M3 mg/L -30 70 - 130 6 20 2800 M3 D2 21.0 2760 M3 20 Magnesium mg/L -127 70 - 130

Lab Sample ID: 550-103741-1 MSD Client Sample ID: FC-CCR-MW-66-53118 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149141 Prep Batch: 148863** 

Sample Sample Spike MSD MSD **RPD** %Rec. Result Qualifier Added Limits RPD Limit **Analyte** Result Qualifier Unit %Rec Potassium 39 20.0 58.2 mg/L 95 70 - 130 20 Sodium 630 M3 20.0 618 M3 mg/L -40 70 - 13020

### Method: 245.1 - Mercury (CVAA)

Hg

Lab Sample ID: MB 550-148890/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Prep Batch: 148890 Analysis Batch: 149203** MB MB Result Qualifier RL Unit Dil Fac Analyte **Prepared** Analyzed

mg/L

Lab Sample ID: LCS 550-148890/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149203 Prep Batch: 148890** Spike LCS LCS %Rec.

0.00020

Added Analyte Result Qualifier Unit %Rec Limits Hg 0.0100 0.0103 mg/L 103 85 - 115

ND

TestAmerica Phoenix

6/20/2018

06/05/18 14:38 06/08/18 15:52

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

## Method: 245.1 - Mercury (CVAA) (Continued)

Lab Sample ID: LCSD 550-148890/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149203 Prep Batch: 148890** Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit

0.0100 85 - 115 Hg 0.0102 mg/L 102 Lab Sample ID: 550-103741-1 MS Client Sample ID: FC-CCR-MW-66-53118

**Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149203 Prep Batch: 148890** Sample Sample Spike MS MS %Rec. Result Qualifier Added Analyte Result Qualifier Limits Unit %Rec 0.0100 70 - 130 Hg  $\overline{\mathsf{ND}}$ 0.00771 mg/L

Lab Sample ID: 550-103741-1 MSD Client Sample ID: FC-CCR-MW-66-53118 Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 149203 Prep Batch: 148890** Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Result Qualifier Added Limits RPD Limit Analyte Unit D %Rec Hg ND 0.0100 0.00714 mg/L 70 - 130

### Method: SM 2320B - Alkalinity

Lab Sample ID: MB 550-149023/5 **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149023** 

	MB	MR							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1	
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1	
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1	
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/06/18 13:52	1	
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/06/18 13:52	1	

Lab Sample ID: LCS 550-149023/4 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149023** 

LCS LCS Spike %Rec. Added Result Qualifier Unit D %Rec Limits Alkalinity as CaCO3 250 256 ma/L 102 90 - 110

Lab Sample ID: LCSD 550-149023/17 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149023** 

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier %Rec Limits RPD Unit Limit 250 258 Alkalinity as CaCO3 103 mg/L 90 - 110

Lab Sample ID: 550-103741-1 DU Client Sample ID: FC-CCR-MW-66-53118 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 149023

7 maryolo Batom 140020	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
Alkalinity as CaCO3	300		 305		mg/L		 	0.1	20

SDG: Cholla

Client: Arizona Public Service Company Project/Site: CCR

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: 550-103741-1 DU

**Matrix: Water** 

**Analysis Batch: 149023** 

Client Sample ID: FC-CCR-MW-66-53118

Prep Type: Total/NA

	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Bicarbonate Alkalinity as CaCO3	300		305		mg/L		0.1	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: 550-103742-D-1 DU **Client Sample ID: Duplicate** Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 149023

DU DU RPD Sample Sample Analyte Result Qualifier Result Qualifier Unit RPD Limit Alkalinity as CaCO3 510 514 mg/L 0.07 20 Bicarbonate Alkalinity as CaCO3 510 514 mg/L 0.07 20 Carbonate Alkalinity as CaCO3 ND ND mg/L NC 20 Alkalinity, Phenolphthalein ND ND NC 20 mg/L Hydroxide Alkalinity as CaCO3 ND ND mg/L NC 20

Lab Sample ID: MB 550-149226/1 **Client Sample ID: Method Blank** Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 149226

MB MB

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1	
Bicarbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1	
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1	
Alkalinity, Phenolphthalein	ND		6.0	mg/L			06/10/18 12:30	1	
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			06/10/18 12:30	1	

Lab Sample ID: LCS 550-149226/2 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 149226

	Spike	e LCS	LCS				%Rec.	
Analyte	Added	d Result	Qualifier	Unit I	D	%Rec	Limits	
Alkalinity as CaCO3	250	244		mg/L		98	90 - 110	

Lab Sample ID: LCSD 550-149226/5 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 149226

	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Alkalinity as CaCO3	250	250		mg/L		100	90 - 110	2	20	

Lab Sample ID: 550-103738-A-1 DU **Client Sample ID: Duplicate** Prep Type: Total/NA

**Matrix: Water** 

ı	Analysis Batch: 149221										
	-	Sample	Sample	DU	DU					RPD	
	Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit	
	Alkalinity as CaCO3	750		700		mg/L			7	20	
	Bicarbonate Alkalinity as CaCO3	750		700		mg/L			7	20	
	Carbonate Alkalinity as CaCO3	ND		ND		mg/L			NC	20	

TestAmerica Phoenix

6/20/2018

Page 20 of 35

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Method: SM 2320B - Alkalinit	ty (Continued)
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Lab Sample ID: 550-103738-A-1 DU **Client Sample ID: Duplicate Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 149227** 

	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
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 550-148821/1 **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 148821

	MB	INIR						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			06/05/18 08:44	1

Lab Sample ID: LCS 550-148821/2 **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA Analysis Batch: 148821** 

	Spike	LCS	LCS			%Rec.
Analyte	Added	Result	Qualifier U	Init D	%Rec	Limits
Total Dissolved Solids	1000	990	m	ng/L	99	90 - 110

Lab Sample ID: LCSD 550-148821/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 148821** 

	Spike	LCSD	LCSD				%Rec.		RPD	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Total Dissolved Solids	1000	986		ma/L		99	90 - 110		10	

Lab Sample ID: 550-103741-1 DU Client Sample ID: FC-CCR-MW-66-53118 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 148821

•	Sample	Sample	DU	DU					RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D		RPD	Limit
Total Dissolved Solids	19000	D2	 18900	D2	mg/L			0.05	10

### Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-148864/1 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 148864

Analysis batch. 140004	Spike	LCSSRM	LCSSRM				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
pH	7.00	7.0		SU	_	100.3	98.5 - 101.	
							_	

**Client Sample ID: Lab Control Sample** Lab Sample ID: LCSSRM 550-148864/13 **Prep Type: Total/NA** 

**Matrix: Water** 

Analysis Ratch: 148864

Alialysis batch. 140004								
	Spike	LCSSRM	LCSSRM				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
pH	7.00	7.1		SU		100.7	98.5 - 101.	
							5	

## **QC Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1

SDG: Cholla

Lab Sample ID: LCSSRM 550-148864/25

**Matrix: Water** 

Analysis Batch: 148864

	Spik	: LCSSRM	LCSSRM				%Rec.	
Analyte	Adde	l Result	Qualifier	Unit	D	%Rec	Limits	
pH	7.0	7.1		SU	_	100.9	98.5 - 101.	
							5	

Lab Sample ID: 550-103741-1 DU

**Matrix: Water** 

Analysis Batch: 1/886/

Analysis Datch: 140004								
	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
pH	7.2	H5	7.2	H5	SU	_	 0.1	5
Temperature	20.2	H5	20.2	H5	Degrees C		0	

Lab Sample ID: 550-103741-5 DU

**Matrix: Water** 

Analysis Batch: 148864								
-	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
pH	7.3	H5	7.3	H5	SU	_	 0	5
Temperature	20.4	H5	20.3	H5	Degrees C		0.5	

**Client Sample ID: Lab Control Sample** 

**Prep Type: Total/NA** 

Client Sample ID: FC-CCR-MW-66-53118

**Prep Type: Total/NA** 

Client Sample ID: FC-CCR-FD02-6218

Prep Type: Total/NA

HPLC/IC

Project/Site: CCR

Analysis Batch: 148810

Client: Arizona Public Service Company

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	300.0	_
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	300.0	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	300.0	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	300.0	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	300.0	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	300.0	
MB 550-148810/2	Method Blank	Total/NA	Water	300.0	
LCS 550-148810/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-148810/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-103742-C-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-103742-C-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	

**Analysis Batch: 149123** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	300.0	
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	300.0	
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	300.0	
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	300.0	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	300.0	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	300.0	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	300.0	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	300.0	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	300.0	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	300.0	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	300.0	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	300.0	
MB 550-149123/2	Method Blank	Total/NA	Water	300.0	
LCS 550-149123/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-149123/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	300.0	
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	300.0	

Metals

**Prep Batch: 148863** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.7	_
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.7	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.7	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.7	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.7	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.7	
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.7	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.7	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.7	
MB 550-148863/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-148863/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-148863/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.7	
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.7	

TestAmerica Phoenix

SDG: Cholla

Page 23 of 35 6/20/2018

**Metals (Continued)** 

Client: Arizona Public Service Company

## **Prep Batch: 148890**

Project/Site: CCR

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	245.1	
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	245.1	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	245.1	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	245.1	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	245.1	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	245.1	
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	245.1	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	245.1	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	245.1	
MB 550-148890/1-A	Method Blank	Total/NA	Water	245.1	
LCS 550-148890/2-A	Lab Control Sample	Total/NA	Water	245.1	
LCSD 550-148890/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	245.1	
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	245.1	

### **Analysis Batch: 149071**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.7 Rev 4.4	148863
MB 550-148863/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	148863
LCS 550-148863/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	148863
LCSD 550-148863/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863

#### **Analysis Batch: 149141**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.7 Rev 4.4	148863
MB 550-148863/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	148863

TestAmerica Phoenix

SDG: Cholla

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Client: Arizona Public Service Company Project/Site: CCR

SDG: Cholla

## **Metals (Continued)**

### **Analysis Batch: 149141 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 550-148863/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	148863
LCSD 550-148863/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863

## Analysis Batch: 149203

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	245.1	148890
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	245.1	148890
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	245.1	148890
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	245.1	148890
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	245.1	148890
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	245.1	148890
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	245.1	148890
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	245.1	148890
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	245.1	148890
MB 550-148890/1-A	Method Blank	Total/NA	Water	245.1	148890
LCS 550-148890/2-A	Lab Control Sample	Total/NA	Water	245.1	148890
LCSD 550-148890/3-A	Lab Control Sample Dup	Total/NA	Water	245.1	148890
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	245.1	148890
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	245.1	148890

### **Analysis Batch: 149397**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.7 Rev 4.4	148863

## **General Chemistry**

### **Analysis Batch: 148821**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	SM 2540C	_ :
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	SM 2540C	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	SM 2540C	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	SM 2540C	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	SM 2540C	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	SM 2540C	
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	SM 2540C	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	SM 2540C	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	SM 2540C	
MB 550-148821/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-148821/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-148821/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-103741-1 DU	FC-CCR-MW-66-53118	Total/NA	Water	SM 2540C	

SDG: Cholla

## **General Chemistry (Continued)**

Client: Arizona Public Service Company

### Analysis Batch: 148864

Project/Site: CCR

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	SM 4500 H+ B	
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	SM 4500 H+ B	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	SM 4500 H+ B	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	SM 4500 H+ B	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	SM 4500 H+ B	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	SM 4500 H+ B	
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	SM 4500 H+ B	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	SM 4500 H+ B	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-148864/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-103741-1 DU	FC-CCR-MW-66-53118	Total/NA	Water	SM 4500 H+ B	
550-103741-5 DU	FC-CCR-FD02-6218	Total/NA	Water	SM 4500 H+ B	

### **Analysis Batch: 149023**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	SM 2320B	
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	SM 2320B	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	SM 2320B	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	SM 2320B	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	SM 2320B	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	SM 2320B	
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	SM 2320B	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	SM 2320B	
MB 550-149023/5	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-149023/4	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-149023/17	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-103741-1 DU	FC-CCR-MW-66-53118	Total/NA	Water	SM 2320B	
550-103742-D-1 DU	Duplicate	Total/NA	Water	SM 2320B	

### **Analysis Batch: 149226**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 550-149226/1	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-149226/2	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-149226/5	Lab Control Sample Dup	Total/NA	Water	SM 2320B	

## Analysis Batch: 149227

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	SM 2320B	
550-103738-A-1 DU	Duplicate	Total/NA	Water	SM 2320B	

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Client Sample ID: FC-CCR-MW-66-53118 Lab Sample ID: 550-103741-1

Date Collected: 05/31/18 14:14 Date Received: 06/04/18 13:25

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			149123	06/07/18 23:24	NBL	TAL PHX
Total/NA	Analysis	300.0		200	149123	06/07/18 23:52	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 19:57	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		5	149141	06/07/18 19:44	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 19:50	SGO	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:00	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 14:59	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	06/05/18 08:44 06/06/18 10:20	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1		06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-MW-67-6218

Lab Sample ID: 550-103741-2 Date Collected: 06/02/18 09:25 **Matrix: Water** 

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			149123	06/08/18 01:14	NBL	TAL PHX
Total/NA	Analysis	300.0		200	149123	06/08/18 01:41	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:21	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		5	149141	06/07/18 20:14	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 20:19	SGO	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:01	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 15:19	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) (	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

## **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1

SDG: Cholla

Client Sample ID: FC-CCR-MW-68-6218

Date Collected: 06/02/18 08:57 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-3

**Matrix: Water** 

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	149123	06/08/18 02:09	NBL	TAL PHX
Total/NA	Analysis	300.0		200	149123	06/08/18 02:36	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:27	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		5	149141	06/07/18 20:25	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 20:31	SGO	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:03	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 15:30	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	06/05/18 08:44 06/06/18 10:20	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-MW-69-6218

Date Collected: 06/02/18 08:16 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-4

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			149123	06/08/18 03:04	NBL	TAL PH
Total/NA	Analysis	300.0		200	149123	06/08/18 03:31	NBL	TAL PH
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PH
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:33	ARE	TAL PH
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PH
Total/NA	Analysis	200.7 Rev 4.4		2	149141	06/07/18 20:37	SGO	TAL PH
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PH
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 20:48	SGO	TAL PH
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PH
Total/NA	Analysis	200.7 Rev 4.4		4	149397	06/12/18 12:26	ARE	TAL PH
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PH
Total/NA	Analysis	245.1		1	149203	06/08/18 16:04	JTG	TAL PH
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 15:40	DGS	TAL PH
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PH
					` ,	06/05/18 08:44 06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PH

### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1

SDG: Cholla

Client Sample ID: FC-CCR-FD02-6218

Date Collected: 06/02/18 08:16 Date Received: 06/04/18 13:25 Lab Sample ID: 550-103741-5

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	149123	06/08/18 04:53	NBL	TAL PHX
Total/NA	Analysis	300.0		200	149123	06/08/18 05:21	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:39	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	149141	06/07/18 20:54	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 21:00	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	149397	06/12/18 12:31	ARE	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:06	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 15:50	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) (	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Client Sample ID: FC-CCR-MW-70-53118

Date Collected: 05/31/18 14:52

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			149123	06/08/18 05:48	NBL	TAL PHX
Total/NA	Analysis	300.0		200	149123	06/08/18 06:15	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:50	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	149141	06/07/18 21:06	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 21:12	SGO	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:08	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 16:39	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					,	06/05/18 08:44 06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

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Lab Sample ID: 550-103741-6

Matrix: Water

TestAmerica Job ID: 550-103741-1 SDG: Cholla

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW-71-6218

Project/Site: CCR

Lab Sample ID: 550-103741-7

**Matrix: Water** 

Date Collected: 06/02/18 10:25 Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	148810	06/05/18 10:12	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 10:39	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:56	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 21:24	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	149397	06/12/18 12:37	ARE	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:09	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 16:49	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) 0	6/05/18 08:44		
					(End) C	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

Lab Sample ID: 550-103741-8 Client Sample ID: FC-CCR-MW-72-6218

Date Collected: 06/02/18 11:07 **Matrix: Water** 

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 11:07	NBL	TAL PHX
Total/NA	Analysis	300.0		200	148810	06/05/18 11:34	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:02	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		5	149141	06/07/18 21:30	SGO	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 21:35	SGO	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:11	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149023	06/06/18 17:01	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) (	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PH

Client Sample ID: FC-CCR-MW-73-6218

Lab Sample ID: 550-103741-9 Date Collected: 06/02/18 11:45 **Matrix: Water** 

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	148810	06/05/18 12:01	NBL	TAL PHX

TestAmerica Phoenix

Page 30 of 35

6/20/2018

## **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-1 SDG: Cholla

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	148810	06/05/18 12:29	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:08	ARE	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149141	06/07/18 21:41	SGO	TAL PHX
Total/NA	Prep	245.1			148890	06/05/18 14:38	JTG	TAL PHX
Total/NA	Analysis	245.1		1	149203	06/08/18 16:12	JTG	TAL PHX
Total/NA	Analysis	SM 2320B		1	149227	06/10/18 12:30	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	148821		YET	TAL PHX
					(Start) (	06/05/18 08:44		
					(End) (	06/06/18 10:20		
Total/NA	Analysis	SM 4500 H+ B		1	148864	06/05/18 11:50	BDN	TAL PHX

#### **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: 550-103741-1
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: 550-103741-1

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	рН	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

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Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

Date/Time:

Date/Time:

9:30

Therm ID No.

Date/Time:

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Job / SDG No.:

Sample Specific Notes:

∟ab Sampling: For Lab Use Only: Walk-in Client: Sampler:

TestAmerica Laboratories, Inc.

## Login Sample Receipt Checklist

Client: Arizona Public Service Company

Job Number: 550-103741-1

SDG Number: Cholla

Login Number: 103741 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.</td <td></td> <td>Comment</td>		Comment
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.

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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: 550-103741-2

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 6/28/2018 8:34:11 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	12
QC Association Summary	16
Lab Chronicle	19
Certification Summary	22
Method Summary	23
Subcontract Data	24
Chain of Custody	34
Receipt Checklists	35

3

4

6

8

9

11

12

14

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## **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

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**

motaro	
Qualifier	Qualifier Description
D1	Sample required dilution due to matrix.

## Glossary

PQL

QC

RER RL

RPD

TEF

TEQ

**Practical Quantitation Limit** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

**Quality Control** 

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)

### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

Job ID: 550-103741-2

Laboratory: TestAmerica Phoenix

Narrative

Job Narrative 550-103741-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 6/4/2018 1:25 PM: the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.8° C, 2.0° C, 2.0° 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 nature of the sample matrix: FC-CCR-MW-71-6218 (550-103741-7), FC-CCR-MW-72-6218 (550-103741-8) and FC-CCR-MW-73-6218 (550-103741-9). The analyte was not detected in the diluted samples. 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.

Method(s) 200.8 LL: The following samples were diluted due to the nature of the sample matrix: FC-CCR-MW-66-53118 (550-103741-1). FC-CCR-MW-67-6218 (550-103741-2), FC-CCR-MW-68-6218 (550-103741-3), FC-CCR-MW-69-6218 (550-103741-4), FC-CCR-FD02-6218 (550-103741-5), FC-CCR-MW-70-53118 (550-103741-6), FC-CCR-MW-71-6218 (550-103741-7), FC-CCR-MW-72-6218 (550-103741-8) and FC-CCR-MW-73-6218 (550-103741-9). Elevated reporting limits (RLs) are provided. Samples were run at a x1, x4, x10, x20 dilutions. The x20 was the lowest dilution for which the internal standards did not fail.

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

#### 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: 550-103741-2

Lab Sample ID	Client Sample ID	Matrix	Collected I	Received
550-103741-1	FC-CCR-MW-66-53118	Water	05/31/18 14:14 06/	/04/18 13:25
550-103741-2	FC-CCR-MW-67-6218	Water	06/02/18 09:25 06/	/04/18 13:25
550-103741-3	FC-CCR-MW-68-6218	Water	06/02/18 08:57 06/	/04/18 13:25
550-103741-4	FC-CCR-MW-69-6218	Water	06/02/18 08:16 06/	/04/18 13:25
550-103741-5	FC-CCR-FD02-6218	Water	06/02/18 08:16 06/	/04/18 13:25
550-103741-6	FC-CCR-MW-70-53118	Water	05/31/18 14:52 06/	/04/18 13:25
550-103741-7	FC-CCR-MW-71-6218	Water	06/02/18 10:25 06/	/04/18 13:25
550-103741-8	FC-CCR-MW-72-6218	Water	06/02/18 11:07 06/	/04/18 13:25
550-103741-9	FC-CCR-MW-73-6218	Water	06/02/18 11:45 06/	/04/18 13:25

SDG: Cholla

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-2

Lab Sample ID: 550-103741-1

Lab Sample ID: 550-103741-2

Lab Sample ID: 550-103741-3

Lab Sample ID: 550-103741-4

Lab Sample ID: 550-103741-5

Lab Sample ID: 550-103741-6

SDG: Cholla

Cliant Campla	ID: FC-CCR-MW-66-53118	
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Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	25	D1	0.80	mg/L		300.0	Total/NA
Lithium	0.36		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.020	D1	0.010	mg/L	20	200.8 LL	Total/NA
Cobalt	0.010	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.015	D1	0.010	mg/L	20	200.8 LL	Total/NA
Thallium	0.0025	D1	0.0020	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-67-6218

Analyte	Result	Qualifier	RL	Unit	Dil Fac [	Method	Prep Type
Fluoride	25	D1	0.80	mg/L		300.0	Total/NA
Lithium	0.50		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.020	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.041	D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-68-6218

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	12 D1	0.80	mg/L	2	300.0	Total/NA
Lithium	0.38	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Selenium	0.24 D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-69-6218

Analyte	Result	Qualifier	RL	Unit	Dil Fac	Method	Prep Type
Fluoride	21	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
Barium	0.016	D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.016	D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.014	D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-FD02-6218

Analyte Fluoride Lithium	Result Qualifie 21 D1 0.49	RL 0.80 0.20	mg/L mg/L	Dil Fac D 1	Method 300.0 200.7 Rev 4.4	Prep Type Total/NA Total/NA
Barium	0.014 D1	0.010	mg/L	20	200.8 LL	Total/NA
Molybdenum	0.015 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.013 D1	0.010	mg/L	20	200.8 LL	Total/NA

### Client Sample ID: FC-CCR-MW-70-53118

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	1.8 D1	0.80	mg/L		300.0	Total/NA
Lithium	0.30	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.012 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.18 D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-71-6218

Lab Sample ID: 550-103741-7

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 35

# **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

Lab Sample ID: 550-103741-8

Lab Sample ID: 550-103741-9

SDG: Cholla

Client Sample ID: FC-CCR-MW-71-6218 (Continued)	Lab Sa
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Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.32	0.20	mg/L	1 -	200.7 Rev 4.4	Total/NA
Arsenic	0.012 D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.20 D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-72-6218

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.35	0.20	mg/L		200.7 Rev 4.4	Total/NA
Selenium	0.10 D1	0.010	mg/L	20	200.8 LL	Total/NA

# Client Sample ID: FC-CCR-MW-73-6218

Analyte		Qualifier	RL	Unit	Dil Fac		Prep Type
Lithium	0.26		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.023	D1	0.010	mg/L	20	200.8 LL	Total/NA
Selenium	0.011	D1	0.010	mg/L	20	200.8 LL	Total/NA

Sample ID: 550-103741-7

SDG: Cholla

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW-66-53118 Date Collected: 05/31/18 14:14 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-1

06/05/18 08:55 06/15/18 10:34

TestAmerica Job ID: 550-103741-2

**Matrix: Water** 

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	25	D1	0.80	mg/L			06/07/18 23:24	2
Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.36		0.20	mg/L		06/05/18 11:56	06/06/18 19:57	1
Method: 200.8 LL - Met Analyte	,	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	N.D.	D1 -	0.010	mg/L		06/05/18 08:55	06/15/18 10:34	20
Arsenic	ND	וט	0.010	IIIg/L		00/03/10 00.33	00/10/10 10.04	20
Arsenic  Barium	0.020		0.010	mg/L		06/05/18 08:55		20
		D1		ū			06/15/18 10:34	
Barium	0.020	D1 D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:34 06/15/18 10:34	20

Client Sample ID: FC-CCR-MW-67-6218 Lab Sample ID: 550-103741-2

0.0020

0.0025 D1

mg/L

Date Collected: 06/02/18 09:25 **Matrix: Water** 

Date Received: 06/04/18 13:25

**Thallium** 

Method: 300.0 - Anio	ns, Ion Chromatogra	aphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	25	D1	0.80	mg/L			06/08/18 01:14	2
Method: 200.7 Rev 4	.4 - Metals (ICP)							
Analyte	• • •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.50		0.20	mg/L		06/05/18 11:56	06/06/18 20:21	1

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:48	20
Barium	0.020	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:48	20
Cobalt	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:48	20
Molybdenum	0.041	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:48	20
Selenium	ND	D1	0.010	mg/L		06/05/18 08:55	06/23/18 13:36	20
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 10:48	20

Client Sample ID: FC-CCR-MW-68-6218 Lab Sample ID: 550-103741-3 Date Collected: 06/02/18 08:57 **Matrix: Water** 

Method: 300.0 - Anior	ns, Ion Chromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	12	D1	0.80	mg/L			06/08/18 02:09	2
- Method: 200.7 Rev 4.4	4 - Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Analyte Lithium	Result 0.38	Qualifier	RL 0.20	Unit mg/L	D	Prepared 06/05/18 11:56		Dil Fac
Lithium	0.38	Qualifier			D			Dil Fac
	0.38 etals (ICP/MS)	Qualifier			D			Dil Fac

TestAmerica Phoenix

Page 8 of 35

TestAmerica Job ID: 550-103741-2 SDG: Cholla

Client Sample ID: FC-CCR-MW-68-6218

Date Collected: 06/02/18 08:57 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-3

**Matrix: Water** 

Method: 200.8 LL - Met	tals (ICP/MS) (Cont	inued)						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:50	20
Cobalt	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:50	20
Molybdenum	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:50	20
Selenium	0.24	D1	0.010	mg/L		06/05/18 08:55	06/23/18 13:39	20
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 10:50	20

Lab Sample ID: 550-103741-4 Client Sample ID: FC-CCR-MW-69-6218 **Matrix: Water** 

Date Collected: 06/02/18 08:16 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Chromatography									
	Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Fluoride	21	D1	0.80	mg/L			06/08/18 03:04	2

Method: 200.7 Rev 4.4 - Metals (ICP)									
	Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
L	Lithium	0.49		0.20	mg/L	_	06/05/18 11:56	06/06/18 20:33	1

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:52	20
Barium	0.016	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:52	20
Cobalt	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:52	20
Molybdenum	0.016	D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:52	20
Selenium	0.014	D1	0.010	mg/L		06/05/18 08:55	06/23/18 13:41	20
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 10:52	20

Lab Sample ID: 550-103741-5 Client Sample ID: FC-CCR-FD02-6218 Date Collected: 06/02/18 08:16 **Matrix: Water** 

Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Chromatography									
	Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
l	Fluoride	21	D1	0.80	mg/L			06/08/18 04:53	2

Method: 200.7 Rev 4.4 - Metals	(ICP)							
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.49		0.20	mg/L		06/05/18 11:56	06/06/18 20:39	1

Method: 200.8 LL - Metals	(ICP/MS)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:59	20
Barium	0.014 D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:59	20
Cobalt	ND D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:59	20
Molybdenum	0.015 D1	0.010	mg/L		06/05/18 08:55	06/15/18 10:59	20
Selenium	0.013 D1	0.010	mg/L		06/05/18 08:55	06/23/18 13:43	20
Thallium	ND D1	0.0020	mg/L		06/05/18 08:55	06/15/18 10:59	20

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-70-53118

Date Collected: 05/31/18 14:52 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-6

**Matrix: Water** 

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.8 D1	0.80	mg/L			06/08/18 05:48	2

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac 0.20 mg/L 06/05/18 11:56 06/06/18 20:50 Lithium 0.30

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:01	20
Barium	0.012	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:01	20
Cobalt	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:01	20
Molybdenum	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:01	20
Selenium	0.18	D1	0.010	mg/L		06/05/18 08:55	06/23/18 13:50	20
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:01	20

Client Sample ID: FC-CCR-MW-71-6218 Lab Sample ID: 550-103741-7 **Matrix: Water** 

Date Collected: 06/02/18 10:25 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 10:12	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		06/05/18 11:56	06/06/18 20:56	1

Is (ICP/MS)							
Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
0.012	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:04	20
ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:04	20
ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:04	20
ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:04	20
0.20	D1	0.010	mg/L		06/05/18 08:55	06/23/18 13:52	20
ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:04	20
	Result 0.012 ND ND ND 0.20	Result   Qualifier	Result 0.012         Qualifier D1         RL 0.010           ND D1         0.010           ND D1         0.010           ND D1         0.010           ND D1         0.010           0.20         D1         0.010	Result 0.012         Qualifier D1         RL 0.010         Unit mg/L mg/L mg/L           ND D1         0.010         mg/L mg/L           ND D1         0.010         mg/L           ND D1         0.010         mg/L           0.20 D1         0.010         mg/L	Result Qualifier         RL 0.010         Unit mg/L mg/L mg/L         D           ND D1         0.010         mg/L mg/L           ND D1         0.010         mg/L           ND D1         0.010         mg/L           ND D1         0.010         mg/L           0.20 D1         0.010         mg/L	Result 0.012         Qualifier D1         RL 0.010         Unit mg/L mg/L mg/L 06/05/18 08:55         D 06/05/18 08:55           ND D1         0.010         mg/L 06/05/18 08:55         06/05/18 08:55           ND D1         0.010         mg/L 06/05/18 08:55           ND D1         0.010         mg/L 06/05/18 08:55           0.20 D1         0.010         mg/L 06/05/18 08:55	Result 0.012         Qualifier D1         RL 0.010         Unit mg/L mg/L mg/L         D 06/05/18 08:55         Analyzed 06/15/18 11:04           ND D1         0.010         mg/L 06/05/18 08:55         06/15/18 11:04           ND D1         0.010         mg/L 06/05/18 08:55         06/15/18 11:04           ND D1         0.010         mg/L 06/05/18 08:55         06/15/18 11:04           ND D1         0.010         mg/L 06/05/18 08:55         06/15/18 11:04           0.20 D1         0.010         mg/L 06/05/18 08:55         06/23/18 13:52

Lab Sample ID: 550-103741-8 Client Sample ID: FC-CCR-MW-72-6218 Date Collected: 06/02/18 11:07

Date Received: 06/04/18 13:25

**Analyte** 

Arsenic

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 11:07	
Method: 200.7 Rev 4	• • •	Our lift an	D.	11-24	_	Day was all	Anabasad	D E
Method: 200.7 Rev 4. Analyte	• • •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa

RL

0.010

Unit

mg/L

TestAmerica Phoenix

Analyzed

06/05/18 08:55 06/15/18 11:06

Prepared

Result Qualifier

 $\overline{ND}$   $\overline{D1}$ 

Dil Fac

**Matrix: Water** 

# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-72-6218

Date Collected: 06/02/18 11:07 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-8

**Matrix: Water** 

Method: 200.8 LL - Met	tals (ICP/MS) (Cont	inued)						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:06	20
Cobalt	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:06	20
Molybdenum	ND	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:06	20
Selenium	0.10	D1	0.010	mg/L		06/05/18 08:55	06/23/18 13:54	20
Thallium	ND	D1	0.0020	mg/L		06/05/18 08:55	06/15/18 11:06	20

Lab Sample ID: 550-103741-9 Client Sample ID: FC-CCR-MW-73-6218 **Matrix: Water** 

Date Collected: 06/02/18 11:45 Date Received: 06/04/18 13:25

Method: 300.0 - Anions, Ion C	hromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			06/05/18 12:01	2

Method: 200.7 Rev 4.4 - Metals	(ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.26	0.20	mg/L		06/05/18 11:56	06/06/18 21:08	1

(ICP/MS)							
Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
ND D	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:08	20
0.023 D	01	0.010	mg/L		06/05/18 08:55	06/15/18 11:08	20
ND D	D1	0.010	mg/L		06/05/18 08:55	06/15/18 11:08	20
ND D	01	0.010	mg/L		06/05/18 08:55	06/15/18 11:08	20
0.011	01	0.010	mg/L		06/05/18 08:55	06/23/18 13:57	20
ND D	01	0.0020	mg/L		06/05/18 08:55	06/15/18 11:08	20
	Result 0  ND 0  0.023 0  ND 0  ND 0  ND 0  0.011 0	(ICP/MS)  Result Qualifier  ND D1  0.023 D1  ND D1  ND D1  0.011 D1  ND D1	Result Qualifier   RL	Result ND         Qualifier D1         RL 0.010         Unit mg/L mg/L mg/L           0.023         D1         0.010         mg/L mg/L           ND         D1         0.010         mg/L           ND         D1         0.010         mg/L           0.011         D1         0.010         mg/L	Result         Qualifier         RL         Unit         D           ND         D1         0.010         mg/L           0.023         D1         0.010         mg/L           ND         D1         0.010         mg/L           ND         D1         0.010         mg/L           0.011         D1         0.010         mg/L	Result         Qualifier         RL         Unit         D         Prepared           ND         D1         0.010         mg/L         06/05/18 08:55           0.023         D1         0.010         mg/L         06/05/18 08:55           ND         D1         0.010         mg/L         06/05/18 08:55           ND         D1         0.010         mg/L         06/05/18 08:55           0.011         D1         0.010         mg/L         06/05/18 08:55	Result         Qualifier         RL         Unit         D         Prepared 06/05/18 08:55         Analyzed 06/15/18 11:08           0.023         D1         0.010         mg/L         06/05/18 08:55         06/15/18 11:08           ND         D1         0.010         mg/L         06/05/18 08:55         06/15/18 11:08           ND         D1         0.010         mg/L         06/05/18 08:55         06/15/18 11:08           0.011         D1         0.010         mg/L         06/05/18 08:55         06/15/18 11:08           0.011         D1         0.010         mg/L         06/05/18 08:55         06/23/18 13:57

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

Method: 300.0 - Anions,	Ion Chromatography
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Lab Sample ID: MB 550-148810/2 Client Sample ID: Method Blank **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 148810** 

MB MB Analyte Result Qualifier RL Unit Analyzed Dil Fac D Prepared 0.40 06/04/18 14:33 Fluoride ND mg/L

Lab Sample ID: LCS 550-148810/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 148810** 

Spike LCS LCS %Rec. Added Limits Analyte Result Qualifier Unit %Rec Fluoride 4.00 4.18 mg/L 104 90 - 110

Lab Sample ID: LCSD 550-148810/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 148810

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit Analyte Unit D %Rec Fluoride 4.00 4.18 mg/L 105

Lab Sample ID: 550-103742-C-1 MS ^200 **Client Sample ID: Matrix Spike** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 148810** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride ND D1 800 873 D1 109 80 - 120 mg/L

Lab Sample ID: 550-103742-C-1 MSD ^200 Client Sample ID: Matrix Spike Duplicate **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 148810

Spike MSD MSD %Rec. RPD Sample Sample Added Analyte Result Qualifier Result Qualifier Unit D %Rec Limits RPD Limit Fluoride ND D1 800 865 D1 108 80 - 120 mg/L

Lab Sample ID: MB 550-149123/2 **Client Sample ID: Method Blank** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 149123** 

MB MB Analyte Result Qualifier RL Unit Prepared D Analyzed Dil Fac Fluoride 0.40 ND mg/L 06/07/18 15:38

Lab Sample ID: LCS 550-149123/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149123** 

Spike LCS LCS %Rec. Added Result Qualifier Analyte Unit %Rec Limits Fluoride 4.00 4.18 104 90 - 110

Lab Sample ID: LCSD 550-149123/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149123** 

LCSD LCSD RPD Spike %Rec. Analyte Added Limits RPD Limit Result Qualifier Unit D %Rec Fluoride 4.00 4.18 mg/L 105 0

TestAmerica Phoenix

TestAmerica Job ID: 550-103741-2

Client Sample ID: FC-CCR-MW-66-53118

SDG: Cholla

Lab Sample ID: 550-103741-1 MS

Client: Arizona Public Service Company

**Matrix: Water** 

Project/Site: CCR

Analysis Batch: 149123

Prep Type: Total/NA Sample Sample Spike MS MS %Rec.

Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride ND D1 800 871 D1 80 - 120 mg/L 106

Lab Sample ID: 550-103741-1 MSD Client Sample ID: FC-CCR-MW-66-53118

**Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149123** 

MSD MSD Sample Sample Spike %Rec. **RPD** Result Qualifier Result Qualifier Added Limits RPD Analyte Unit D %Rec Limit ND D1 800 80 - 120 Fluoride 864 D1 mg/L 105 20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: 550-103741-1 MS Client Sample ID: FC-CCR-MW-66-53118 Prep Type: Total/NA

**Matrix: Water** 

**Prep Batch: 148863 Analysis Batch: 149071** Sample Sample Spike MS MS %Rec.

Result Qualifier Added Result Qualifier Analyte Unit D %Rec Limits Beryllium -0.000277 1.00 0.899 mg/L 90 70 - 130 Lithium 0.363 1.00 1.38 mg/L 101 70 - 130

Lab Sample ID: 550-103741-1 MSD Client Sample ID: FC-CCR-MW-66-53118 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149071** 

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier Limits RPD Analyte Unit D %Rec I imit Beryllium -0.000277 1.00 0.906 mg/L 91 70 - 130 20 Lithium 0.363 1.00 1.37 mg/L 101 70 - 130 20

Method: 200.8 LL - Metals (ICP/MS)

Lab Sample ID: MB 550-148822/1-A Client Sample ID: Method Blank Prep Type: Total/NA

**Matrix: Water** 

Selenium

Analysis Batch: 149720 **Prep Batch: 148822** 

	IVID IV	ID					
Analyte	Result Q	Qualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	0.0010	mg/L		06/05/18 08:55	06/15/18 10:27	1
Arsenic	ND	0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Barium	ND	0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Cadmium	ND	0.00010	mg/L		06/05/18 08:55	06/15/18 10:27	1
Cobalt	ND	0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Lead	ND	0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Molybdenum	ND	0.00050	mg/L		06/05/18 08:55	06/15/18 10:27	1
Thallium	ND	0.00010	mg/L		06/05/18 08:55	06/15/18 10:27	1

Lab Sample ID: MB 550-148822/1-A **Client Sample ID: Method Blank** Prep Type: Total/NA

**Matrix: Water Analysis Batch: 150245** 

ND

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chromium  $\overline{\mathsf{ND}}$ 0.0010 mg/L 06/05/18 08:55 06/23/18 13:16

0.00050

Page 13 of 35 6/28/2018

mg/L

**Prep Batch: 148863** 

**Prep Batch: 148822** 

TestAmerica Phoenix

06/05/18 08:55 06/23/18 13:16

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

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

Matrix: Water Analysis Batch: 149720				Clie	ent Sai	mple ID	Prep Type: Total/NA Prep Batch: 148822
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	0.100	0.0976		mg/L		98	85 - 115
Arsenic	0.100	0.102		mg/L		102	85 <sub>-</sub> 115
Barium	0.100	0.0990		mg/L		99	85 <sub>-</sub> 115
Cadmium	0.100	0.0966		mg/L		97	85 - 115
Cobalt	0.100	0.0995		mg/L		100	85 - 115
Lead	0.100	0.0991		mg/L		99	85 - 115
Molybdenum	0.100	0.0982		mg/L		98	85 - 115
Thallium	0.100	0.0988		mg/L		99	85 <sub>-</sub> 115

Lab Sample ID: LCS 550-148822/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA Analysis Batch: 150245 **Prep Batch: 148822** LCS LCS Spike %Rec. Added Analyte Result Qualifier Unit %Rec Limits Chromium 0.100 0.102 102 85 - 115 mg/L 0.100 Selenium 0.101 mg/L 101 85 - 115

Lab Sample ID: LCSD 550-148822/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 149720 Prep Batch: 148822** Spike LCSD LCSD %Rec. **RPD** Added Limit Result Qualifier Unit D %Rec Limits RPD 0.100 0.0998 mg/L 100 85 - 115 2 20 0.100 0.0961 96 85 - 115 20 mg/L 6

**Analyte** Antimony Arsenic Barium 0.100 0.0988 99 85 - 115 20 mg/L 0 Cadmium 0.100 0.100 mg/L 100 85 - 115 20 Cobalt 0.100 0.0964 96 85 - 115 20 mg/L Lead 0.100 0.0988 mg/L 99 85 - 115 20 Molybdenum 0.100 0.0989 85 - 115 20 mg/L 99 Thallium 0.100 0.0973 mg/L 97 85 - 115 20

Lab Sample ID: LCSD 550-148822/3-A Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 150245 Prep Batch: 148822** Spike LCSD LCSD **RPD** %Rec. Analyte Added Result Qualifier Unit %Rec Limits **RPD** Limit 0.100 Chromium 0.101 mg/L 101 85 - 115 20 0.100 Selenium 0.101 mg/L 101 85 - 115 20

Lab Sample ID: 550-103741-1 MS Client Sample ID: FC-CCR-MW-66-53118 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 149720 Prep Batch: 148822** 

	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	ND	D1	0.100	0.103		mg/L		101	70 - 130
Arsenic	ND	D1	0.100	0.103		mg/L		103	70 - 130
Barium	0.020	D1	0.100	0.121		mg/L		101	70 - 130
Cadmium	ND	D1	0.100	0.0977		mg/L		97	70 - 130
Cobalt	0.010	D1	0.100	0.104		mg/L		93	70 - 130

TestAmerica Phoenix

Page 14 of 35

6/28/2018

# **QC Sample Results**

Client: Arizona Public Service Company Project/Site: CCR

Thallium

Thallium

TestAmerica Job ID: 550-103741-2

70 - 130

70 - 130

SDG: Cholla

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

0.0025 D1

0.0025 D1

ı	Lab Sample ID: 550-10374	1-1 MS					Cilent	Samp	DIE ID: I	-C-CCR-MW-66-5311	ŏ
	Matrix: Water									Prep Type: Total/N	Α
	Analysis Batch: 149720									Prep Batch: 14882	2
	_	Sample	Sample	Spike	MS	MS				%Rec.	
	Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
	Lead	ND	D1	0.100	0.0983		mg/L		94	70 - 130	_
	Molybdenum	0.015	D1	0.100	0.114		mg/L		99	70 - 130	

0.0976

mg/L

mg/L

Lab Sample ID: 550-10374 Matrix: Water Analysis Batch: 150245	1-1 MS					Client	Samp	ile ID: I	-C-CCR-MW-66-53118 Prep Type: Total/NA Prep Batch: 148822
-	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Chromium	ND	D1	0.100	0.112		mg/L		112	70 - 130
Selenium	ND	D1	0.100	0.116		ma/L		111	70 <sub>-</sub> 130

0.100

Lab Sample ID: 550-10374 Matrix: Water	11-1 MSD					Client	Samp	ole ID: F	C-CCR-M Prep Tyl		
Analysis Batch: 149720									Prep Ba		
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	ND	D1	0.100	0.101		mg/L		100	70 - 130	1	20
Arsenic	ND	D1	0.100	0.103		mg/L		103	70 - 130	0	20
Barium	0.020	D1	0.100	0.122		mg/L		101	70 - 130	0	20
Cadmium	ND	D1	0.100	0.0998		mg/L		99	70 - 130	2	20
Cobalt	0.010	D1	0.100	0.105		mg/L		94	70 - 130	1	20
Lead	ND	D1	0.100	0.0983		mg/L		94	70 - 130	0	20
Molybdenum	0.015	D1	0.100	0.113		mg/L		99	70 - 130	1	20

Lab Sample ID: 550-103741	-1 MSD					Client	Samp	ole ID: F	C-CCR-M		
Matrix: Water									Prep Typ	oe: Tot	al/NA
Analysis Batch: 150245									Prep Ba	itch: 14	18822
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chromium	ND	D1	0.100	0.101		mg/L		101	70 - 130	10	20
Selenium	ND	D1	0.100	0.110		mg/L		105	70 - 130	5	20

0.0965

0.100

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

## HPLC/IC

# **Analysis Batch: 148810**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	300.0	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	300.0	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	300.0	
MB 550-148810/2	Method Blank	Total/NA	Water	300.0	
LCS 550-148810/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-148810/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-103742-C-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-103742-C-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	

## **Analysis Batch: 149123**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	300.0	_
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	300.0	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	300.0	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	300.0	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	300.0	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	300.0	
MB 550-149123/2	Method Blank	Total/NA	Water	300.0	
LCS 550-149123/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-149123/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	300.0	
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	300.0	

### Metals

### **Prep Batch: 148822**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.8	
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.8	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.8	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.8	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.8	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.8	
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.8	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.8	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.8	
MB 550-148822/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-148822/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-148822/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.8	
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.8	

### **Prep Batch: 148863**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.7	
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.7	
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.7	
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.7	
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.7	
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.7	

TestAmerica Phoenix

Page 16 of 35

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-2 SDG: Cholla

# **Metals (Continued)**

# Prep Batch: 148863 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.7	
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.7	
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.7	
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.7	
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.7	

### **Analysis Batch: 149071**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.7 Rev 4.4	148863

### **Analysis Batch: 149720**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.8 LL	148822
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.8 LL	148822
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.8 LL	148822
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.8 LL	148822
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.8 LL	148822
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.8 LL	148822
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.8 LL	148822
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.8 LL	148822
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.8 LL	148822
MB 550-148822/1-A	Method Blank	Total/NA	Water	200.8 LL	148822
LCS 550-148822/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	148822
LCSD 550-148822/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	148822
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.8 LL	148822
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.8 LL	148822

### **Analysis Batch: 150245**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1	FC-CCR-MW-66-53118	Total/NA	Water	200.8 LL	148822
550-103741-2	FC-CCR-MW-67-6218	Total/NA	Water	200.8 LL	148822
550-103741-3	FC-CCR-MW-68-6218	Total/NA	Water	200.8 LL	148822
550-103741-4	FC-CCR-MW-69-6218	Total/NA	Water	200.8 LL	148822
550-103741-5	FC-CCR-FD02-6218	Total/NA	Water	200.8 LL	148822
550-103741-6	FC-CCR-MW-70-53118	Total/NA	Water	200.8 LL	148822
550-103741-7	FC-CCR-MW-71-6218	Total/NA	Water	200.8 LL	148822
550-103741-8	FC-CCR-MW-72-6218	Total/NA	Water	200.8 LL	148822
550-103741-9	FC-CCR-MW-73-6218	Total/NA	Water	200.8 LL	148822
MB 550-148822/1-A	Method Blank	Total/NA	Water	200.8 LL	148822
LCS 550-148822/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	148822
LCSD 550-148822/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	148822

TestAmerica Phoenix

# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

# **Metals (Continued)**

# **Analysis Batch: 150245 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-103741-1 MS	FC-CCR-MW-66-53118	Total/NA	Water	200.8 LL	148822
550-103741-1 MSD	FC-CCR-MW-66-53118	Total/NA	Water	200.8 LL	148822

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-66-53118

Date Collected: 05/31/18 14:14 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-1

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			149123	06/07/18 23:24	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 19:57	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 10:34	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 13:23	TEK	TAL PHX

Client Sample ID: FC-CCR-MW-67-6218 Lab Sample ID: 550-103741-2

Date Collected: 06/02/18 09:25 Date Received: 06/04/18 13:25

**Matrix: Water** 

**Matrix: Water** 

**Matrix: Water** 

Batch **Dilution** Batch Prepared Batch **Prep Type** Method Factor Number or Analyzed Analyst Type Run Lab Total/NA 300.0 149123 06/08/18 01:14 NBL TAL PHX Analysis Total/NA 200.7 TAL PHX Prep 148863 06/05/18 11:56 SGO Total/NA Analysis 200.7 Rev 4.4 149071 06/06/18 20:21 ARE TAL PHX 1 Total/NA Prep 200.8 148822 06/05/18 08:55 SGO TAL PHX Total/NA Analysis 200.8 LL 149720 06/15/18 10:48 TEK TAL PHX 20 200.8 Total/NA Prep 148822 06/05/18 08:55 SGO TAL PHX Total/NA Analysis 200.8 LL 20 150245 06/23/18 13:36 TEK TAL PHX

Client Sample ID: FC-CCR-MW-68-6218 Lab Sample ID: 550-103741-3

Date Collected: 06/02/18 08:57

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			149123	06/08/18 02:09	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:27	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 10:50	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 13:39	TEK	TAL PHX

Client Sample ID: FC-CCR-MW-69-6218

Date Collected: 06/02/18 08:16

Date Received: 06/04/18 13:25

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			149123	06/08/18 03:04	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:33	ARE	TAL PHX

Lab Sample ID: 550-103741-4

Page 19 of 35

10

TestAmerica Phoenix

6/28/2018

TestAmerica Job ID: 550-103741-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-69-6218

Date Collected: 06/02/18 08:16 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-4

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 10:52	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 13:41	TEK	TAL PHX

Client Sample ID: FC-CCR-FD02-6218

Date Collected: 06/02/18 08:16

Lab Sample ID: 550-103741-5 **Matrix: Water** 

Date Received: 06/04/18 13:25 Batch Dilution Batch Batch **Prepared** 

Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Analysis	300.0			149123	06/08/18 04:53	NBL	TAL PHX
Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:39	ARE	TAL PHX
Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Analysis	200.8 LL		20	149720	06/15/18 10:59	TEK	TAL PHX
Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Analysis	200.8 LL		20	150245	06/23/18 13:43	TEK	TAL PHX
	Analysis Prep Analysis Prep Analysis Prep Analysis	Analysis 300.0  Prep 200.7  Analysis 200.7 Rev 4.4  Prep 200.8  Analysis 200.8 LL  Prep 200.8	Analysis 300.0  Prep 200.7  Analysis 200.7 Rev 4.4  Prep 200.8  Analysis 200.8 LL  Prep 200.8	Analysis 300.0 2  Prep 200.7  Analysis 200.7 Rev 4.4 1  Prep 200.8  Analysis 200.8 LL 20  Prep 200.8	Analysis       300.0       2       149123         Prep       200.7       148863         Analysis       200.7 Rev 4.4       1       149071         Prep       200.8       148822         Analysis       200.8 LL       20       149720         Prep       200.8       148822         Analysis       200.8       148822	Analysis       300.0       2       149123       06/08/18 04:53         Prep       200.7       148863       06/05/18 11:56         Analysis       200.7 Rev 4.4       1       149071       06/06/18 20:39         Prep       200.8       148822       06/05/18 08:55         Analysis       200.8 LL       20       149720       06/15/18 10:59         Prep       200.8       148822       06/05/18 08:55	Analysis         300.0         2         149123         06/08/18 04:53         NBL           Prep         200.7         148863         06/05/18 11:56         SGO           Analysis         200.7 Rev 4.4         1         149071         06/06/18 20:39         ARE           Prep         200.8         148822         06/05/18 08:55         SGO           Analysis         200.8 LL         20         149720         06/15/18 10:59         TEK           Prep         200.8         148822         06/05/18 08:55         SGO

Client Sample ID: FC-CCR-MW-70-53118

Date Collected: 05/31/18 14:52

Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-6 **Matrix: Water** 

Batch **Batch** Dilution Batch **Prepared Prep Type** Type Method Run Factor Number or Analyzed Analyst Lab Total/NA Analysis 300.0 2 149123 06/08/18 05:48 NBL TAL PHX Total/NA Prep 200.7 148863 06/05/18 11:56 SGO TAL PHX Total/NA Analysis 200.7 Rev 4.4 1 149071 06/06/18 20:50 ARE TAL PHX Total/NA Prep 200.8 148822 06/05/18 08:55 SGO TAL PHX Total/NA Analysis 200.8 LL 20 149720 06/15/18 11:01 TEK TAL PHX Total/NA Prep 200.8 148822 06/05/18 08:55 SGO TAL PHX Total/NA Analysis 200.8 LL 20 150245 06/23/18 13:50 TEK TAL PHX

Client Sample ID: FC-CCR-MW-71-6218

Date Collected: 06/02/18 10:25 Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-7 **Matrix: Water** 

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			148810	06/05/18 10:12	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 20:56	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 11:04	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 13:52	TEK	TAL PHX

TestAmerica Phoenix

Page 20 of 35

### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-103741-2

SDG: Cholla

Client Sample ID: FC-CCR-MW-72-6218

Date Collected: 06/02/18 11:07 Date Received: 06/04/18 13:25 Lab Sample ID: 550-103741-8

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	148810	06/05/18 11:07	NBL	TAL PHX
Total/NA	Prep	200.7			148863	06/05/18 11:56	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	149071	06/06/18 21:02	ARE	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	149720	06/15/18 11:06	TEK	TAL PHX
Total/NA	Prep	200.8			148822	06/05/18 08:55	SGO	TAL PHX
Total/NA	Analysis	200.8 LL		20	150245	06/23/18 13:54	TEK	TAL PHX

Client Sample ID: FC-CCR-MW-73-6218

Date Collected: 06/02/18 11:45

Date Received: 06/04/18 13:25

Lab Sample ID: 550-103741-9

Matrix: Water

Batch **Batch** Dilution Batch **Prepared** Type **Prep Type** Method Run **Factor** Number or Analyzed Analyst Lab 300.0 Total/NA Analysis 148810 06/05/18 12:01 NBL TAL PHX Total/NA Prep 200.7 148863 06/05/18 11:56 SGO TAL PHX Total/NA Analysis 200.7 Rev 4.4 1 149071 06/06/18 21:08 ARE TAL PHX Total/NA Prep 200.8 148822 06/05/18 08:55 SGO TAL PHX Total/NA 200.8 LL TAL PHX Analysis 20 149720 06/15/18 11:08 TEK Total/NA 200.8 TAL PHX Prep 148822 06/05/18 08:55 SGO Total/NA 150245 06/23/18 13:57 TEK TAL PHX Analysis 200.8 LL 20

### **Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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

TestAmerica Phoenix

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12

# **Accreditation/Certification Summary**

Client: Arizona Public Service Company
Project/Site: CCR
TestAmerica Job ID: 550-103741-2
SDG: Cholla

# Laboratory: TestAmerica Phoenix

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

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

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13

14

# **Method Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-103741-2

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
Subcontract	Radium 226/228	None	Radiation
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.

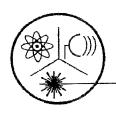
None = None

### **Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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

TestAmerica Phoenix



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(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: May 31, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-66-53118 (550-103741-1)	$1.1 \pm 0.2$	$1.0 \pm 0.3$	$2.1 \pm 0.4$

Date of Analysis	6/8/2018	6/8/2018	6/8/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462

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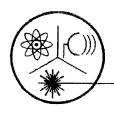
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(480) 897-9459 FAX (480) 892-5446

# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: June 02, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-67-6218 (550-103741-2)	< 0.4	$1.5 \pm 0.3$	1.5 ± 0.3

Date of Analysis	6/8/2018	6/8/2018	6/8/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462

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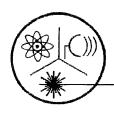
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(480) 897-9459 FAX (480) 892-5446

# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: June 02, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-68-6218 (550-103741-3)	$0.6 \pm 0.2$	< 0.6	$0.6 \pm 0.2$

Date of Analysis	6/8/2018	6/8/2018	6/8/2018

Robert L. Metzger, Ph.D., C.H.P.

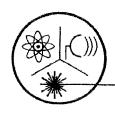
6/18/2018

Date

Laboratory License Number AZ0462

Page 26 of 35

6/28/2018



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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: June 02, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-69-6218 (550-103741-4)	$1.3 \pm 0.2$	$3.3 \pm 0.4$	4.6 ± 0.4

		T	
Date of Analysis	6/8/2018	6/8/2018	6/8/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018 Date

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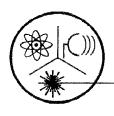
Laboratory License Number AZ0462

Page 27 of 35

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(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: June 02, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD02-6218 (550-103741-5)	$0.9 \pm 0.2$	$2.2 \pm 0.3$	3.1 ± 0.4

Date of Analysis	6/8/2018	6/8/2018	6/8/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018

Date

Laboratory License Number AZ0462

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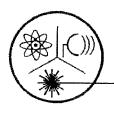
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(480) 897-9459 FAX (480) 892-5446

# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: May 31, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-70-53118 (550-103741-6)	$0.5 \pm 0.2$	$2.3 \pm 0.3$	$2.8 \pm 0.4$

		T	
Date of Analysis	6/8/2018	6/8/2018	6/8/2018
			l li

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018 Date

Laboratory License Number AZ0462

Page 29 of 35

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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: June 02, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-71-6218 (550-103741-7)	$0.4 \pm 0.2$	1.5 ± 0.3	1.9 ± 0.4

Date of Analysis	6/8/2018	6/8/2018	6/8/2018

Robert L. Metzger, Ph.D., C.H.P.

6/18/2018 Date

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Laboratory License Number AZ0462

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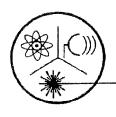
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(480) 897-9459 FAX (480) 892-5446

# Radiochemical Activity in Water (pCi/L)

TestAmerica
4625 E. Cotton Center Blvd., Suite #189
Phoenix, AZ 85040

Sampling Date: June 02, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-72-6218 (550-103741-8)	< 0.4	$2.8 \pm 0.3$	$2.8 \pm 0.3$

Date of Analysis	6/8/2018	6/8/2018	6/8/2018

6/18/2018

Robert L. Metzger, Ph.D., C.H.P.

Date

Laboratory License Number AZ0462

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(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: June 02, 2018 Sample Received: June 05, 2018 Analysis Completed: June 18, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW-73-6218 (550-103741-9)	$0.8 \pm 0.2$	$2.0 \pm 0.3$	$2.8 \pm 0.4$

		<u></u>	
Date of Analysis	6/8/2018	6/8/2018	6/8/2018
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6/18/2018

Date

Laboratory License Number AZ0462

Page 32 of 35

Ver: 09/20/2016

# Chain of Custody Record

TestAmerica Phoenix

TO SECURITY OF THE PROPERTY OF	PortAmerica	シンシーシーシーシー	THE LEASTER OF SEVERCENARY TAX SERVER G	
				Careine Teaching Major.
	المروم والمرامين أم مندمان	Citatil of Custody Record		Lab PM
•			2) 454-9303	Sampler.
lestamerica Phoenix	4625 East Cotton Ctr Bivd Suite 189	Phoenix, AZ 85040	Phone (602) 437-3340 Fax (602) 454-9303	

	Sampler.			Lab PM:	.¥:					Carrier	Carrier Tracking No(s):	No(s).		SO No.	The state of the s
Client Information (Sub Contract Lab)				Bak	Baker, Ken									550.21312.1	
Client Contact:	Phone:			E-Mail						Stala	State of Dogin.				
Shipping/Receiving				ken	baker@	testame	ken.baker@testamericainc.com	Com		Arizona	2 6			Page.	
Company:					Accredite	tions Rec	Accreditations Required (See note)	(alone)							
Radiation Safety Eng., Inc.					State F	rogram	State Program - Arizona	a						550-103741.1	-
Address	Due Date Requested:							İ					-	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
3245 North Washington Street,	6/13/2018							Analy	Analysis Requested	nest	þ			Preservation Codes	odes:
City	TAT Requested (days):	ند			100 mg	-		F	$\vdash$		ŀ			A HCL	M - Hexane
Changier										_				B - NaOH	None
State, Zip: AZ, 85225											••••			D-Nitric Acid	P - Na204S
										_				E - Namboo4	Q - Na2SO3
l'nane:	# Od				234	822						<del></del>		F - MeOH G - Amchlor	R - Na2S2O3 S - H2SO4
Email	#OM				100	/9ZZ								H - Ascorbic Acid	T - TSP Dodecahydrate U - Acetone
					-	щг									V - MCAA
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	00/60000				7.77	1 /(									t - and (shear))
one. Arizona Public Service	SSOW#:					877/9								Other	
					COLDEN	22.								91 O	
			Sample Type	Matrix (w=water,	enetii- ZM:MS	nuibs								quin	
Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time		B=solid, O=waste/oll, BT=Tissue, A=Air ]	WEIGHT AND	a) ans						*		i lato	
	$\langle \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	X	100	on Code:	X										opecial Illandenolis/Note:
FC-CCR-MW-66-53118 (550-103741-1)	5/31/18	14:14 Mountain		Water		×								2 Job 3	303
FC-CCR-MW-67-6218 (550-103741-2)	6/2/18	09:25 Mountain		Water		×					-		-	1	
FC-CCR-MW-68-6218 (550-103741-3)	6/2/18	08:57 Mountain		Water		   ×			-					2 Job 3	2000
FC-CCR-MW-69-6218 (550-103741-4)	6/2/18	08:16 Iountain		Water		×								2 Job 3	31777
FC-CCR-FD02-6218 (550-103741-5)	6/2/18	08:16 Mountain		Water		×					-			2 Job 3	
FC-CCR-MW-70-53118 (550-103741-6)	5/31/18 IN	14:52 Mountain		Water		×					-			2 Job 3	3000
FC-CCR-MW-71-6218 (550-103741-7)	6/2/18 N	10:25 Mountain		Water		×						1		2 Job 3	
FC-CCR-MW-72-6218 (550-103741-8)	6/2/18 N	11:07 Mountain		Water		×								2 Job 3	
FC-CCR-MW-73-6218 (550-103741-9)	6/2/18 N	11:45 Mountain		Water		×			_					2 Job 3	
Note: Since laboration are subject to change. TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compilance 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/lests/mainty being analyzed, the samples must be shipped back to the TestAmerica above not originally acceptable to the samples must be shipped back to the TestAmerica above not originally acceptable to the samples of the samples must be shipped back to the TestAmerica above not originally acceptable to the samples of the samples must be shipped back to the TestAmerica above the samples of the test of the test of the samples of the samp	ss, Inc. places the own atrix being analyzed, I	ership of met te samples r	nod, analyte & ust be shippe	accreditation	compliance	upon ou	subcontr	act tabora	tories. Th	is sample	shipmen	t is forwar	ded under	r chain-of-custody. If the	ne laboratory does not

Laboratories, Inc. altoritor immediately. If all requested accreditations are current to date, refurn the signed Chain of Custofy affecting to said complicance to TestAmerica Laboratories, Inc. Possible Hazard Identification

	COSTON CONTRACTOR OF THE CONTR		Š	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)	Samples are retained founer than 1	month
	Unconfirmed			Return To Client	ah Arahina Ear	(1)
	Deliverable Requested: I, III, IV, Other (specify)	Primary Deliverable Rank: 2	S	Red		SULUDINI
	Empty Kit Relinquished by:	Date:	Time:		Melhod of Shipmen:	
	Relinquished by:	Date/Time: 0 4, 54/1m	Company Fest Ams	Received by:	Date/Time;	Company
	Relinquished by:	Date/Time:	Company	-		Company
6	Relinquished by.	.Date/Time:	Сотрапу	Received by:	Date/Time:	Company
/28/2	Custody Seals Intact: Custody Seal No.:			Coaler Temperature(s) °C and Other Remarks:		
2(						

TestAmerica Phoenix

# Chain of Custody Record

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013	Form No. CA						
Date/Time:	Company:	Received in Laboratory by:	Date/Time:		Company:		Relinquished by:
Date/Time:	Company:	Received by:	Date/Time:		Company:		remiquistied by.
Date/Timg: 6:70a	Company:	Heceived by Charles	CAK CO	ARS	Company.		Palinguishodhu
Therm ID No.:		Cooler Temp. (°C): Obs'd	1	No.:	Custody Seal No.:		Custody Seals Intact:
	*	ТАРНХ	M				
						nments:	Special Instructions/QC Requirements & Comments:
	fee may be assessed if samples are retained longer than 1 month)	Sample Disposal ( A fee may be as:	sample in the	Waste Codes for the	List any EPA	Waste? Please sample.	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.
				her selection and the	NaOHMAN	AMALHNO3度5	Preservation Used: Terios 2= HCi; 3= H2SO4 MALHNO3 KS-NaOHMO-Other Male Control of the Control o
		××××	¥ 4	1145 G	6/2/2018	109	FC-CCR-MW-73-6218
		×	W 4 N	1107 G	6/2/2018	30-	FC-CCR-MW-72-6218
		× × ×	₩ 4	1025 G	6/2/2018	-07	FC-CCR-MW-71-6218
		× × ×	W 4	1452 G	5/31/2018	40-	FC-CCR-MW-70-53118
		× × ×	¥ 4	816 G	6/2/2018	50-	FC-CCR-FD02-6218
		×	¥ 4	816 G	6/2/2018	104	FC-CCR-MW-69-6218
		××××	₩ 4	857 G	6/2/2018	3	FC-CCR-MW-68-6218
		××××	₩ 4 2	925 G	6/2/2018	- 02	FC-CCR-MW-67-6218
		××××	\$ 4 2	1414 G	5/31/2018	10-	FC-CCH-MW-66-53118
Sample Specific Notes:		Perform M EPA 200.7 200.8 (As, EPA_Ra EPA 300.0	Matrix # of Filtered S	Sample Sample CCComp, Time G=Grab)	Sample Date		Sample Identification
		(Li) Ba, 226	amp				P O #
lob / SDG No :		Co,	le (				Site: Cholla
rab Cariping.		Мо	Y / Y			7	CCR
ab Sampling:		, Se	N)				
For Lab Use Only:		, TI)		TAT if different from Below	TAT		(928) 587-0319 Phone
Sampler:			Time	Analysis Turnaround Time	An		End of County Hoad 66/5
1 of1 COCs	Carrier:				928-587-0319		APS Four Corners
6/3/2018 COC No:	6/3/201	Doug Lavarnway	Do	nway	Doug Lavarnway		Client Contact
TestAmerica Laboratories, Inc.		CCR		Regulatory Program:	Regula		phone 602.437.3340 fax 602.454.9303
			7	127771			Suite 189 Phoenix, AZ 85040

Client: Arizona Public Service Company

Job Number: 550-103741-2

SDG Number: Cholla

Login Number: 103741 List Source: TestAmerica Phoenix

List Number: 1

Creator: Gravlin, Andrea

Groutor. Gravini, Anaroa		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.



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: 550-113007-1

Client Project/Site: CCR

### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 11/26/2018 4:06:46 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	10
QC Sample Results	16
QC Association Summary	22
Lab Chronicle	25
Certification Summary	30
Method Summary	31
Subcontract Data	32
Chain of Custody	44
Receipt Checklists	47

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# **Definitions/Glossary**

Client: Arizona Public Service Company

**Qualifier Description** 

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

# **Qualifiers**

### **HPLC/IC** Qualifier

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.
D2	Sample required dilution due to high concentration of analyte.

### **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**

ND

PQL

QC

RLRPD

TEF

**TEQ** 

**RER** 

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

Not Detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

**Practical Quantitation Limit** 

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

**Quality Control** 

Page 3 of 47

### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Job ID: 550-113007-1

Laboratory: TestAmerica Phoenix

Narrative

Job Narrative 550-113007-1

### Comments

No additional comments.

### Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.9° C, 3.0° C and 3.8° C.

### **Receipt Exceptions**

Received 3 pages of COCs from the courier.

Samples #6 - #9 only request Appendix I.

All of the other samples request Appendix I and II.

Client did provide sample containers if Appendix II is needed.

 $FC-CCR-MW62-11218 \ (550-113007-6), \ FC-CCR-MW63-112818 \ (550-113007-7), \ FC-CCR-MW64-11218 \ (550-113007-8) \ and \ FC-CCR-MW65-11218 \ (550-113007-9)$ 

### 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: FC-CCR-MW71-11318 (550-113007-10), FC-CCR-MW72-11318 (550-113007-11), FC-CCR-MW73-11318 (550-113007-12) and FC-CCR-FD01-11318 (550-113007-13). This analyte was not detected in the diluted samples. 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: FC-CCR-FD02-11318 (550-113007-14). This analyte was not detected in the diluted samples. 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 additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TestAmerica Phoenix 11/26/2018

# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-113007-1	FC-CCR-MW66-11218	Water	11/02/18 13:28	11/07/18 13:00
550-113007-2	FC-CCR-MW67-11318	Water	11/03/18 09:57	11/07/18 13:00
550-113007-3	FC-CCR-MW68-11318	Water	11/03/18 11:01	11/07/18 13:00
550-113007-4	FC-CCR-MW69-11318	Water	11/03/18 08:49	11/07/18 13:00
550-113007-5	FC-CCR-MW70-11218	Water	11/02/18 15:32	11/07/18 13:00
550-113007-6	FC-CCR-MW62-11218	Water	11/02/18 14:10	11/07/18 13:00
550-113007-7	FC-CCR-MW63-112818	Water	11/02/18 14:49	11/07/18 13:00
550-113007-8	FC-CCR-MW64-11218	Water	11/02/18 12:52	11/07/18 13:00
550-113007-9	FC-CCR-MW65-11218	Water	11/02/18 12:08	11/07/18 13:00
550-113007-10	FC-CCR-MW71-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-11	FC-CCR-MW72-11318	Water	11/03/18 12:31	11/07/18 13:00
550-113007-12	FC-CCR-MW73-11318	Water	11/03/18 13:24	11/07/18 13:00
550-113007-13	FC-CCR-FD01-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-14	FC-CCR-FD02-11318	Water	11/03/18 12:31	11/07/18 13:00

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218

Lab Sample ID: 550-113007-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1800	D2	400	mg/L	200	_	300.0	Total/NA
Fluoride	25	D1	2.0	mg/L	5		300.0	Total/NA
Sulfate	12000	D2	400	mg/L	200		300.0	Total/NA
Boron	140	D2 M3	0.20	mg/L	4		200.7 Rev 4.4	Total/NA
Calcium	470	M3	2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	20000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	9.6	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: FC-CCR-MW67-11318

Lab Sample ID: 550-113007-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2000	D2	400	mg/L	200	_	300.0	Total/NA
Fluoride	16	D1	2.0	mg/L	5		300.0	Total/NA
Sulfate	13000	D2	400	mg/L	200		300.0	Total/NA
Boron	170	D2	0.20	mg/L	4		200.7 Rev 4.4	Total/NA
Calcium	470		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
рН	7.4	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	14.7	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: FC-CCR-MW68-11318

Lab Sample ID: 550-113007-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	1500	D2 -	400	mg/L	200	300.0	Total/NA
Fluoride	12	D1	2.0	mg/L	5	300.0	Total/NA
Sulfate	11000	D2	400	mg/L	200	300.0	Total/NA
Boron	150	D2	0.20	mg/L	4	200.7 Rev 4.4	Total/NA
Calcium	460		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	18000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.2	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: FC-CCR-MW69-11318

Lab Sample ID: 550-113007-4

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	1200	D2	400	mg/L	200	300.0	Total/NA
Fluoride	11	D1	2.0	mg/L	5	300.0	Total/NA
Sulfate	8700	D2	400	mg/L	200	300.0	Total/NA
Boron	92	D2	0.10	mg/L	2	200.7 Rev 4.4	Total/NA
Calcium	470		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	14000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.3	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	13.0	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

Client Sample ID: FC-CCR-MW70-11218

Lab Sample ID: 550-113007-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1100	D2	400	mg/L	200	_	300.0	Total/NA
Fluoride	2.7	D1	0.80	mg/L	2		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 47

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW70-11218 (Continued)

Lab Sample ID: 550-113007-5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	6400	D2	400	mg/L	200	_	300.0	Total/NA
Boron	88	D2	0.10	mg/L	2		200.7 Rev 4.4	Total/NA
Calcium	510		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	11000	D2	100	mg/L	1		SM 2540C	Total/NA
pH	7.0	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: FC-CCR-MW62-11218

Lab Sample II	D: 550-113007-6
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Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	110	D2	100	mg/L	50	_	300.0	Total/NA
Fluoride	1.5		0.40	mg/L	1		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	550		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	5600	D2	100	mg/L	1		SM 2540C	Total/NA
pН	6.8	H5	1.7	SU	1		SM 4500 H+ B	Total/NA
Temperature	13.9	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-MW63-112818

### Lab Sample ID: 550-113007-7

Analyte	Result Qualifier	RL	Unit	Dil Fac	Method	Prep Type
Chloride	88	2.0	mg/L		300.0	Total/NA
Fluoride	1.9	0.40	mg/L	1	300.0	Total/NA
Sulfate	2800 D2	100	mg/L	50	300.0	Total/NA
Boron	1.9	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
Total Dissolved Solids	4300 D2	40	mg/L	1	SM 2540C	Total/NA
pH	7.1 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	15.3 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-MW64-11218

#### Lab Sample ID: 550-113007-8

Analyte	Result Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	50	2.0	mg/L	1	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	0.64	0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	88	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	760	20	mg/L	1	SM 2540C	Total/NA
pH	7.8 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	14.8 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-MW65-11218

#### Lab Sample ID: 550-113007-9

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	51	2.0	mg/L		300.0	Total/NA
Fluoride	1.9	0.40	mg/L	1	300.0	Total/NA
Sulfate	420 D2	40	mg/L	20	300.0	Total/NA
Boron	0.77	0.050	mg/L	1	200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 7 of 47

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Client: Arizona Public Service Company

Project/Site: CCR

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Temperature

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-9

Lab Sample ID: 550-113007-10

SM 4500 H+ B

SM 4500 H+ B

Lab Sample ID: 550-113007-11

Lab Sample ID: 550-113007-12

Lab Sample ID: 550-113007-13

Lab Sample ID: 550-113007-14

Total/NA

Total/NA

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Calcium	100	2.0	mg/L		200.7 Rev 4.4	Total/NA
Total Dissolved Solids	940	20	mg/L	1	SM 2540C	Total/NA
рH	7.5 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: FC-CCR-MW71-11318

Client Sample ID: FC-CCR-MW65-11218 (Continued)

7.0 H5

14.8 H5

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Chloride	520	D2	400	mg/L	200	300.0	Total/NA
Sulfate	11000	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
Total Dissolved Solids	16000	D2	100	mg/L	1	SM 2540C	Total/NA

1.7

SU

Degrees C

#### Client Sample ID: FC-CCR-MW72-11318

Analyte	Result Qual	ifier RL	Unit	Dil Fac	D Method	Prep Type
Chloride	450	10	mg/L	5	300.0	Total/NA
Sulfate	11000 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	470	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	16000 D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.0 H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	14.8 H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-MW73-11318

Analyte	Result	Qualifier	RL	Unit	Dil Fac I	Method	Prep Type
Chloride	660	D2	200	mg/L	100	300.0	Total/NA
Sulfate	7500	D2	200	mg/L	100	300.0	Total/NA
Boron	1.7		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
Total Dissolved Solids	12000	D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.0	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: FC-CCR-FD01-11318

Analyte	Result (	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	520	D2 -	400	mg/L	200	300.0	Total/NA
Sulfate	11000 [	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	450		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	16000 I	D2	100	mg/L	1	SM 2540C	Total/NA
рН	7.2 H	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	7.4 l	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-FD02-11318

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 8 of 47 11/26/2018

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### **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-14

# Client Sample ID: FC-CCR-FD02-11318 (Continued)

Analyte	Result Qu	ualifier	RL	Unit	Dil Fac	Method	Prep Type
Chloride	450 D1	1	10	mg/L	5	300.0	Total/NA
Sulfate	11000 D2	2	400	mg/L	200	300.0	Total/NA
Boron	0.21		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	460		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Total Dissolved Solids	16000 D2	2	100	mg/L	1	SM 2540C	Total/NA
pН	7.1 H5	5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	9.5 H5	5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

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Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218 Lab Sample ID: 550-113007-1

Date Collected: 11/02/18 13:28

9.6 H5

**Matrix: Water** 

11/09/18 16:54

Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1800	D2	400	mg/L			11/13/18 19:51	200
Fluoride	25	D1	2.0	mg/L			11/13/18 19:33	5
Sulfate	12000	D2	400	mg/L			11/13/18 19:51	200
- Method: 200.7 Rev 4.4 - Me	etals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	140	D2 M3	0.20	mg/L		11/09/18 07:19	11/16/18 04:05	4
Calcium	470	M3	2.0	mg/L		11/09/18 07:19	11/14/18 21:27	1
-	410		2.0	mg/L		11/03/10 07:13	11/14/10 21.21	
General Chemistry	470		2.0	9/2		11/03/10 07:13	11/14/10 21.2/	'
General Chemistry		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
- · · · · · · · · · · · · · · · · · · ·		Qualifier		Ü	<u>D</u>			Dil Fac

Client Sample ID: FC-CCR-MW67-11318 Lab Sample ID: 550-113007-2

0.1

Degrees C

Date Collected: 11/03/18 09:57 **Matrix: Water** 

Date Received: 11/07/18 13:00

**Temperature** 

Method: 300.0 - Anions, Ion C	hromatogra	iphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2000	D2	400	mg/L			11/13/18 21:42	200
Fluoride	16	D1	2.0	mg/L			11/13/18 21:23	5
Sulfate	13000	D2	400	mg/L			11/13/18 21:42	200
Method: 200.7 Rev 4.4 - Metal	s (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	170	D2	0.20	mg/L		11/09/18 07:19	11/16/18 04:11	4
Calcium	470		2.0	mg/L		11/09/18 07:19	11/14/18 21:33	1

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	19000	D2	200	mg/L			11/08/18 12:33	1
pH	7.4	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.7	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW68-11318 Lab Sample ID: 550-113007-3 Matrix: Water Date Collected: 11/03/18 11:01

Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1500	D2	400	mg/L			11/13/18 22:18	200
Fluoride	12	D1	2.0	mg/L			11/13/18 22:00	5
Sulfate	11000	D2	400	mg/L			11/13/18 22:18	200

Method: 200.7 Rev 4.4 - Metals (ICP)									
	Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Boron	150	D2	0.20	mg/L		11/09/18 07:19	11/16/18 04:17	4
	Calcium	460		2.0	mg/L		11/09/18 07:19	11/14/18 21:39	1

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW68-11318

Date Collected: 11/03/18 11:01 Date Received: 11/07/18 13:00 Lab Sample ID: 550-113007-3

Matrix: Water

**Matrix: Water** 

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	18000	D2	100	mg/L			11/08/18 12:33	1
pH	7.2	H5	1.7	SU			11/09/18 16:54	1
Temperature	13.5	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW69-11318 Lab Sample ID: 550-113007-4

Date Collected: 11/03/18 08:49 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography									
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac	
Chloride	1200	D2	400	mg/L			11/13/18 23:32	200	
Fluoride	11	D1	2.0	mg/L			11/13/18 23:14	5	
Sulfate	8700	D2	400	mg/L			11/13/18 23:32	200	

Method: 200.7 Rev 4.4 - Metals	(ICP)							
Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	92	02	0.10	mg/L		11/09/18 07:19	11/16/18 04:22	2
Calcium	470		2.0	mg/L		11/09/18 07:19	11/14/18 21:45	1

General Chemistry	Danult	Ovelities.	DI.	11	_	D	A seek see al	D:: F
Analyte	Result	Qualifier	RL	Unit	ט	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	14000	D2	100	mg/L			11/08/18 12:33	1
pH	7.3	H5	1.7	SU			11/09/18 16:54	1
Temperature	13.0	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW70-11218

Lab Sample ID: 550-113007-5

Date Collected: 11/02/18 15:32

Matrix: Water

Date Collected: 11/02/18 15:32 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography										
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac		
Chloride	1100	D2	400	mg/L			11/14/18 00:09	200		
Fluoride	2.7	D1	0.80	mg/L			11/13/18 23:50	2		
Sulfate	6400	D2	400	mg/L			11/14/18 00:09	200		

	(ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	88	D2	0.10	mg/L		11/09/18 07:19	11/16/18 04:28	2
Calcium	510		2.0	mg/L		11/09/18 07:19	11/14/18 21:51	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	11000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.2	H5	0.1	Degrees C			11/09/18 16:54	1

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Client: Arizona Public Service Company

Project/Site: CCR

**Calcium** 

Client Sample ID: FC-CCR-MW62-11218

Date Collected: 11/02/18 14:10 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113007-6

11/09/18 07:19 11/14/18 21:57

**Matrix: Water** 

Method: 300.0 - Anior	ns, Ion Chromatogra	aphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	110	D2	100	mg/L			11/14/18 00:46	50
Fluoride	1.5		0.40	mg/L			11/14/18 00:27	1
Sulfate	3300	D2	100	mg/L			11/14/18 00:46	50
Method: 200.7 Rev 4.4	4 - Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.4		0.050	ma/L		11/09/18 07:19	11/14/18 21:57	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5600	D2	100	mg/L			11/08/18 12:33	1
pH	6.8	H5	1.7	SU			11/09/18 16:54	1
Temperature	13.9	H5	0.1	Degrees C			11/09/18 16:54	1

2.0

mg/L

**550** 

Client Sample ID: FC-CCR-MW63-112818 Lab Sample ID: 550-113007-7 **Matrix: Water** 

Date Collected: 11/02/18 14:49 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chloride 88 2.0 mg/L 11/14/18 01:04 **Fluoride** 0.40 mg/L 11/14/18 01:04 1.9 **Sulfate** 2800 D2 100 mg/L 11/14/18 01:22 50

Method: 200.7 Rev 4.4 - Me Analyte	etals (ICP) Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Allalyte	Tresuit Qualifier				Trepared	Allalyzea	Diriac
Boron	1.9	0.050	mg/L		11/09/18 07:19	11/14/18 22:02	1
Calcium	550	2.0	mg/L		11/09/18 07:19	11/14/18 22:02	1
General Chemistry							

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4300	D2	40	mg/L			11/08/18 12:33	1
pH	7.1	H5	1.7	SU			11/09/18 16:54	1
Temperature	15.3	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW64-11218 Lab Sample ID: 550-113007-8 Date Collected: 11/02/18 12:52 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography											
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac			
Chloride	50		2.0	mg/L			11/14/18 01:41	1			
Fluoride	1.4		0.40	mg/L			11/14/18 01:41	1			
Sulfate	350 [	D2	100	mg/L			11/14/18 01:59	50			

Method: 200.7 Rev 4.4 - Metals (	(ICP)						
Analyte	Result Qu	ualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.64	0.050	mg/L		11/09/18 07:19	11/14/18 22:08	1
Calcium	88	2.0	mg/L		11/09/18 07:19	11/14/18 22:08	1

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW64-11218

Date Collected: 11/02/18 12:52 Date Received: 11/07/18 13:00 Lab Sample ID: 550-113007-8

Matrix: Water

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	760		20	mg/L			11/08/18 12:33	1
pH	7.8	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.8	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW65-11218 Lab Sample ID: 550-113007-9

Date Collected: 11/02/18 12:08 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chloride 51 2.0 mg/L 11/14/18 02:54 **Fluoride** 0.40 11/14/18 02:54 1.9 mg/L 1 **Sulfate** 420 D2 40 mg/L 11/14/18 03:13 20

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Boron 0.77 0.050 mg/L 11/09/18 07:19 11/14/18 22:11 2.0 11/09/18 07:19 11/14/18 22:11 **Calcium** mg/L 100

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	940		20	mg/L			11/08/18 12:33	1
pH	7.5	H5	1.7	SU			11/09/18 16:54	1
Temperature	12.9	H5	0.1	Degrees C			11/09/18 16:54	1

Client Sample ID: FC-CCR-MW71-11318 Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography<br/>AnalyteResult<br/>QualifierRLUnit<br/>mg/LDPreparedAnalyzedDil FacChloride520D2400mg/L11/14/18 03:50200

Fluoride ND D1 D5 2.0 mg/L 11/14/18 03:31 5 400 **Sulfate** mg/L 11/14/18 03:50 200 11000 D2 Method: 200.7 Rev 4.4 - Metals (ICP) Linit ы Popult Qualifier Analyzod

Allalyte	Result	Qualifier	NL.	Ollit	ט	Fiepaieu	Allalyzeu	DIIFac
Boron	0.56		0.050	mg/L		11/09/18 07:19	11/14/18 22:14	1
Calcium	470		2.0	mg/L		11/09/18 07:19	11/14/18 22:14	1
General Chemistry								

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.8	H5	0.1	Degrees C			11/09/18 16:54	1

4

5

7

q

**Matrix: Water** 

**Matrix: Water** 

10

40

13

14

15

Client: Arizona Public Service Company

Project/Site: CCR

Calcium

Client Sample ID: FC-CCR-MW72-11318

Date Collected: 11/03/18 12:31 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113007-11

11/09/18 07:19 11/14/18 22:25

**Matrix: Water** 

Method: 300.0 - Anions, Ion Chromatography								
Analyte	Result Qu	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	450		10	mg/L			11/14/18 04:08	5
Fluoride	ND D1	1 D5	2.0	mg/L			11/14/18 04:08	5
Sulfate	11000 D2	2	400	mg/L			11/14/18 04:26	200
Method: 200.7 Rev 4.4 - Meta	als (ICP)							
Analyte	Result Qu	ualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.22		0.050	mg/L		11/09/18 07:19	11/14/18 22:25	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/09/18 16:54	1
Temperature	14.8	H5	0.1	Degrees C			11/09/18 16:54	1

2.0

mg/L

470

Client Sample ID: FC-CCR-MW73-11318 Lab Sample ID: 550-113007-12 **Matrix: Water** 

Date Collected: 11/03/18 13:24 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	660	D2	200	mg/L			11/14/18 05:03	100
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 04:45	2
Sulfate	7500	D2	200	mg/L			11/14/18 05:03	100

Method: 200.7 Rev 4.4 - Meta	als (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.7	0.050	mg/L		11/09/18 07:19	11/14/18 22:31	1
Calcium	480	2.0	mg/L		11/09/18 07:19	11/14/18 22:31	1
Company Champiatus							

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	12000	D2	100	mg/L			11/08/18 12:33	1
pH	7.0	H5	1.7	SU			11/12/18 13:18	1
Temperature	8.6	H5	0.1	Degrees C			11/12/18 13:18	1

Client Sample ID: FC-CCR-FD01-11318 Lab Sample ID: 550-113007-13 **Matrix: Water** 

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	520	D2	400	mg/L			11/14/18 05:40	200
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 05:22	2
Sulfate	11000	D2	400	mg/L			11/14/18 05:40	200

Method: 200.7 Rev 4.4 - Metals (	(ICP)							
Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.54		0.050	mg/L	_	11/09/18 07:19	11/14/18 22:37	1
Calcium	450		2.0	mg/L		11/09/18 07:19	11/14/18 22:37	1

TestAmerica Phoenix

### **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-13

**Matrix: Water** 

**Matrix: Water** 

Client Sample	ID: FC-CCR-FD01-11318	
B ( B II ( I 4)		

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.2	H5	1.7	SU			11/12/18 13:18	1
Temperature	7.4	H5	0.1	Degrees C			11/12/18 13:18	1

Client Sample ID: FC-CCR-FD02-11318 Lab Sample ID: 550-113007-14

Date Collected: 11/03/18 12:31 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	450	D1	10	mg/L			11/14/18 06:35	5
Fluoride	ND	D1 D5	2.0	mg/L			11/14/18 06:35	5
Sulfate	11000	D2	400	mg/L			11/14/18 06:54	200

	Method: 200.7 Rev 4.4 - Met	tals (ICP)						
١	Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Boron	0.21	0.050	mg/L		11/09/18 07:19	11/14/18 22:43	1
Į	Calcium	460	2.0	mg/L		11/09/18 07:19	11/14/18 22:43	1

General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	16000	D2	100	mg/L			11/08/18 12:33	1
pH	7.1	H5	1.7	SU			11/12/18 13:18	1
Temperature	9.5	H5	0.1	Degrees C			11/12/18 13:18	1

Client: Arizona Public Service Company Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-161850/2 **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 161850

	MB	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			11/13/18 18:01	1
Fluoride	ND		0.40	mg/L			11/13/18 18:01	1
Sulfate	ND		2.0	mg/L			11/13/18 18:01	1

Lab Sample ID: LCS 550-161850/5 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161850** 

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	20.0	21.6		mg/L		108	90 - 110	
Fluoride	4.00	4.12		mg/L		103	90 - 110	
Sulfate	20.0	20.7		mg/L		104	90 - 110	

Lab Sample ID: LCSD 550-161850/6 **Client Sample ID: Lab Control Sample Dup Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 161850** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	20.0	21.5		mg/L		108	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	1	20

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161850

	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	25	D1	20.0	45.9	D1	ma/l	_	102	80 120	-

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 161850

	Sample	Sample	Spike	MS	MS				%Rec.		
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Chloride	1800	D2	4000	6300	D2	mg/L		112	80 - 120		-
Sulfate	12000	D2	4000	15900	D2	mg/L		88	80 - 120		

Lab Sample ID: 550-113007-1 MSD Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161850

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	25	D1	20.0	46.5	D1	mg/L		105	80 - 120	1	20

TestAmerica Phoenix

Project/Site: CCR

Client: Arizona Public Service Company

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-113007-1 MSD

Client Sample ID: FC-CCR-MW66-11218

Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161850** 

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit	
Chloride	1800	D2	4000	6340	D2	mg/L		113	80 - 120	1	20	
Sulfate	12000	D2	4000	16000	D2	mg/L		91	80 - 120	1	20	

Lab Sample ID: MB 550-161852/1042

Client Sample ID: Method Blank
Matrix: Water

Prep Type: Total/NA

Analysis Batch: 161852

MB MB Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Chloride 2.0  $\overline{\mathsf{ND}}$ mg/L 11/14/18 06:17 Fluoride ND 0.40 mg/L 11/14/18 06:17 Sulfate ND 2.0 mg/L 11/14/18 06:17

Lab Sample ID: LCS 550-161852/73

Client Sample ID: Lab Control Sample Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161852** 

Spike LCS LCS %Rec. Analyte Added Result Qualifier Limits Unit D %Rec Chloride 20.0 21.5 107 90 - 110 mg/L Fluoride 4.00 4.16 mg/L 104 90 - 110 90 - 110 Sulfate 20.0 20.5 mg/L 103

Lab Sample ID: LCSD 550-161852/74

Client Sample ID: Lab Control Sample Dup
Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161852** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	20.0	21.4		mg/L		107	90 - 110	0	20
Fluoride	4.00	4.16		mg/L		104	90 - 110	0	20
Sulfate	20.0	20.5		mg/L		102	90 - 110	0	20

Lab Sample ID: 550-113012-A-1 MS ^2

Client Sample ID: Matrix Spike
Matrix: Water

Prep Type: Total/NA

Analysis Ratch: 1618

Analysis balch: 161652										
-	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	1.3	D1	8 00	9 67	D1	ma/L		104	80 - 120	

Lab Sample ID: 550-113012-A-1 MS ^200

Client Sample ID: Matrix Spike
Matrix: Water

Prep Type: Total/NA

**Analysis Batch: 161852** 

Sample Sample Spike MS MS %Rec. Result Qualifier Added Limits **Analyte** Result Qualifier Unit %Rec Chloride 800 D2 4000 5340 D2 mg/L 114 80 - 120 Sulfate 1200 D2 4000 5490 D2 mg/L 107 80 - 120

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-113012-A-1 MSD ^2 **Client Sample ID: Matrix Spike Duplicate Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161852** Sample Sample Spike MSD MSD %Rec. RPD Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit 8.00 Fluoride 1.3 D1 9.79 D1 mg/L 106 80 - 120 20 Lab Sample ID: 550-113012-A-1 MSD ^200 Client Sample ID: Matrix Spike Duplicate **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161852** Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Result Qualifier Added Limits **RPD** Analyte Unit %Rec Limit Chloride 800 D2 4000 5310 D2 mg/L 113 80 - 120 20 Sulfate 1200 D2 4000 5460 D2 mg/L 107 80 - 12020 Lab Sample ID: 550-113026-B-1 MS ^200 Client Sample ID: Matrix Spike **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161852** MS MS %Rec. Sample Sample Spike Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Chloride 680 D2 4000 5160 D2 112 80 - 120 mg/L Sulfate 6100 D2 4000 10400 D2 108 mg/L 80 - 120Lab Sample ID: 550-113026-B-1 MS ^5 **Client Sample ID: Matrix Spike** 

**Matrix: Water** 

**Analysis Batch: 161852** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits ND D1 D5 20.0 Fluoride 20.9 D1 mg/L 102 80 - 120

Lab Sample ID: 550-113026-B-1 MSD ^200

**Matrix: Water** 

**Analysis Batch: 161852** 

MSD MSD %Rec. **RPD** Sample Sample Spike Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits RPD Limit Chloride 680 D2 4000 5200 D2 80 - 120 20 mg/L 113 Sulfate 6100 D2 4000 10400 D2 mg/L 110 80 - 120 20

Lab Sample ID: 550-113026-B-1 MSD ^5

**Matrix: Water** 

**Analysis Batch: 161852** 

Sample Sample Spike MSD MSD %Rec. **RPD** Analyte **Result Qualifier** Added Result Qualifier Unit D %Rec Limits RPD Limit Fluoride ND D1 D5 20.0 21.0 D1 mg/L 103 80 - 120

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-161450/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161972 Prep Batch: 161450** 

	IVID IVID						
Analyte	Result Qualifie	er RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND	0.050	mg/L	_	11/09/18 07:19	11/14/18 21:06	1
Calcium	ND	2.0	mg/L		11/09/18 07:19	11/14/18 21:06	1

TestAmerica Phoenix

Page 18 of 47

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

**Client Sample ID: Matrix Spike Duplicate** 

**Client Sample ID: Matrix Spike Duplicate** 

Client: Arizona Public Service Company

Project/Site: CCR

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

Lab Sample ID: LCS 550-161450/2-A Matrix: Water Analysis Batch: 161972	Spike	1.00	LCS	Clie	nt Saı	mple ID	Prep Type: Total/NA Prep Batch: 161450 **Rec.
	<b>эріке</b>	LUS	LUS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	1.00	0.971		mg/L		97	85 - 115
Calcium	21.0	21.0		mg/L		100	85 - 115
Lah Sample ID: LCSD 550-161450/3-A				Cliont Sa	mnla	ID: Lak	o Control Sample Dun

Lab Sample ID: LCSD 550-161450/3-A		(	Jilent Sa	mpie	ID: Lar	Control	Sample	e Dup	
Matrix: Water						Prep Typ	e: Tot	al/NA	
Analysis Batch: 161972							Prep Ba	itch: 10	31450
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	1.00	0.949		mg/L		95	85 - 115	2	20
Calcium	21.0	21.1		mg/L		100	85 - 115	0	20

Lab Sample ID: 550-11300				Client	t Sam	ple ID:	FC-CCR-MW66-11218		
Matrix: Water									Prep Type: Total/NA
Analysis Batch: 161972									<b>Prep Batch: 161450</b>
_	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Calcium	470	M3	21.0	462	M3	mg/L		-45	70 - 130

Lab Sample ID: 550-11300		Client Sample ID: FC-CCR-MW66-							
Matrix: Water									Prep Type: Total/NA
Analysis Batch: 162061									<b>Prep Batch: 161450</b>
_	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	140	M3 D2	1.00	134	M3	ma/l		-514	70 - 130

Lab Sample ID: 550-11300	_ab Sample ID: 550-113007-1 MSD						Client Sample ID: FC-CCR-MW66-11218								
Matrix: Water									Prep Ty	pe: Tot	al/NA				
Analysis Batch: 161972									Prep Ba	atch: 16	31450				
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD				
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit				
Calcium	470	M3	21.0	475	M3	mg/L		15	70 - 130	3	20				

Lab Sample ID: 550-113007-1	MSD					Client	t Sam	ple ID:	FC-CCR-N	<b>NW66-</b> 1	11218
Matrix: Water									Prep Typ	e: Tot	al/NA
Analysis Batch: 162061									Prep Ba	itch: 16	61450
-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron	140	M3 D2	1.00	142	M3	mg/L		282	70 - 130	6	20

### Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-16139 Matrix: Water Analysis Batch: 161396	6/1				(		ple ID: Method Prep Type: To	
7 maryolo Batom 101000	МВ	MB						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		20	mg/L			11/08/18 12:33	1

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 550-161396/2 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161396** 

Spike LCS LCS %Rec. Analyte Added Result Qualifier Unit D %Rec Limits **Total Dissolved Solids** 1000 974 mg/L 97 90 - 110

Lab Sample ID: LCSD 550-161396/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161396** 

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits Analyte **RPD** Limit Unit %Rec Total Dissolved Solids 1000 974 mg/L 97 90 - 110

Lab Sample ID: 550-113007-1 DU Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 161396

Sample Sample DU DU **RPD** Result Qualifier Result Qualifier RPD Limit Analyte Unit Total Dissolved Solids 20000 D2 19000 D2 mg/L

Lab Sample ID: 550-113026-A-4 DU **Client Sample ID: Duplicate** Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 161396** 

Sample Sample DU DU RPD Result Qualifier Result Qualifier Unit **RPD** Limit **Total Dissolved Solids** 6200 D2 6210 D2 0.5 mg/L 10

Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-161550/1 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161550** 

Spike LCSSRM LCSSRM %Rec. Analyte Added Result Qualifier Unit %Rec Limits 7.00 SU pН 7.0 99.6 98.5 - 101. 5

Lab Sample ID: LCSSRM 550-161550/12 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161550** 

Spike LCSSRM LCSSRM %Rec. **Analyte** Added Result Qualifier Unit %Rec Limits pH 7.00 7.0 SU 100.1 98.5 - 101. 5

Lab Sample ID: LCSSRM 550-161550/24 Client Sample ID: Lab Control Sample Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 161550** 

Spike LCSSRM LCSSRM %Rec. Added Result Qualifier Unit %Rec Limits Analyte SU рН 7.00 7.0 100.1 98.5 - 101. 5

TestAmerica Phoenix

**Client Sample ID: Lab Control Sample** 

Prep Type: Total/NA

Client: Arizona Public Service Company

Project/Site: CCR

Method: SM 4500 H+ B - pH (Continued)

Lab Sample ID: 550-113007-1 DU Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 161550

	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
рН	7.3	H5	 7.3	H5	SU		 0.1	5
Temperature	9.6	H5	10.7	H5	Degrees C		11	

Lab Sample ID: 550-113007-11 DU Client Sample ID: FC-CCR-MW72-11318 **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 161550** 

	Sample	Sample	DU	DU				RPD	
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit	
рН	7.0	H5	 7.1	H5	SU	_	 0.7	5	
Temperature	14.8	H5	15.7	H5	Degrees C		6		

Lab Sample ID: LCSSRM 550-161638/1 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161638** 

LCSSRM LCSSRM Spike %Rec. Analyte Added Result Qualifier D %Rec Limits Unit pH 7.00 7.0 SU 100.3 98.5 - 101

Lab Sample ID: LCSSRM 550-161638/12

**Matrix: Water** 

**Analysis Batch: 161638** 

		Spike	LCSSRM	LCSSRM				%Rec.	
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	
рН	 	7.00	7.0		SU		100.3	98.5 - 101.	
								5	

**Client Sample ID: Duplicate** Lab Sample ID: 550-113012-A-1 DU Prep Type: Total/NA

**Matrix: Water** 

Analysis Ratch: 161638

Analysis Datch. 101030									
	Sample	Sample	DU	DU				RPD	
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit	
рН	9.7	H5	9.6	H5	SU		 0.4	5	
Temperature	10.2	H5	9.9	H5	Degrees C		3		

TestAmerica Phoenix

Client: Arizona Public Service Company Project/Site: CCR

### HPLC/IC

**Analysis Batch: 161850** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	300.0	_
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	300.0	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	300.0	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	300.0	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	300.0	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	300.0	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	300.0	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	300.0	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	300.0	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	300.0	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	300.0	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	300.0	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	300.0	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	300.0	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	300.0	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	300.0	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	300.0	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	300.0	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	300.0	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	300.0	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	300.0	
MB 550-161850/2	Method Blank	Total/NA	Water	300.0	
LCS 550-161850/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-161850/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	300.0	

#### **Analysis Batch: 161852**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	300.0	<del>-</del>
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	300.0	
MB 550-161852/1042	Method Blank	Total/NA	Water	300.0	
LCS 550-161852/73	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-161852/74	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113012-A-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-113012-A-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-113012-A-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113012-A-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113026-B-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-113026-B-1 MS ^5	Matrix Spike	Total/NA	Water	300.0	
550-113026-B-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-113026-B-1 MSD ^5	Matrix Spike Duplicate	Total/NA	Water	300.0	

Page 22 of 47

Client: Arizona Public Service Company Project/Site: CCR

**Metals** 

**Prep Batch: 161450** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	200.7	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	200.7	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	200.7	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	200.7	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.7	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.7	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.7	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.7	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.7	
MB 550-161450/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-161450/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-161450/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7	

**Analysis Batch: 161972** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.7 Rev 4.4	161450
MB 550-161450/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	161450
LCS 550-161450/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	161450
LCSD 550-161450/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450

**Analysis Batch: 162061** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450

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Client: Arizona Public Service Company

Project/Site: CCR

### **General Chemistry**

#### Analysis Batch: 161396

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	SM 2540C	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	SM 2540C	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	SM 2540C	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	SM 2540C	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	SM 2540C	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	SM 2540C	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	SM 2540C	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	SM 2540C	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	SM 2540C	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	SM 2540C	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	SM 2540C	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	SM 2540C	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	SM 2540C	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	SM 2540C	
MB 550-161396/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-161396/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-161396/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-113007-1 DU	FC-CCR-MW66-11218	Total/NA	Water	SM 2540C	
550-113026-A-4 DU	Duplicate	Total/NA	Water	SM 2540C	

#### Analysis Batch: 161550

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-6	FC-CCR-MW62-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-7	FC-CCR-MW63-112818	Total/NA	Water	SM 4500 H+ B	
550-113007-8	FC-CCR-MW64-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-9	FC-CCR-MW65-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161550/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161550/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161550/24	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-113007-1 DU	FC-CCR-MW66-11218	Total/NA	Water	SM 4500 H+ B	
550-113007-11 DU	FC-CCR-MW72-11318	Total/NA	Water	SM 4500 H+ B	

#### **Analysis Batch: 161638**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	SM 4500 H+ B	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161638/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-161638/12	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-113012-A-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	

Page 24 of 47

Client: Arizona Public Service Company

Project/Site: CCR

Lab Sample ID: 550-113007-1

Client Sample ID: FC-CCR-MW66-11218 Date Collected: 11/02/18 13:28 Date Received: 11/07/18 13:00

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 19:33	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 19:51	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:27	ARE	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	162061	11/16/18 04:05	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396		YET	TAL PHX
					(Start) 1	1/08/18 12:33		
					(End) 1	1/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Lab Sample ID: 550-113007-2 Client Sample ID: FC-CCR-MW67-11318

Date Collected: 11/03/18 09:57 Date Received: 11/07/18 13:00

**Matrix: Water** 

Dran Tura	Batch	Batch Method	Dum	Dilution	Batch	Prepared	Amelyet	l ab
Prep Type Total/NA	Type Analysis	- <del>Metriod</del> - 300.0	Run	_	Number 161850	or Analyzed 11/13/18 21:23	Analyst NEL	Lab TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 21:42	NEL	TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	161450 161972	11/09/18 07:19 11/14/18 21:33		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		4	161450 162061	11/09/18 07:19 11/16/18 04:11		TAL PHX TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW68-11318 Lab Sample ID: 550-113007-3

Date Collected: 11/03/18 11:01 Date Received: 11/07/18 13:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 22:00	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 22:18	NEL	TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1		11/09/18 07:19 11/14/18 21:39		TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		4	161450 162061	11/09/18 07:19 11/16/18 04:17		TAL PHX TAL PHX
Total/NA	Analysis	SM 2540C		1	()	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

TestAmerica Phoenix

11/26/2018

Page 25 of 47

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW69-11318

Lab Sample ID: 550-113007-4 Date Collected: 11/03/18 08:49 Matrix: Water

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 23:14	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/13/18 23:32	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:45	ARE	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	162061	11/16/18 04:22	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396	14/00/40 40:22	YET	TAL PHX
					` ,	11/08/18 12:33 11/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW70-11218

Lab Sample ID: 550-113007-5 Date Collected: 11/02/18 15:32

**Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 23:50	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 00:09	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:51	ARE	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		2	162061	11/16/18 04:28	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396		YET	TAL PHX
					(Start) 1	1/08/18 12:33		
					(End) 1	1/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW62-11218

Lab Sample ID: 550-113007-6 Date Collected: 11/02/18 14:10 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 00:27	NEL	TAL PHX
Total/NA	Analysis	300.0		50	161850	11/14/18 00:46	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:57	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Page 26 of 47

Dilution

**Factor** 

50

1

1

Run

Batch

161396

(Start) 11/08/18 12:33 (End) 11/09/18 11:15

161550 11/09/18 16:54 MRR

Client: Arizona Public Service Company

Batch

Туре

Analysis

Analysis

Analysis

Analysis

Analysis

Prep

Client Sample ID: FC-CCR-MW63-112818

Batch

300.0

300.0

200.7

200.7 Rev 4.4

SM 4500 H+ B

SM 2540C

Method

Project/Site: CCR

**Prep Type** 

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

Lab Sample ID: 550-113007-7

Date Collected: 11/02/18 14:49 Date Received: 11/07/18 13:00

**Matrix: Water** 

**Prepared** Number or Analyzed Analyst Lab 161850 11/14/18 01:04 NEL TAL PHX 161850 11/14/18 01:22 NEL TAL PHX 161450 11/09/18 07:19 SGO TAL PHX 161972 11/14/18 22:02 ARE TAL PHX TAL PHX YET

TAL PHX

Client Sample ID: FC-CCR-MW64-11218

Lab Sample ID: 550-113007-8

**Matrix: Water** 

**Matrix: Water** 

Date Collected: 11/02/18 12:52 Date Received: 11/07/18 13:00

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 01:41	NEL	TAL PHX
Total/NA	Analysis	300.0		50	161850	11/14/18 01:59	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:08	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	(/	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW65-11218

Lab Sample ID: 550-113007-9 Date Collected: 11/02/18 12:08

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 02:54	NEL	TAL PHX
Total/NA	Analysis	300.0		20	161850	11/14/18 03:13	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:11	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

TestAmerica Phoenix

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Project/Site: CCR

Client Sample ID: FC-CCR-MW71-11318 Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

Client: Arizona Public Service Company

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/14/18 03:31	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 03:50	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:14	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	(/	1/08/18 12:33 1/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Lab Sample ID: 550-113007-11 Client Sample ID: FC-CCR-MW72-11318

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:08	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 04:26	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:25	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	(/	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161550	11/09/18 16:54	MRR	TAL PHX

Client Sample ID: FC-CCR-MW73-11318

Lab Sample ID: 550-113007-12 Date Collected: 11/03/18 13:24 Matrix: Water

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:45	NEL	TAL PHX
Total/NA	Analysis	300.0		100	161850	11/14/18 05:03	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:31	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

#### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-1

Lab Sample ID: 550-113007-13

Client Sample ID: FC-CCR-FD01-11318 Date Collected: 11/03/18 11:45 Matrix: Water

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	161850	11/14/18 05:22	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161850	11/14/18 05:40	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:37	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	161396		YET	TAL PHX
					(Start) 1	1/08/18 12:33		
					(End) 1	1/09/18 11:15		
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	MRR	TAL PHX

Client Sample ID: FC-CCR-FD02-11318 Lab Sample ID: 550-113007-14

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161852	11/14/18 06:35	NEL	TAL PHX
Total/NA	Analysis	300.0		200	161852	11/14/18 06:54	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:43	ARE	TAL PHX
Total/NA	Analysis	SM 2540C		1	` ,	11/08/18 12:33 11/09/18 11:15	YET	TAL PHX
Total/NA	Analysis	SM 4500 H+ B		1	161638	11/12/18 13:18	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: 550-113007-1

### **Laboratory: TestAmerica Phoenix**

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

Authority	Program	<b>EPA</b> Region	Identification Number	<b>Expiration Date</b>
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: 550-113007-1

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	рН	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

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(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: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW66-11218 (550-113007-1)	2.0 ± 0.3	$0.9 \pm 0.3$	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW67-11318 (550-113007-2)	$0.8 \pm 0.2$	$0.8 \pm 0.3$	1.6 ± 0.4

		1	
Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Jeremy Russell, BSE

11/21/2018 Date



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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

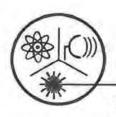
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW68-11318 (550-113007-3)	$0.6 \pm 0.2$	$1.3 \pm 0.3$	1.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date

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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW69-11318 (550-113007-4)	1.7 ± 0.2	1.3 ± 0.3	3.0 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW70-11218 (550-113007-5)	$0.7 \pm 0.2$	< 0.7	$0.7 \pm 0.2$

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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11/21/2018 Date

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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW71-11318 (550-113007-10)	1.2 ± 0.2	< 0.7	$1.2 \pm 0.2$

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Date of Ana	lysis	11/9/2018	11/9/2018	11/9/2018
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11/21/2018

Jeremy Russell, BSE

Date

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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

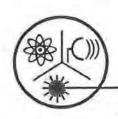
Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW72-11318 (550-113007-11)	0.7 ± 0.2	$1.0 \pm 0.3$	1.7 ± 0.4

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Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW73-11318 (550-113007-12)	1.5 ± 0.2	1.4 ± 0.3	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD01-11318 (550-113007-13)	1.8 ± 0.2	< 0.7	1.8 ± 0.2

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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11/21/2018 Date



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## Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD02-11318 (550-113007-14)	0.5 ± 0.2	1.5 ± 0.3	2.0 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
Date of Latery and	10372010	31/2/2010	111372010

Jeremy Russell, BSE

11/21/2018 Date

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W68-11218 (550-113007-1) 井 [6/2](2) 11/218 W68-11318 (550-113007-2) 井 [6/2](2) 11/318 W68-11318 (550-113007-3) 井 [6/2](2) 11/318 W69-11318 (550-113007-4) 井 [6/2](2) 11/318 W71-11318 (550-113007-10) 井 [6/2](2) 11/318 W71-11318 (550-113007-10) 井 [6/2](2) 11/318 W71-11318 (550-113007-12) 井 [6/2](2) 11/318 W71-11318 (550-113007-12) 井 [6/2](2) 11/318 W71-11318 (550-113007-12) 井 [6/2](2) 11/318 W71-11318 (550-113007-12) 井 [6/2](2) 11/318 W71-11318 (550-113007-12) 井 [6/2](2) 11/318 W71-11318 (550-113007-12) 井 [6/2](2) 11/318 W71-11318 (550-113007-12) 井 [6/2](2) 11/318 W71-11318 (550-113007-13	mple Identification - Client ID (Lab ID)	Semple Date	Sample			MSM mohas					
W68-11318 (550-113007-1) 井		X	X			1					ructions/Note:
N68-11318 (550-113007-2) # L0   DL0 ≥ 11/3/18   N68-11318 (550-113007-4) # L0   DL0 ≥ 1   11/3/18   N69-11318 (550-113007-4) # L0   DL0 ≥ 1   11/3/18   N70-11218 (550-113007-10) # L0   DL0 > 11/3/18   N71-11318 (550-113007-12) # L0   DL0 > 11/3/18   N71-11318 (550-113007-12) # L0   DL0 > 11/3/18   N71-11318 (550-113007-12) # L0   DL0 > 11/3/18   N71-11318 (550-113007-13) # L0   DL0 > 11/3/18   N71-11318 (550-113007-13) # L0   DL0 > 11/3/18   N71-11318 (550-113007-13) # L0   DL0 > 11/3/18   N71-11318 (550-113007-13) # L0   Dl0 > 11/3/18   N71-11318 (550-113007-13) # L0   Dl0 > 11/3/18   N71-11318 (550-113007-13) # L0   Dl0 > 11/3/18   N71-11318 (550-113007-13) # L0   Dl0 > 11/3/18   N71-11318 (550-113007-13) # L0   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13)   Dl0 > 11/3/18   N11-11318 (550-113007-13   Dl0 > 11/3/18   N11-11318 (550-113007-13   Dl0 > 11/3/18   N11-11318 (550-113007-13   Dl0 > 11/3/18   N11-11318 (550-113007-13   Dl0 > 11/3/18   N11-11318 (550-113007-13   Dl0 > 11/3/18   N11-11318 (550-113007-13   Dl0 > 11/3/18	1.00	11/2/18	13:28 Arizona		Water	×				_	
17/3/18   (550-113007-3)   11/3/18   17/3/	CCR-MW67-11318 (550-113007-2) # 10 1310-2	11/3/18	09:57 Arizona		Water	×				_	
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Client Information (Sub Contract Lab)	Sampler.			Lab	Lab PM Baker, Ken		Carner Tracking No(s)	Aing No(s).	COC No:	
Client Contact: Shipping/Receiving	Phone:			E-Mail	9	The second second	State of Origin:	Sinc	550-22780.2 Page	
Company. Radiation Safety Eng., Inc.					Accreditations Chate Depart	Accreditations Required (See note):	Anzona		Page 2 of 2 Job #:	
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Sure cores Sure 2p: AZ, 85225					-				B - NaOH C - Zn Acetate D - Nitro Acid	N - None O - AsNeO2 P - Na204S
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Project Name: CCR	Project 6				OF NO.				_	V-MCAA W-pH4-S
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Relinquished by:	Date/Time:		Com	Company	Received by.	1 by:		Date/Time		Company

# TestAmerica Phoenix

Phoenix, AZ 8: 4645 E Cotton

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3340 fax 623 445.6192	110001			TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway Site Contact: Doug Lavarnway	Site Contact: Doug Lavarnway	Date: 11/7/2018	COC No:
orners	Tel/Fax: 928-288-1394	Lab Contact: Ken Baker	Carrier:	1 of1 COCs
5, MS 4915	Analysis Turnaround Time			Job No.
M 87416	Calendar ( C ) or Work Days (W)			
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Client Contact	Project Manager: Doug Lavarnway	nager: D	oug Lava	rnway		ite	Con	tact	0	oug La	Site Contact: Doug Lavarnway	Date:	Date: 11/7/2018	2018				0	COC No:	Vo:						
APS Four Corners	Tel/Fax: 928-288-1394	288-1394				ab (	inoc	tact	~	Lab Contact: Ken Baker	er	Carrier:	er:							1	of	-4	0	COCs		
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FC-CCR-MW65-11218 -09	11/2/2018	1208	G	×	2	Z	×	×	×	×																
FC-CCR-MW71-11318 -17	11/3/18	1145	G	8	2	Z	×	×	×	×				-												
FC-CCR-MW72-11318 -//	11/3/18	1231	G	8	2	Z	×	×	×	×				$\vdash$												
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Preservation Used: 1= fee, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	)3; 5=NaOH; 6=	Other							$\vdash$									$\dashv$								
Possible Hazard Identification  Non-Hazard   Flammable   Skin Irritant		Poisoir	Unknown	WII		S	dwe	Ret	um	Sample Disposal ( A fe	A fee may	fee may be assessed if samples are retained longer than 1 month)  1t Disposal By Lab Archive For Month	Disposal By Lab	Samı	ples	are	Arc	etained Ion Archive For	onge	r tha	n 1 1	Mo	onth) Months			
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# TestAmerica Phoenix

4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

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phone 602 437 3340 fax 623 445 6192													TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway	ager: Dou	ıg Lavarı	nway	S	00	ntac	2	5	Site Contact: Doug Lavarnway	Date:	11/7/2018	COC No.
APS Four Corners	Tel/Fax: 928-587-0319	87-0319	¢		E	Lab Contact: Ken Baker	ntac	# K	n Ba				
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Sample Identification	Sample S Date	Sample S Time	Sample Type N	# of Matrix Cont.	Filtered Sa	Perform M	EPA 200.7	200.8 (As	Radium 2	EPA 300.0			Sample Specific Notes:
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FC-CCR-MW67-11318 - 02	11/3/2018	957	G	¥ 4	z		×	×	×				
FC-CCR-MW68-11318 -03	11/3/2018	1101	G	W 4	z	L	×	×	×				
FC-CCR-MW69-11318 - 54	11/3/18	849	G	W 4	z		×	×	×				
FC-CCR-MW70-11218 ~OS	11/2/18	1532	G	W 4	z		×	×	×				
FC-CCR-MW71-11318 -10	11/3/18	1145	G	W 4	z		×	×	×				
FC-CCR-MW72-11318 - (1	11/3/18	1231	G	W 4	z		×	×	×				
FC-CCR-MW73-11318 - (2)	11/3/18	1324	G	W 4	z	×	×	×	×				
FC-CCR-FD01-11318 -13	11/3/18	1145	G	W 4	z		×	×	×				
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Possible Hazard Identification  Non-Hazard Flammable Skin	Skin Irritant Po	PolsmiB	Unknown	nown		San	□ <sub>R</sub>	Dis	oosa 7 To	le Disposal ( A fee may be a	isposa	assessed if samples are reta  Disposal By Lab  Arc	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client Disposal By Lab Archive For Months
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Client: Arizona Public Service Company

Job Number: 550-113007-1

Login Number: 113007 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.</td <td>True</td> <td>Common</td>	True	Common
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.



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: 550-113007-2

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 11/27/2018 7:47:31 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	9
QC Sample Results	13
QC Association Summary	16
Lab Chronicle	18
Certification Summary	21
Method Summary	22
Subcontract Data	23
Chain of Custody	35
Receipt Checklists	38

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#### **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

#### **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.
Motolo	

#### Metals

Metals	
Qualifier	Qualifier Description
M1	Matrix spike recovery was high, the associated blank spike recovery was acceptable.
V1	CCV recovery was above method acceptance limits. This target analyte was not detected in the sample.

#### Glossary

RER

RPD TEF

**TEQ** 

RL

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

Abbreviation	These commonly used abbreviations may or may not be present in this report.
a	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

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#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

Job ID: 550-113007-2

Laboratory: TestAmerica Phoenix

Narrative

Job Narrative 550-113007-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.9° C, 3.0° C and 3.8° C.

#### **Receipt Exceptions**

Received 3 pages of COCs from the courier.

Samples #6 - #9 only request Appendix I.

All of the other samples request Appendix I and II.

Client did provide sample containers if Appendix II is needed.

 $FC-CCR-MW62-11218 \ (550-113007-6), \ FC-CCR-MW63-112818 \ (550-113007-7), \ FC-CCR-MW64-11218 \ (550-113007-8) \ and \ FC-CCR-MW65-11218 \ (550-113007-9)$ 

#### 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: FC-CCR-MW71-11318 (550-113007-10), FC-CCR-MW72-11318 (550-113007-11), FC-CCR-MW73-11318 (550-113007-12) and FC-CCR-FD01-11318 (550-113007-13). This analyte was not detected in the diluted samples. 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: FC-CCR-FD02-11318 (550-113007-14). This analyte was not detected in the diluted samples. 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.

#### 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.

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TestAmerica Phoenix 11/27/2018

# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-113007-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-113007-1	FC-CCR-MW66-11218	Water	11/02/18 13:28	11/07/18 13:00
550-113007-2	FC-CCR-MW67-11318	Water	11/03/18 09:57	11/07/18 13:00
550-113007-3	FC-CCR-MW68-11318	Water	11/03/18 11:01	11/07/18 13:00
550-113007-4	FC-CCR-MW69-11318	Water	11/03/18 08:49	11/07/18 13:00
550-113007-5	FC-CCR-MW70-11218	Water	11/02/18 15:32	11/07/18 13:00
550-113007-10	FC-CCR-MW71-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-11	FC-CCR-MW72-11318	Water	11/03/18 12:31	11/07/18 13:00
550-113007-12	FC-CCR-MW73-11318	Water	11/03/18 13:24	11/07/18 13:00
550-113007-13	FC-CCR-FD01-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-14	FC-CCR-FD02-11318	Water	11/03/18 12:31	11/07/18 13:00

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218 Lab Sample ID: 550-113007-1

Analyte	Result C	Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	25 [	D1 -	2.0	mg/L		300.0	Total/NA
Lithium	0.38		0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0015		0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.023		0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.012		0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.019		0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0020 N	M1	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.0011		0.00010	mg/L	1	200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW67-11318

Lab Sample ID: 550-113007-2

Analyte	Result C	Qualifier RL	. Unit	Dil Fac	D	Method	Prep Type
Fluoride	16	01 2.0	mg/L	5	_	300.0	Total/NA
Lithium	0.39	0.20	) mg/L	1		200.7 Rev 4.4	Total/NA
Arsenic	0.0016	0.00050	) mg/L	1		200.8 LL	Total/NA
Barium	0.017	0.00050	) mg/L	1		200.8 LL	Total/NA
Cobalt	0.0061	0.00050	mg/L	1		200.8 LL	Total/NA
Molybdenum	0.037	0.00050	) mg/L	1		200.8 LL	Total/NA
Selenium	0.0043	0.00050	) mg/L	1		200.8 LL	Total/NA
Thallium	0.00078	0.00010	) mg/L	1		200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW68-11318

Lab Sample ID: 550-113007-3

Analyte	Result Qua	alifier RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	12 D1	2.0	mg/L		300.0	Total/NA
Lithium	0.42	0.20	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0030	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0081	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0038	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.0078	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.11	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.0016	0.00010	ma/L	1	200.8 LL	Total/NA

Client Sample ID: FC-CCR-MW69-11318

Analyte Result Qualifier RL Unit Dil Fac D Method Prep Type Total/NA Fluoride 11 D1 2.0 mg/L 5 300.0 Lithium 0.35 0.20 mg/L 1 200.7 Rev 4.4 Total/NA Arsenic 0.0042 0.00050 mg/L 1 200.8 LL Total/NA Barium 0.012 0.00050 mg/L 200.8 LL Total/NA Cobalt 0.0041 0.00050 mg/L 200.8 LL Total/NA Molybdenum 0.012 0.00050 mg/L 200.8 LL Total/NA Selenium 0.025 0.00050 mg/L 200.8 LL Total/NA Thallium 200.8 LL 0.00024 0.00010 mg/L Total/NA

Client Sample ID: FC-CCR-MW70-11218

Analyte	Result	Qualifier RL	Unit	Dil Fac	D Method	Prep Type
Fluoride	2.7	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

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

11/27/2018

Lab Sample ID: 550-113007-4

Lab Sample ID: 550-113007-5

Page 6 of 38

TestAmerica Job ID: 550-113007-2

Lab Sample ID: 550-113007-10

200.8 LL

Lab Sample ID: 550-113007-11

Lab Sample ID: 550-113007-12

Lab Sample ID: 550-113007-13

Client: Arizona Public Service Company

Project/Site: CCR

Thallium

Client Sample ID: FC-CCR-MW70-11218 (Continued) Lab Sample ID: 550-113007-5

Analyte	Result Qualifier	RL	Unit	Dil Fac	D Method	Prep Type
Arsenic	0.0043	0.00050	mg/L		200.8 LL	Total/NA
Barium	0.010	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0041	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.0064	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.19	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00029	0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW71-11318

Analyte	Result Q	ualifier RL	Unit	Dil Fac D	Method	Prep Type	
Lithium	0.35	0.20	mg/L	1	200.7 Rev 4.4	Total/NA	
Arsenic	0.0046	0.00050	mg/L	1	200.8 LL	Total/NA	
Barium	0.0098	0.00050	mg/L	1	200.8 LL	Total/NA	
Molybdenum	0.00079	0.00050	mg/L	1	200.8 LL	Total/NA	
Selenium	0.27	0.00050	ma/l	1	200 8 1 1	Total/NA	

0.00010

mg/L

#### Client Sample ID: FC-CCR-MW72-11318

0.00031

Analyte	Result Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.37	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0031	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0075	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0020	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.00078	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.13	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00088	0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-MW73-11318

Analyte	Result (	Qualifier	RL	Unit	Dil Fac I	O Method	Prep Type
Lithium	0.31		0.20	mg/L		200.7 Rev 4.4	Total/NA
Barium	0.022		0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0078		0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.0026		0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.0062		0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00020		0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-FD01-11318

Analyte	Result Qualifie	r RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.34	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0068	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0095	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.00065	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.31	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00030	0.00010	mg/L	1	200.8 LL	Total/NA

#### Client Sample ID: FC-CCR-FD02-11318

Lab Sample ID: 550-113007-14

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

11/27/2018

Page 7 of 38

Total/NA

#### **Detection Summary**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-FD02-11318 (Continued)

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

#### Lab Sample ID: 550-113007-14

Analyte	Result Qualifie	r RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.37	0.20	mg/L		200.7 Rev 4.4	Total/NA
Arsenic	0.0026	0.00050	mg/L	1	200.8 LL	Total/NA
Barium	0.0075	0.00050	mg/L	1	200.8 LL	Total/NA
Cobalt	0.0020	0.00050	mg/L	1	200.8 LL	Total/NA
Molybdenum	0.00078	0.00050	mg/L	1	200.8 LL	Total/NA
Selenium	0.15	0.00050	mg/L	1	200.8 LL	Total/NA
Thallium	0.00087	0.00010	mg/L	1	200.8 LL	Total/NA

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This Detection Summary does not include radiochemical test results.

**Matrix: Water** 

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218 Lab Sample ID: 550-113007-1

Date Collected: 11/02/18 13:28 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Cl	hromatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac

**Fluoride** 2.0 mg/L 11/13/18 19:33 25 D1

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium 0.20 mg/L 11/09/18 07:19 11/14/18 21:27 0.38

Method: 200.8 LL - Metals (ICP/MS)

Mictilod. 200.0 LL - Micti							
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0015	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Barium	0.023	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Cobalt	0.012	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Molybdenum	0.019	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Selenium	0.0020 M1	0.00050	mg/L		11/11/18 11:26	11/12/18 20:39	1
Thallium	0.0011	0.00010	mg/L		11/11/18 11:26	11/12/18 20:39	1
_							

Client Sample ID: FC-CCR-MW67-11318 Lab Sample ID: 550-113007-2 Matrix: Water

Date Collected: 11/03/18 09:57 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	16	D1	2.0	mg/L			11/13/18 21:23	5

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium 0.39 0.20 mg/L 11/09/18 07:19 11/14/18 21:33

Method: 200.8 LL - Metals (ICP/MS)

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0016	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Barium	0.017	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Cobalt	0.0061	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Molybdenum	0.037	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Selenium	0.0043	0.00050	mg/L		11/11/18 11:26	11/12/18 20:48	1
Thallium	0.00078	0.00010	mg/L		11/11/18 11:26	11/12/18 20:48	1

Lab Sample ID: 550-113007-3 Client Sample ID: FC-CCR-MW68-11318 Date Collected: 11/03/18 11:01 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anio Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	12	D1 -	2.0	mg/L			11/13/18 22:00	- 5
Method: 200.7 Rev 4	.4 - Metals (ICP)							
Analyte	• • • • • • • • • • • • • • • • • • • •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.42		0.20	mg/L		11/00/110 07 10	11/14/18 21:39	

Method: 200.8 LL - Metals (ICP/MS) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac **Arsenic** 0.0030 0.00050 mg/L 11/11/18 11:26 11/12/18 20:50

TestAmerica Phoenix

Page 9 of 38

11/27/2018

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW68-11318 Lab Sample ID: 550-113007-3

Date Collected: 11/03/18 11:01 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 200.8 LL - Meta	ils (ICP/MS) (Continued)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.0081	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Cobalt	0.0038	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Molybdenum	0.0078	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Selenium	0.11	0.00050	mg/L		11/11/18 11:26	11/12/18 20:50	1
Thallium	0.0016	0.00010	mg/L		11/11/18 11:26	11/12/18 20:50	1

Client Sample ID: FC-CCR-MW69-11318 Lab Sample ID: 550-113007-4 Date Collected: 11/03/18 08:49 **Matrix: Water** 

Date	Conected.	11/03/10 00.43
<b>Date</b>	Received:	11/07/18 13:00

Method: 300.0 - Anions, Ion Cl	hromatograp	ohy						
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	11	D1	2.0	mg/L			11/13/18 23:14	5

Method: 200.7 Rev 4.4 - Metals	s (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.35	0.20	mg/L		11/09/18 07:19	11/14/18 21:45	1

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0042	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Barium	0.012	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Cobalt	0.0041	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Molybdenum	0.012	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Selenium	0.025	0.00050	mg/L		11/11/18 11:26	11/12/18 20:53	1
Thallium	0.00024	0.00010	mg/L		11/11/18 11:26	11/12/18 20:53	1

Lab Sample ID: 550-113007-5 Client Sample ID: FC-CCR-MW70-11218 **Matrix: Water** 

Date Collected: 11/02/18 15:32 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	2.7	D1	0.80	mg/L			11/13/18 23:50	2
<del>-</del>								

Method: 200.7 Rev 4.4 - Metals	(ICP)						
Analyte	Result Qual	alifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.32	0.20	mg/L		11/09/18 07:19	11/14/18 21:51	1

Method: 200.8 LL - Meta	nis (ICP/MS)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0043	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Barium	0.010	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Cobalt	0.0041	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Molybdenum	0.0064	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Selenium	0.19	0.00050	mg/L		11/11/18 11:26	11/12/18 20:46	1
Thallium	0.00029	0.00010	mg/L		11/11/18 11:26	11/12/18 20:46	1

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW71-11318 Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

**Matrix: Water** 

**Matrix: Water** 

Method: 300.0 - Anions, Ion Ch	romatograp	hy						
Analyte	Result C	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND D	D1 D5	2.0	mg/L			11/14/18 03:31	5

Method: 200.7 Rev 4.4 - Metals (ICP) Analyte Result Qualifier RL Unit Prepared Analyzed Dil Fac Lithium 0.20 mg/L 11/09/18 07:19 11/14/18 22:14 0.35

Method: 200.8 LL - Metals (IC	P/MS)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0046	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Barium	0.0098	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Cobalt	ND	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Molybdenum	0.00079	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Selenium	0.27	0.00050	mg/L		11/11/18 11:26	11/12/18 20:55	1
Thallium	0.00031	0.00010	mg/L		11/11/18 11:26	11/12/18 20:55	1

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

Date Collected: 11/03/18 12:31 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Cl	hromatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND D1 D5	2.0	mg/L			11/14/18 04:08	5

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		11/09/18 07:19	11/14/18 22:25	1

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0031	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Barium	0.0075	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Cobalt	0.0020	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Molybdenum	0.00078	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Selenium	0.13	0.00050	mg/L		11/11/18 11:26	11/12/18 20:57	1
Thallium	0.00088	0.00010	mg/L		11/11/18 11:26	11/12/18 20:57	1

Client Sample ID: FC-CCR-MW73-11318 Lab Sample ID: 550-113007-12 **Matrix: Water** 

Date Collected: 11/03/18 13:24 Date Received: 11/07/18 13:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 04:45	- /
-								
Method: 200.7 Rev 4	.4 - Metals (ICP)							
Method: 200.7 Rev 4. Analyte	• •	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa

Method: 200.8 LL - Metals (ICP/	IVIS)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	V1	0.00050	mg/L	_	11/11/18 11:26	11/12/18 21:07	1

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

Client Sample ID: FC-CCR-MW73-11318 Lab Sample ID: 550-113007-12

Date Collected: 11/03/18 13:24 Date Received: 11/07/18 13:00

**Matrix: Water** 

Method: 200.8 LL - Metals (	(ICP/MS) (Continued)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	0.022	0.00050	mg/L		11/11/18 11:26	11/12/18 21:07	1
Cobalt	0.0078	0.00050	mg/L		11/11/18 11:26	11/12/18 21:07	1
Molybdenum	0.0026	0.00050	mg/L		11/11/18 11:26	11/12/18 21:07	1
Selenium	0.0062	0.00050	mg/L		11/11/18 11:26	11/14/18 21:16	1
Thallium	0.00020	0.00010	mg/L		11/11/18 11:26	11/12/18 21:07	1

Client Sample ID: FC-CCR-FD01-11318 Lab Sample ID: 550-113007-13 **Matrix: Water** 

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chro	matogra	ıphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			11/14/18 05:22	2

Method: 200.7 Rev 4.4 - Metals	s (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.34	0.20	mg/L		11/09/18 07:19	11/14/18 22:37	1

Analyte	Result Q	Qualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0068	0.00050	mg/L		11/11/18 11:26	11/14/18 21:18	1
Barium	0.0095	0.00050	mg/L		11/11/18 11:26	11/12/18 21:09	1
Cobalt	ND	0.00050	mg/L		11/11/18 11:26	11/12/18 21:09	1
Molybdenum	0.00065	0.00050	mg/L		11/11/18 11:26	11/12/18 21:09	1
Selenium	0.31	0.00050	mg/L		11/11/18 11:26	11/14/18 21:18	1
Thallium	0.00030	0.00010	mg/L		11/11/18 11:26	11/12/18 21:09	1

Lab Sample ID: 550-113007-14 Client Sample ID: FC-CCR-FD02-11318 Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Ch	hromatography						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND D1 D5	2.0	mg/L			11/14/18 06:35	5

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		11/09/18 07:19	11/14/18 22:43	1	

Method: 200.8 LL - Me Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0026	0.00050	mg/L		11/11/18 11:26	11/14/18 21:20	1
Barium	0.0075	0.00050	mg/L		11/11/18 11:26	11/12/18 21:11	1
Cobalt	0.0020	0.00050	mg/L		11/11/18 11:26	11/12/18 21:11	1
Molybdenum	0.00078	0.00050	mg/L		11/11/18 11:26	11/12/18 21:11	1
Selenium	0.15	0.00050	mg/L		11/11/18 11:26	11/14/18 21:20	1
Thallium	0.00087	0.00010	mg/L		11/11/18 11:26	11/12/18 21:11	1

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 161850** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits 20.0 Fluoride 25 45.9 D1 mg/L 102 80 - 120

Lab Sample ID: 550-113007-1 MSD Client Sample ID: FC-CCR-MW66-11218 Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 161850

7 manyolo Zatom 101000	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	25		20.0	46.5	D1	mg/L		105	80 - 120	1	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: 550-113007-1 MS Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161972 Prep Batch: 161450** Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit Limits Lithium 1.00 107 70 - 130 0.378 1.45 mg/L

Lab Sample ID: 550-113007-1 MSD Client Sample ID: FC-CCR-MW66-11218 **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161972 Prep Batch: 161450** 

Sample Sample Spike MSD MSD %Rec. **RPD** Result Qualifier Added Result Qualifier Limits Limit Analyte Unit %Rec **RPD** Lithium 0.378 1.00 1.42 mg/L 105 70 - 130 20

Method: 200.8 LL - Metals (ICP/MS)

Lab Sample ID: MB 550-161588/1-A Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161708 Prep Batch: 161588** 

MB MB Analyte Result Qualifier RI Unit D Prepared Analyzed Dil Fac 11/11/18 11:26 11/12/18 20:32 Antimony ND 0.0010 mg/L Arsenic ND 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 Barium ND 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 Cadmium ND 0.00010 mg/L 11/11/18 11:26 11/12/18 20:32 Chromium ND 0.0010 11/11/18 11:26 11/12/18 20:32 mg/L 11/11/18 11:26 11/12/18 20:32 Cobalt ND 0.00050 mq/L ND Lead 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 ND 0.00050 11/11/18 11:26 11/12/18 20:32 Molybdenum mg/L ND Selenium 0.00050 mg/L 11/11/18 11:26 11/12/18 20:32 Thallium ND 0.00010 mg/L 11/11/18 11:26 11/12/18 20:32

Lab Sample ID: LCS 550-161588/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA **Analysis Batch: 161708 Prep Batch: 161588** LCS LCS Spike %Rec.

Added Result Qualifier Limits Analyte Unit D %Rec Antimony 0.100 0.0999 mg/L 100 85 - 115

TestAmerica Phoenix

Page 13 of 38

11/27/2018

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company

Project/Site: CCR

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

Lab Sample ID: LCS 550-161588/2-A				Client Sample ID: Lab Control Sample					
Matrix: Water							Prep Type: Total/NA		
Analysis Batch: 161708							<b>Prep Batch: 161588</b>		
	Spike	LCS	LCS				%Rec.		
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits		
Arsenic	0.100	0.0962		mg/L		96	85 - 115		
Barium	0.100	0.0076		ma/l		08	85 115		

	Spike	LUS	LUS				MREC.	
Analyte	Added	Result (	Qualifier	Unit	D	%Rec	Limits	
Arsenic	0.100	0.0962		mg/L		96	85 - 115	
Barium	0.100	0.0976		mg/L		98	85 <sub>-</sub> 115	
Cadmium	0.100	0.0974		mg/L		97	85 - 115	
Chromium	0.100	0.0960		mg/L		96	85 - 115	
Cobalt	0.100	0.0962		mg/L		96	85 <sub>-</sub> 115	
Lead	0.100	0.0971		mg/L		97	85 - 115	
Molybdenum	0.100	0.0970		mg/L		97	85 <sub>-</sub> 115	
Selenium	0.100	0.0975		mg/L		98	85 <sub>-</sub> 115	
Thallium	0.100	0.0974		mg/L		97	85 - 115	

Lab Sample ID: LCSD 550-161588/3-A **Client Sample ID: Lab Control Sample Dup Matrix: Water** Prep Type: Total/NA

Arsenic

Analysis Batch: 161708							Prep Ba	itch: 16	<b>61588</b>
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	0.100	0.0991		mg/L		99	85 - 115	1	20
Arsenic	0.100	0.0965		mg/L		96	85 - 115	0	20
Barium	0.100	0.0956		mg/L		96	85 - 115	2	20
Cadmium	0.100	0.0967		mg/L		97	85 - 115	1	20
Chromium	0.100	0.0963		mg/L		96	85 - 115	0	20
Cobalt	0.100	0.0964		mg/L		96	85 - 115	0	20
Lead	0.100	0.0971		mg/L		97	85 - 115	0	20
Molybdenum	0.100	0.0964		mg/L		96	85 - 115	1	20
Selenium	0.100	0.0981		mg/L		98	85 - 115	1	20
Thallium	0.100	0.0973		mg/L		97	85 - 115	0	20

Lab Sample ID: 550-11300	7-1 MS	Clie	nt Sample ID: FC-CCR-MW66-11218
Matrix: Water			Prep Type: Total/NA
Analysis Batch: 161708			Prep Batch: 161588

Alialysis Balcii. 101700	Sample	Sample	Spike	MS	MS				%Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Antimony	ND		0.100	0.0997		mg/L		99	70 - 130
Arsenic	0.0015		0.100	0.112		mg/L		110	70 - 130
Barium	0.023		0.100	0.122		mg/L		100	70 - 130
Cadmium	ND		0.100	0.0891		mg/L		89	70 - 130
Chromium	0.0017		0.100	0.103		mg/L		102	70 - 130
Cobalt	0.012		0.100	0.103		mg/L		91	70 - 130
Lead	ND		0.100	0.0860		mg/L		86	70 - 130
Molybdenum	0.019		0.100	0.120		mg/L		102	70 - 130
Selenium	0.0020	M1	0.100	0.139	M1	mg/L		137	70 - 130
Thallium	0.0011		0.100	0.0886		mg/L		87	70 <sub>-</sub> 130

Lab Sample ID: 550-113007-1 MSD Client Samp Matrix: Water									ple ID:	FC-CCR-I		
	Analysis Batch: 161708	Sample	Sample	Spike	MSD	MSD				Prep Ba %Rec.	itch: 16	61588 RPD
	Analyte Antimony	Result ND	Qualifier	Added 0.100	<b>Result</b> 0.0982	Qualifier	Unit mg/L	D	% <b>Rec</b> 98	70 - 130	<b>RPD</b> 1	Limit 20

0.100

0.0015

Page 14 of 38

0.108

mg/L

106

70 - 130

11/27/2018

#### **QC Sample Results**

MSD MSD

0.120

0.0866

0.100

0.101

0.0843

0.118

0.0867

0.139 M1

Result Qualifier

Unit

mg/L

mg/L

mg/L

mg/L

mg/L

mg/L

mg/L

mg/L

Spike

Added

0.100

0.100

0.100

0.100

0.100

0.100

0.100

0.100

Client: Arizona Public Service Company

Lab Sample ID: 550-113007-1 MSD

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

Sample Sample

0.023

0.0017

0.012

0.019

0.0011

ND

0.0020 M1

ND

Result Qualifier

Project/Site: CCR

**Matrix: Water** 

Analyte

Barium

Cobalt

Lead

Cadmium

Chromium

Molybdenum

Selenium

Thallium

**Analysis Batch: 161708** 

TestAmerica Job ID: 550-113007-2

# Client Sample ID: FC-CCR-MW66-11218

84

99

137

86

**Prep Type: Total/NA** 

		Prep Ba %Rec.	itch: 16	81588 RPD
D	%Rec	Limits	RPD	Limit
	97	70 - 130	2	20
	87	70 - 130	3	20
	98	70 - 130	3	20
	88	70 - 130	2	20

70 - 130

70 - 130

70 - 130

70 - 130

2

2

0 2

20

20

20

TestAmerica Job ID: 550-113007-2

Client: Arizona Public Service Company Project/Site: CCR

#### HPLC/IC

#### Analysis Batch: 161850

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	300.0	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	300.0	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	300.0	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	300.0	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	300.0	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	300.0	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	300.0	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	300.0	

#### **Analysis Batch: 161852**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	300.0	

#### **Metals**

#### **Prep Batch: 161450**

				– Daton: 101400
Method Prep Bate	Matrix	Prep Type	Client Sample ID	Lab Sample ID
200.7	Water	Total/NA	FC-CCR-MW66-11218	550-113007-1
200.7	Water	Total/NA	FC-CCR-MW67-11318	550-113007-2
200.7	Water	Total/NA	FC-CCR-MW68-11318	550-113007-3
200.7	Water	Total/NA	FC-CCR-MW69-11318	550-113007-4
200.7	Water	Total/NA	FC-CCR-MW70-11218	550-113007-5
200.7	Water	Total/NA	FC-CCR-MW71-11318	550-113007-10
200.7	Water	Total/NA	FC-CCR-MW72-11318	550-113007-11
200.7	Water	Total/NA	FC-CCR-MW73-11318	550-113007-12
200.7	Water	Total/NA	FC-CCR-FD01-11318	550-113007-13
200.7	Water	Total/NA	FC-CCR-FD02-11318	550-113007-14
200.7	Water	Total/NA	FC-CCR-MW66-11218	550-113007-1 MS
200.7	Water	Total/NA	FC-CCR-MW66-11218	550-113007-1 MSD
	Water Water Water Water Water	Total/NA Total/NA Total/NA Total/NA Total/NA	FC-CCR-MW71-11318 FC-CCR-MW72-11318 FC-CCR-MW73-11318 FC-CCR-FD01-11318 FC-CCR-FD02-11318 FC-CCR-MW66-11218	550-113007-10 550-113007-11 550-113007-12 550-113007-13 550-113007-14 550-113007-1 MS

#### **Prep Batch: 161588**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.8	
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.8	
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.8	
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.8	
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.8	
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.8	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.8	
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.8	
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.8	
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.8	
MB 550-161588/1-A	Method Blank	Total/NA	Water	200.8	
LCS 550-161588/2-A	Lab Control Sample	Total/NA	Water	200.8	
LCSD 550-161588/3-A	Lab Control Sample Dup	Total/NA	Water	200.8	
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.8	
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.8	

TestAmerica Phoenix

11/27/2018

Page 16 of 38

# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

#### **Metals (Continued)**

#### **Analysis Batch: 161708**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.8 LL	161588
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.8 LL	161588
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.8 LL	161588
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.8 LL	161588
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.8 LL	161588
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.8 LL	161588
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.8 LL	161588
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.8 LL	161588
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.8 LL	161588
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.8 LL	161588
MB 550-161588/1-A	Method Blank	Total/NA	Water	200.8 LL	161588
LCS 550-161588/2-A	Lab Control Sample	Total/NA	Water	200.8 LL	161588
LCSD 550-161588/3-A	Lab Control Sample Dup	Total/NA	Water	200.8 LL	161588
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.8 LL	161588
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.8 LL	161588

#### **Analysis Batch: 161944**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.8 LL	161588
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.8 LL	161588
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.8 LL	161588

#### **Analysis Batch: 161972**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-1	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-2	FC-CCR-MW67-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-3	FC-CCR-MW68-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-4	FC-CCR-MW69-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-5	FC-CCR-MW70-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-12	FC-CCR-MW73-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-13	FC-CCR-FD01-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-14	FC-CCR-FD02-11318	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MS	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450
550-113007-1 MSD	FC-CCR-MW66-11218	Total/NA	Water	200.7 Rev 4.4	161450

Page 17 of 38

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW66-11218

Date Collected: 11/02/18 13:28 Date Received: 11/07/18 13:00

Lab Sample ID: 550-113007-1

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 19:33	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:27	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:39	SLS	TAL PHX

Lab Sample ID: 550-113007-2 Client Sample ID: FC-CCR-MW67-11318

Date Collected: 11/03/18 09:57

Date Received: 11/07/18 13:00

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 21:23	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:33	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:48	SLS	TAL PHX

Client Sample ID: FC-CCR-MW68-11318

Date Collected: 11/03/18 11:01

Date Received: 11/07/18 13:00

ab	Sample	:טו	550-113007-3	
			Matrix: Water	

Matrix: Water

**Matrix: Water** 

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 22:00	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:39	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:50	SLS	TAL PHX

Client Sample ID: FC-CCR-MW69-11318 Lab Sample ID: 550-113007-4

Date Collected: 11/03/18 08:49

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	161850	11/13/18 23:14	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:45	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:53	SLS	TAL PHX

TestAmerica Phoenix

Client: Arizona Public Service Company Project/Site: CCR

Client Sample ID: FC-CCR-MW70-11218

Date Collected: 11/02/18 15:32

Lab Sample ID: 550-113007-5 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/13/18 23:50	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 21:51	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:46	SLS	TAL PHX

Lab Sample ID: 550-113007-10 Client Sample ID: FC-CCR-MW71-11318

Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 03:31	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:14	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:55	SLS	TAL PHX

Client Sample ID: FC-CCR-MW72-11318

Lab Sample ID: 550-113007-11

Date Collected: 11/03/18 12:31 **Matrix: Water** Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:08	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:25	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 20:57	SLS	TAL PHX

Lab Sample ID: 550-113007-12 Client Sample ID: FC-CCR-MW73-11318

Date Collected: 11/03/18 13:24 **Matrix: Water** Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 04:45	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:31	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 21:07	SLS	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161944	11/14/18 21:16	TEK	TAL PHX

TestAmerica Phoenix

Page 19 of 38

#### **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

Client Sample ID: FC-CCR-FD01-11318

Lab Sample ID: 550-113007-13 Date Collected: 11/03/18 11:45

**Matrix: Water** 

Date Received: 11/07/18 13:00

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161850	11/14/18 05:22	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:37	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 21:09	SLS	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161944	11/14/18 21:18	TEK	TAL PHX

Client Sample ID: FC-CCR-FD02-11318

Lab Sample ID: 550-113007-14

Date Collected: 11/03/18 12:31 **Matrix: Water** Date Received: 11/07/18 13:00

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			161852	11/14/18 06:35	NEL	TAL PHX
Total/NA	Prep	200.7			161450	11/09/18 07:19	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	161972	11/14/18 22:43	ARE	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161708	11/12/18 21:11	SLS	TAL PHX
Total/NA	Prep	200.8			161588	11/11/18 11:26	SLS	TAL PHX
Total/NA	Analysis	200.8 LL		1	161944	11/14/18 21:20	TEK	TAL PHX

#### **Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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: 550-113007-2

#### **Laboratory: TestAmerica Phoenix**

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

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

16

4

5

9

11

12

14

### **Method Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-2

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
Subcontract	Radium 226/228	None	Radiation
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.

None = None

#### **Laboratory References:**

Radiation = Radiation Safety, 3245 North Washington Street, Chandler, AZ 85225

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

TestAmerica Phoenix



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: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW66-11218 (550-113007-1)	2.0 ± 0.3	$0.9 \pm 0.3$	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date



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(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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW67-11318 (550-113007-2)	0.8 ± 0.2	$0.8 \pm 0.3$	1.6 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018
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Jeremy Russell, BSE

11/21/2018 Date

(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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW68-11318 (550-113007-3)	$0.6 \pm 0.2$	$1.3 \pm 0.3$	1.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

11/21/2018

Jeremy Russell, BSE

Date

3245 N. WASHINGTON ST. \* CHANDLER, ARIZONA 85225-1121 Website: www.redsafe.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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

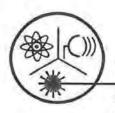
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW69-11318 (550-113007-4)	1.7 ± 0.2	1.3 ± 0.3	3.0 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

11/21/2018

Jeremy Russell, BSE

Date



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(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: November 02, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

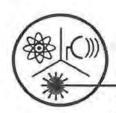
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW70-11218 (550-113007-5)	$0.7 \pm 0.2$	< 0.7	$0.7 \pm 0.2$

Date of Analysis	/2018 11/9/2018	11/9/2018
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11/21/2018

Jeremy Russell, BSE

Date



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(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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW71-11318 (550-113007-10)	1.2 ± 0.2	< 0.7	$1.2 \pm 0.2$

Date of Analysis 11/9/2018 11/9/2018 11/9/2018

Jeremy Russell, BSE

11/21/2018 Date



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## Radiochemical Activity in Water (pCi/L)

**TestAmerica** 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW72-11318 (550-113007-11)	$0.7 \pm 0.2$	$1.0 \pm 0.3$	$1.7 \pm 0.4$

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Jeremy Russell, BSE

11/21/2018 Date



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# Radiochemical Activity in Water (pCi/L)

TestAmerica 4625 E. Cotton Center Blvd., Suite #189 Phoenix, AZ 85040

Sampling Date: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

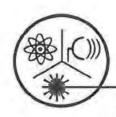
Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-MW73-11318 (550-113007-12)	1.5 ± 0.2	$1.4 \pm 0.3$	2.9 ± 0.4

Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Jeremy Russell, BSE

11/21/2018

Date



# 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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD01-11318 (550-113007-13)	1.8 ± 0.2	< 0.7	1.8 ± 0.2

B	11/0/0010		21.02.000
Date of Analysis	11/9/2018	11/9/2018	11/9/2018

Jeremy Russell, BSE

11/21/2018 Date

160

Laboratory License Number AZ0462



# Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 Website: www.redsafe.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: November 03, 2018 Sample Received: November 08, 2018 Analysis Completed: November 21, 2018

Sample ID	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
FC-CCR-FD02-11318 (550-113007-14)	0.5 ± 0.2	1.5 ± 0.3	2.0 ± 0.4

Date of Analysis 11/9/20	018 11/9/2018	8 11/9/2013

11/21/2018

Jeremy Russell, BSE

Date

Laboratory License Number AZ0462

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Company. Radiation Safety Eng., Inc.					Accreditations R	0).	Anzona	Page 2 of 2 Job #.	2
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Note: Since laboratory accreditations are subject to change. Test/America Laborationes, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody.	alones, Inc. places the own	ership of metho	d, analyte &	accreditation o	ompliance upon c	out subcontract laboratories. This sam	ple shipment is forward	led under chain-of-custod)	*
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TestAmerica Phoeni

					Phone:
				Calendar ( C ) or Work Days (W)	Fruitland, NM 87416
_	Job No.			Analysis Turnaround Time	PO Box 355, MS 4915
	1 of1 COCs	Carrier:	Lab Contact: Ken Baker	Tel/Fax: 928-288-1394	APS Four Corners
_	COC No:	Date: 11/7/2018	Site Contact: Doug Lavarnway	Project Manager: Doug Lavarnway Site Contact: Doug Lavarnw	Client Contact
11/2	TestAmerica Laboratories, Inc.			[ ] 000	phone 602,437.3340 fax 623,445.6192
27/2	THE LEADER IN ENVIRONMENTAL TESTING	rd	Chain of Custody Reco	Chain	Phoenix, AZ 85040
018	lestAmerica			<u>.</u>	4645 E Cotton Ctr Blvd Bdg 3
					The said and the s

4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

# Chain of Custody Record

Client Contact APS Four Corners PO Box 355, MS 4915	Project Manager: Doug Lavarnway Tel/Fax: 928-288-1394	nager: D	oug Lav	arnway		Site (	ont	act	3	a l quarriusy	Date:	11/7/2018			COC No:
APS Four Corners PO Box 355, MS 4915	Tel/Fax: 928-	288-1394						4		one contact. Dong Lavarityay					
PO Box 355, MS 4915		Carlotte of March 14				ab C	onta	act:	Sen l	Lab Contact: Ken Baker					1 of1 COCs
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Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Perform I	EPA 200.	EPA 300.	SM 25400	SM 4500-					Sample Specific Notes:
FC-CCR-MW62-11218 _ & C	11/2/2018	1410	G	٧	2	Z	×	×	×	×					
FC-CCR-MW63-11218 -07	11/2/2018	1449	G	8	2	Z	×	×	×	×					
FC-CCR-MW64-11218 -08	11/2/2018	1252	G	8	2	Z	×	×	×	×					
FC-CCR-MW65-11218 -09	11/2/2018	1208	G	¥	2	Z	×	×	×	×					
FC-CCR-MW71-11318 -170	11/3/18	1145	G	×	2	Z	×	×	×	×					
FC-CCR-MW72-11318 -//	11/3/18	1231	G	×	2	Z	×	×	×	×			H		
FC-CCR-MW73-11318 - 12	11/3/18	1324	G	W	2	×	×	×	×	×					
FC-CCR-FD01-11318 -13	11/3/18	1145	G	×	2	×	×	×	×	×					
FC-CCR-FD02-11318 -/ 4	11/3/18	1231	G	8	N	×	×	×	×	×					
								- (							
Preservation Used: 1=1ce, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other Possible Hazard Identification	103; 5=NaOH; 6=	Other				Sa	mpl	e Di	spo	Sample Disposal ( A fee may b	e assess	d if samp	les are	retaine	ee may be assessed if samples are retained longer than 1 month)
Non-Hazard   Flammable   Skin		Poison	Unknown	SKII]		7.0		Retu	m 7	Return To Client	Disposal By Lab	By Lab		Archive For	re For Months
Special Instructions/QC Requirements & Comments:  Need Fluoride reporting limit ≤ 0.8 mg/L	ments:									3,0°C		3,80	1	3,5	, 2.5°C) pc
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# TestAmerica Phoenix

4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

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# Chain of Custody Record

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phone 602 437 3340 fax 623 445 6192	1000	,													TestAmerica Laboratories Inc	restariac Inc
Client Contact	Project Manager: Doug Lavarnway	anager:	Doug Lav	rnway		Site	001	act:	Por	10	Site Contact: Doug Lavarnway	Date: 11	11/7/2018		COC No.	
APS Four Corners	Tel/Fax: 928-587-0319	-587-0319				Lab	Con	lact:	Ke	Lab Contact: Ken Baker					1 of 1	COCs
PO Box 355, MS 4915		\nalysis T	Analysis Turnaround Time	Time		-	$\dashv$	$\dashv$	$\dashv$	$\dashv$					Job No.	
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Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sa Perform N	EPA 200.7	200.8 (As	Radium 2	EPA 300.0					Sample Specific Notes	ific Notes:
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FC-CCR-MW67-11318 - 02	11/3/2018	957	G	8	4	Z	×	×	×	×						
FC-CCR-MW68-11318 -03	11/3/2018	1101	G	W	4	Z	×	×	×	×						
FC-CCR-MW69-11318 - 54	11/3/18	849	G	W	4	Z	×	×	×	×						
FC-CCR-MW70-11218 ~OS	11/2/18	1532	G	W	4	Z	×	×	×	×						
FC-CCR-MW71-11318 -10	11/3/18	1145	G	W	4	Z	×	×	×	×						
FC-CCR-MW72-11318 - ( )	11/3/18	1231	G	W	4	Z	×	×	×	×						
FC-CCR-MW73-11318 - ( )	11/3/18	1324	G	×	4	z	×	×	×	×						
FC-CCR-FD01-11318 -13	11/3/18	1145	G	×	4	Z	×	×	×	×						
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Non-Hazard Hammable Skin Irritant	ritant	Poison B	U)	Unknown		-	П	Ret	mu	700	Return To Client	Disposal By Lab	By Lab	Ara	Archive For N	Months
Special Instructions/QC Requirements & Comments:  Method 200.8 with collision cell	ents:						100	1.1			120	5	7,8	7	7,82,29°C) F	pc
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Client: Arizona Public Service Company

Job Number: 550-113007-2

Login Number: 113007 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.</td <td>True</td> <td></td>	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: 550-113007-3

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Authorized for release by: 11/30/2018 4:22:04 PM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

**Review your project** results through Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	7
QC Sample Results	8
QC Association Summary	9
Lab Chronicle	10
Certification Summary	11
Method Summary	12
Chain of Custody	13
Receipt Checklists	16

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# **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

#### **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

RL

RPD

TEF TEQ

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)

Reporting Limit or Requested Limit (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Relative Percent Difference, a measure of the relative difference between two points

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Job ID: 550-113007-3

**Laboratory: TestAmerica Phoenix** 

Narrative

Job Narrative 550-113007-3

#### Comments

No additional comments.

#### Receipt

The samples were received on 11/7/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.9° C, 3.0° C and 3.8° C.

#### **Receipt Exceptions**

Received 3 pages of COCs from the courier.

Samples #6 - #9 only request Appendix I.

All of the other samples request Appendix I and II.

Client did provide sample containers if Appendix II is needed.

FC-CCR-MW62-11218 (550-113007-6), FC-CCR-MW63-112818 (550-113007-7), FC-CCR-MW64-11218 (550-113007-8) and FC-CCR-MW65-11218 (550-113007-9)

#### HPLC/IC

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

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# **Sample Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-113007-10	FC-CCR-MW71-11318	Water	11/03/18 11:45	11/07/18 13:00
550-113007-11	FC-CCR-MW72-11318	Water	11/03/18 12:31	11/07/18 13:00

# **Detection Summary**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW71-11318

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID: 550-113007-10

No Detections.

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

No Detections.

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# **Client Sample Results**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW71-11318

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID: 550-113007-10

**Matrix: Water** 

Date Collected: 11/03/18 11:45 Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Result Qualifier Analyte RL Unit Analyzed Dil Fac D Prepared Fluoride ND D1 D5 0.80 11/28/18 01:23 mg/L

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

Date Collected: 11/03/18 12:31 **Matrix: Water** 

Date Received: 11/07/18 13:00

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit D Analyzed **Prepared** Dil Fac Fluoride ND D1 D5 0.80 mg/L 11/28/18 01:41

TestAmerica Job ID: 550-113007-3

**Client Sample ID: Lab Control Sample** 

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

**Client Sample ID: Matrix Spike Duplicate** 

Prep Type: Total/NA

Prep Type: Total/NA

**Prep Type: Total/NA** 

Prep Type: Total/NA

Prep Type: Total/NA

Client Sample ID: Matrix Spike

Client: Arizona Public Service Company

Project/Site: CCR

Method: 300.0 - Anions, Ion Chromatography Lab Sample ID: MB 550-163090/2 Client Sample ID: Method Blank

**Matrix: Water** 

Analysis Batch: 163090

MB MB

Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac 0.40 Fluoride  $\overline{\mathsf{ND}}$ mg/L 11/27/18 20:10

Lab Sample ID: LCS 550-163090/5

**Matrix: Water** 

**Analysis Batch: 163090** 

Spike LCS LCS %Rec. Added Result Qualifier Limits Analyte Unit %Rec Fluoride 4.00 4.11 mg/L 103 90 - 110

Lab Sample ID: LCSD 550-163090/6

**Matrix: Water** 

Analysis Batch: 163090

Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Limits RPD Limit Unit D %Rec Fluoride 4.00 4.10 mg/L 102

Lab Sample ID: 550-113026-A-1 MS ^2

**Matrix: Water** 

Analysis Batch: 163090

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride ND D1 M2 D5 8.00 6.47 D1 M2 mg/L 80 - 120

Lab Sample ID: 550-113026-A-1 MSD ^2

**Matrix: Water** 

Analysis Batch: 163090

Spike MSD MSD %Rec. RPD Sample Sample Added Analyte **Result Qualifier** Result Qualifier Unit %Rec Limits RPD Limit Fluoride ND D1 M2 D5 8.00 6.80 D1 mg/L 81 80 - 120 20

TestAmerica Phoenix

11/30/2018

# **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

# HPLC/IC

#### Analysis Batch: 163090

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-113007-10	FC-CCR-MW71-11318	Total/NA	Water	300.0	
550-113007-11	FC-CCR-MW72-11318	Total/NA	Water	300.0	
MB 550-163090/2	Method Blank	Total/NA	Water	300.0	
LCS 550-163090/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-163090/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-113026-A-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-113026-A-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	

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#### **Lab Chronicle**

Client: Arizona Public Service Company

Client Sample ID: FC-CCR-MW71-11318

Project/Site: CCR

TestAmerica Job ID: 550-113007-3

Lab Sample ID: 550-113007-10

Date Collected: 11/03/18 11:45 **Matrix: Water** 

Date Received: 11/07/18 13:00

Batch Batch Dilution Batch Prepared Method **Factor** Number or Analyzed **Prep Type** Type Run Analyst Lab TAL PHX Total/NA Analysis 300.0 2 163090 11/28/18 01:23 NEL

Client Sample ID: FC-CCR-MW72-11318 Lab Sample ID: 550-113007-11

**Matrix: Water** 

Date Collected: 11/03/18 12:31 Date Received: 11/07/18 13:00

Dilution Batch **Batch** Batch Prepared or Analyzed **Prep Type** Туре Method Run Factor Number Analyst Lab TAL PHX Total/NA 300.0 163090 11/28/18 01:41 NEL Analysis 2

**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: 550-113007-3

# **Laboratory: TestAmerica Phoenix**

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

Authority	Program	<b>EPA Region</b>	Identification Number	<b>Expiration Date</b>
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: 550-113007-3

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL PHX

#### **Protocol References:**

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 4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040

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Custody Record		
THE LEADER IN ENVIRONMENTAL TESTING	<b>TestAmerica</b>	

15 5	Tel/Fax: 928-288-1394  Analysis Turnaround Time  Calendar ( C ) or Work Days (W)  TAT if different from Below7 Days	28-288-1394  Analysis Turnaround Time (C) or Work Days (W)  different from Below7 Days_ 2 weeks 1 week	Id Time		ab Con	tact: K	Lab Contact: Ken Baker	Carrier:	Job No.
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Sample Identification Date	Sample	Sample Type	Matrix	Cont.	Perform I EPA 200.	EPA 300.	SM 25400 SM 4500-		Sample Specific Notes
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FC-CCR-MW67-11318 - 0) 11/3/2018	8 957	G	*	2	×	×			
	10	G	×	2	×	×	×		
FC-CCR-MW69-11318 ~ 54 11/3/18	849	G	W	2	×	×	×		
FC-CCR-MW70-11218 -25 11/2/18	1532	G	W	2	×	×	×		
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Preservation Used: 1=1ce, 2=11Cl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other	6= Other								
Possible Hazard Identification  Non-Hazard Flammable Skin Irritant	Poison	Un	Unkhown		Samp	Retun	le Disposal ( A fee may Return To Client	be assessed if samples a Disposal By Lab	Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)  Return To Client Disposal By Lab Archive For Months
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Sample Identification	Sample Date	Sample Time	Sample Type M	# of	Filtered S	Perform	EPA 200.	EPA 300.	SM 25400	SM 4500-					Sample Specific Notes:
FC-CCR-MW62-11218 _ & C	11/2/2018	1410	G	W 2	z		×	×	×	×					
FC-CCR-MW63-11218 -07	11/2/2018	1449	G	¥ 2	z		×	×	×	×					
FC-CCR-MW64-11218 -08	11/2/2018	1252	G	W 2	z	C	×	×	×	×					
FC-CCR-MW65-11218 -09	11/2/2018	1208	G	W 2	z		×	×	×	×					
FC-CCR-MW71-11318 170	11/3/18	1145	G	W 2	z		×	×	×	×					
FC-CCR-MW72-11318 -//	11/3/18	1231	G	W 2	z		×	×	×	×					
FC-CCR-MW73-11318 -/2	11/3/18	1324	G	W 2	z	×	×	×	×	×					
FC-CCR-FD01-11318 -13	11/3/18	1145	G	W 2	Z	×	×	×	×	×					
FC-CCR-FD02-11318 -14	11/3/18	1231	G	¥ 2	z	×	×	×	×	×					
reservation Used: 1= fce, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	)3; 5=NaOH; 6=	Other													
**Dossible Hazard Identification   Skin Irricant   Skin Irricant		Poison	Unknown	41		Sa	Tab	e D	im	To	Sample Disposal ( A fee may be	assessed if san Disposal By Lab	d if samples ar By Lab □	Archive For	may be assessed if samples are retained longer than 1 month)  Disposal By Lab Archive For Months
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4645 E Cotton Ctr Blvd Bdg 3 Phoenix, AZ 85040 TestAmerica Phoenix

# Chain of Custody Record

340 fax 623 445 6192	113001			TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway	Site Contact: Doug Lavarnway	Date: 11/7/2018	COC No.
ers	TeVFax: 928-587-0319	Lab Contact: Ken Baker	Carrier:	
S 4915	Analysis Turnaround Time			Job No.
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phone 602 437 3340 fax 623 445.6192	1	,										TestAmerica Laboratories, Inc.
Client Contact	Project Manager: Doug Lavarnway	anager: I	Joug Lav	arnway		Site	ont	act:	Doug	Site Contact: Doug Lavarnway	Date: 11/7/2018	COC No.
APS Four Corners	Tel/Fax: 928-587-0319	-587-0319				Lab	Cont	act:	Ken	Lab Contact: Ken Baker	Carrier:	l_of_l_COCs
PO Box 355, MS 4915		alysis Tu	Analysis Turnaround Time	Time		7	$\dashv$	┪	$\exists$			Job No.
Fruitland, NM 87416	Calendar	C) or Wo	Calendar ( C ) or Work Days (W)				_					
Phone:	TAT	TAT if different from Below		7 Days		N )	.,,	, TI)				
Fax:		2	2 weeks			Y / I	2000	, Se				SDG No.
Project Name: CCR		-	week			0. (	010	, Mo	_			
E-Mail Address:		N	2 days			_	_	_	_			
			1 day			_	_			-		
Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered S Perform	EPA 200.	200.8 (As	Radium 2	EPA 300.		Sample Specific Notes:
FC-CCR-MW66-11218 - 01	11/2/2018	1328	G	W	4	Z	×	×	×	×		
FC-CCR-MW67-11318 - 02	11/3/2018	957	G	8	4	Z	×	×	×	×		
FC-CCR-MW68-1131803	11/3/2018	1101	9	×	4	Z	×	×	×	×		
FC-CCR-MW69-11318 - 54	11/3/18	849	G	W	4	Z	×	×	×	×		
FC-CCR-MW70-11218 ~ S	11/2/18	1532	G	٧	4	Z	×	×	×	×		
FC-CCR-MW71-11318 -10	11/3/18	1145	G	8	4	Z	×	×	×	×		
FC-CCR-MW72-11318 - ( )	11/3/18	1231	G	8	4	Z	×	×	×	×		
FC-CCR-MW73-11318 - (2)	11/3/18	1324	G	8	4	z	×	×	×	×		
FC-CCR-FD01-11318 -13	11/3/18	1145	G	8	4	Z	×	×	×	×		
FC-CCR-FD02-11318 -(Y	11/3/18	1231	G	8	4	Z	×	×	×	×		
Preservation Used: 1=1ce, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6= Other	03: 5=NaOH;	= Other				+	+		$\pm$			
Possible Hazard Identification  Non-Hazard Flammable Skin Irriant	rilant	Poison B	U	Unknown		S	□ an	Ret.	ispo	Sample Disposal ( A fee ma	may be assessed if samples are retained longer than 1 month)  Disposal By Lab Archive For Month	etained longer than 1 month) Archive For Months
Special Instructions/QC Requirements & Comments: Method 200.8 with collision cell	nents:					- 1				2	3,06,7,8%	29°C) pc
Relinquished by Lavarance	Company.	508		Date/Time	ne 305	R	Received by	ed b	C	Honre	Company Post	Date/Time/ (11/7//8 8:05 a
- X	Company			Date/Time:		12	Received by	ed b	100	0	Company	Date/Time
Relinquished by:	Company			Date/Time		77	Received by	ed b	1/2		Company:	Date/Time 130>
								11				

# **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-113007-3

Login Number: 113007 List Source: TestAmerica Phoenix

List Number: 1

Creator: Gravlin, Andrea

Answer	Comment
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
True	
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True	
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True	
True	
False	Check done at department level as required.
	True True True True True True True True

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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: 550-115114-1

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 1/17/2019 10:00:43 AM

Ken Baker, Project Manager II (602)659-7624

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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	11
QC Association Summary	18
Lab Chronicle	21
Certification Summary	23
Method Summary	24
Chain of Custody	25
Receipt Checklists	27

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# **Definitions/Glossary**

Client: Arizona Public Service Company

**Qualifier Description** 

TestAmerica Job ID: 550-115114-1 Project/Site: CCR

SDG: Cholla

#### **Qualifiers**

#### **HPLC/IC** Qualifier

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.
D2	Sample required dilution due to high concentration of analyte.

#### **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 MLMinimum 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)

Reporting Limit or Requested Limit (Radiochemistry) RL

RPD Relative Percent Difference, a measure of the relative difference between two points

TEF Toxicity Equivalent Factor (Dioxin) **TEQ** Toxicity Equivalent Quotient (Dioxin)

TestAmerica Phoenix

1/17/2019

Page 3 of 27

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

Job ID: 550-115114-1

**Laboratory: TestAmerica Phoenix** 

**Narrative** 

Job Narrative 550-115114-1

#### Comments

No additional comments.

#### Receipt

The samples were received on 12/18/2018 12:33 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.2° C and 3.7° 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: FC-CCR-MW84-121518 (550-115114-2), FC-CCR-MW85-121518 (550-115114-3), FC-CCR-MW86-121518 (550-115114-4) and FC-CCR-FD01-121518 (550-115114-5). 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**

Method(s) SM 2540C:

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: 550-115114-1

SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-115114-1	FC-CCR-MW83-121518	Water	12/15/18 11:50	12/18/18 12:33
550-115114-2	FC-CCR-MW84-121518	Water	12/15/18 11:04	12/18/18 12:33
550-115114-3	FC-CCR-MW85-121518	Water	12/15/18 10:05	12/18/18 12:33
550-115114-4	FC-CCR-MW86-121518	Water	12/15/18 08:51	12/18/18 12:33
550-115114-5	FC-CCR-FD01-121518	Water	12/15/18 08:51	12/18/18 12:33

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

# Client Sample ID: FC-CCR-MW83-121518

Lab Sample	ID:	550-1	15114-1
------------	-----	-------	---------

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	130	D2	4.0	mg/L	2	300.0	Total/NA
Fluoride	1.8	D1	0.80	mg/L	2	300.0	Total/NA
Sulfate	3400	D2	400	mg/L	200	300.0	Total/NA
Boron	2.5		0.050	mg/L	1	200.7 Rev 4.4	Total/NA
Calcium	470	M3	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	270	M3	2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Potassium	3.2		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	610	M3	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	5200	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: FC-CCR-MW84-121518

# Lab Sample ID: 550-115114-2

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	1400	D2	400	mg/L	200	300.0	Total/NA
Sulfate	8300	D2	400	mg/L	200	300.0	Total/NA
Boron	110	D2	0.20	mg/L	4	200.7 Rev 4.4	Total/NA
Calcium	490		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	1800	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
Potassium	33		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	660		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	410		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	410		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	14000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.1	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: FC-CCR-MW85-121518

# Lab Sample ID: 550-115114-3

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	680	D2	400	mg/L	200	_	300.0	Total/NA
Sulfate	5400	D2	400	mg/L	200		300.0	Total/NA
Boron	30		0.050	mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	510		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Magnesium	770		2.0	mg/L	1		200.7 Rev 4.4	Total/NA
Potassium	18		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Sodium	780		0.50	mg/L	1		200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	380		6.0	mg/L	1		SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	380		6.0	mg/L	1		SM 2320B	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	11.3	H5	0.1	Degrees C	1		SM 4500 H+ B	Total/NA

#### Client Sample ID: FC-CCR-MW86-121518

# Lab Sample ID: 550-115114-4

Analyte	Result C	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1300	02	400	mg/L	200	_	300.0	 Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 27

1/17/2019

# **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

Lab Sample ID: 550-115114-4

SDG: Cholla

# Client Sample ID: FC-CCR-MW86-121518 (Continued)

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Sulfate	9400	D2	400	mg/L	200	300.0	Total/NA
Boron	120	D2	0.20	mg/L	4	200.7 Rev 4.4	Total/NA
Calcium	480		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	1700	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
Potassium	30		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	630		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	330		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	330		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	13000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.1	H5	1.7	SU	1	SM 4500 H+ B	Total/NA
Temperature	11.7	H5	0.1	Degrees C	1	SM 4500 H+ B	Total/NA

# Client Sample ID: FC-CCR-FD01-121518

Client Sample ID: FC-CCR		Lab San	nple ID: 550	)-115114-5			
- Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Chloride	1300	D2	400	mg/L	200	300.0	Total/NA
Sulfate	7900	D2	400	mg/L	200	300.0	Total/NA
Boron	120	D2	0.20	mg/L	4	200.7 Rev 4.4	Total/NA
Calcium	470		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
Magnesium	1700	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
Potassium	30		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Sodium	640		0.50	mg/L	1	200.7 Rev 4.4	Total/NA
Alkalinity as CaCO3	330		6.0	mg/L	1	SM 2320B	Total/NA
Bicarbonate Alkalinity as CaCO3	330		6.0	mg/L	1	SM 2320B	Total/NA
Total Dissolved Solids	13000	D2	100	mg/L	1	SM 2540C	Total/NA
pH	7.2	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.

1/17/2019

# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

Client Sample ID: FC-CCR-MW83-121518

Date Collected: 12/15/18 11:50 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115114-1

Matrix: Water

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	130	D2	4.0	mg/L			12/26/18 21:37	2
Fluoride	1.8	D1	0.80	mg/L			12/26/18 21:37	2
Sulfate	3400	D2	400	mg/L			12/21/18 21:30	200
Method: 200.7 Rev 4.4 - Metals (	ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	2.5		0.050	mg/L		12/20/18 10:34	12/29/18 02:26	1
Calcium	470	M3	2.0	mg/L		12/20/18 10:34	12/27/18 12:13	1
Magnesium	270	M3	2.0	mg/L		12/20/18 10:34	12/27/18 12:13	1
Potassium	3.2		0.50	mg/L		12/20/18 10:34	12/27/18 12:13	1
Sodium	610	M3	0.50	mg/L		12/20/18 10:34	12/27/18 12:13	1
General Chemistry								
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	250		6.0	mg/L			12/19/18 16:04	1
Bicarbonate Alkalinity as CaCO3	250		6.0	mg/L			12/19/18 16:04	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 16:04	1

6.0

6.0

100

1.7

0.1

mg/L

mg/L

mg/L

Degrees C

SU

Client Sample ID: FC-CCR-MW84-121518

ND

ND

5200 D2

7.5 H5

10.6 H5

Date Collected: 12/15/18 11:04

Date Received: 12/18/18 12:33

Alkalinity, Phenolphthalein

**Total Dissolved Solids** 

рĤ

**Temperature** 

Hydroxide Alkalinity as CaCO3

Lab Sample ID	): 550-115114-2
	Matrix: Water

12/19/18 16:04

12/19/18 16:04

12/19/18 11:51

12/26/18 14:18

12/26/18 14:18

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac Chloride 1400 D2 400 mg/L 12/21/18 22:44 200 Fluoride ND D1 D5 0.80 mg/L 12/21/18 22:26 2 **Sulfate** 8300 D2 400 mg/L 12/21/18 22:44 200

Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	110	D2	0.20	mg/L		12/20/18 10:34	12/29/18 04:32	4
Calcium	490		2.0	mg/L		12/20/18 10:34	12/27/18 13:38	1
Magnesium	1800	D2	8.0	mg/L		12/20/18 10:34	12/29/18 04:32	4
Potassium	33		0.50	mg/L		12/20/18 10:34	12/27/18 13:38	1
Sodium	660		0.50	mg/L		12/20/18 10:34	12/27/18 13:38	1

General Chemistry Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	410	6.0	mg/L			12/19/18 16:46	1
Bicarbonate Alkalinity as CaCO3	410	6.0	mg/L			12/19/18 16:46	1
Carbonate Alkalinity as CaCO3	ND	6.0	mg/L			12/19/18 16:46	1
Alkalinity, Phenolphthalein	ND	6.0	mg/L			12/19/18 16:46	1
Hydroxide Alkalinity as CaCO3	ND	6.0	mg/L			12/19/18 16:46	1
Total Dissolved Solids	14000 D2	100	mg/L			12/19/18 11:51	1
pH	7.1 H5	1.7	SU			12/26/18 14:18	1

TestAmerica Phoenix

Page 8 of 27 1/17/2019

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

Client Sample ID: FC-CCR-MW84-121518

Date Collected: 12/15/18 11:04 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-2

**Matrix: Water** 

**General Chemistry (Continued)** 

Analyte Result Qualifier RL Unit Analyzed Dil Fac Prepared 0.1 Degrees C 12/26/18 14:18 **Temperature** 12.6 H5

Client Sample ID: FC-CCR-MW85-121518 Lab Sample ID: 550-115114-3

Date Collected: 12/15/18 10:05 **Matrix: Water** 

Date Received: 12/18/18 12:33

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	680	D2	400	mg/L			12/21/18 23:21	200
Fluoride	ND	D1 D5	0.80	mg/L			12/21/18 23:02	2
Sulfate	5400	D2	400	mg/L			12/21/18 23:21	200

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	30	0.050	mg/L		12/20/18 10:34	12/29/18 04:53	1
Calcium	510	2.0	mg/L		12/20/18 10:34	12/27/18 13:44	1
Magnesium	770	2.0	mg/L		12/20/18 10:34	12/27/18 13:44	1
Potassium	18	0.50	mg/L		12/20/18 10:34	12/27/18 13:44	1
Sodium	780	0.50	mg/L		12/20/18 10:34	12/27/18 13:44	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	380		6.0	mg/L			12/19/18 16:56	1
Bicarbonate Alkalinity as CaCO3	380		6.0	mg/L			12/19/18 16:56	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 16:56	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 16:56	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 16:56	1
<b>Total Dissolved Solids</b>	8700	D2	100	mg/L			12/19/18 11:51	1
pH	7.3	H5	1.7	SU			12/26/18 14:18	1
Temperature	11.3	H5	0.1	Degrees C			12/26/18 14:18	1

Client Sample ID: FC-CCR-MW86-121518 Lab Sample ID: 550-115114-4 **Matrix: Water** 

Date Collected: 12/15/18 08:51 Date Received: 12/18/18 12:33

Method: 300.0 - Anion	s, Ion Chromatograp	hy						
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1300	D2	400	mg/L			12/22/18 00:34	200
Fluoride	ND [	D1 D5	0.80	mg/L			12/22/18 00:16	2
Sulfate	9400 I	D2	400	mg/L			12/22/18 00:34	200

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	120	D2	0.20	mg/L		12/20/18 10:34	12/29/18 04:59	4
Calcium	480		2.0	mg/L		12/20/18 10:34	12/27/18 13:50	1
Magnesium	1700	D2	8.0	mg/L		12/20/18 10:34	12/29/18 04:59	4
Potassium	30		0.50	mg/L		12/20/18 10:34	12/27/18 13:50	1
Sodium	630		0.50	mg/L		12/20/18 10:34	12/27/18 13:50	1

# **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

Client Sample ID: FC-CCR-MW86-121518

Date Collected: 12/15/18 08:51 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115114-4

**Matrix: Water** 

General Chemistry	D 14	0	Б.	1124	_	D	A	D!! E
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	330		6.0	mg/L			12/19/18 17:05	1
Bicarbonate Alkalinity as CaCO3	330		6.0	mg/L			12/19/18 17:05	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 17:05	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 17:05	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 17:05	1
<b>Total Dissolved Solids</b>	13000	D2	100	mg/L			12/19/18 11:51	1
pH	7.1	H5	1.7	SU			12/26/18 14:18	1
Temperature	11.7	H5	0.1	Degrees C			12/26/18 14:18	1

Lab Sample ID: 550-115114-5 Client Sample ID: FC-CCR-FD01-121518 **Matrix: Water** 

Date Collected: 12/15/18 08:51 Date Received: 12/18/18 12:33

Method: 300.0 - Anions, Ion Chromatography Analyte Result Qualifier RL Unit D Prepared Dil Fac Analyzed 400 200 Chloride 1300 D2 mg/L 12/22/18 01:11 Fluoride ND D1 D5 0.80 12/22/18 00:53 2 mg/L **Sulfate** 7900 D2 400 mg/L 12/22/18 01:11 200

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	120	D2	0.20	mg/L		12/20/18 10:34	12/29/18 05:10	4
Calcium	470		2.0	mg/L		12/20/18 10:34	12/27/18 13:56	1
Magnesium	1700	D2	8.0	mg/L		12/20/18 10:34	12/29/18 05:10	4
Potassium	30		0.50	mg/L		12/20/18 10:34	12/27/18 13:56	1
Sodium	640		0.50	mg/L		12/20/18 10:34	12/27/18 13:56	1

General Chemistry Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	330		6.0	mg/L			12/19/18 17:15	1
Bicarbonate Alkalinity as CaCO3	330		6.0	mg/L			12/19/18 17:15	1
Carbonate Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 17:15	1
Alkalinity, Phenolphthalein	ND		6.0	mg/L			12/19/18 17:15	1
Hydroxide Alkalinity as CaCO3	ND		6.0	mg/L			12/19/18 17:15	1
<b>Total Dissolved Solids</b>	13000	D2	100	mg/L			12/19/18 11:51	1
pH	7.2	H5	1.7	SU			12/26/18 14:18	1
Temperature	12.5	H5	0.1	Degrees C			12/26/18 14:18	1

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

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

MD MD

Lab Sample ID: MB 550-165329/2 **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 165329** 

	IVID	IAID						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/21/18 19:03	1
Fluoride	ND		0.40	mg/L			12/21/18 19:03	1
Sulfate	ND		2.0	mg/L			12/21/18 19:03	1

Lab Sample ID: LCS 550-165329/5 **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 165329** 

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	 20.0	20.9		mg/L		105	90 - 110	
Fluoride	4.00	4.06		mg/L		101	90 - 110	
Sulfate	20.0	20.0		mg/L		100	90 - 110	

Lab Sample ID: LCSD 550-165329/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

Analysis Batch: 165329

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	20.0	21.0		mg/L		105	90 - 110	0	20
Fluoride	4.00	4.06		mg/L		101	90 - 110	0	20
Sulfate	20.0	20.1		mg/L		100	90 - 110	0	20

Lab Sample ID: 550-115113-B-1 MS ^2 **Client Sample ID: Matrix Spike** Prep Type: Total/NA **Matrix: Water** 

Analysis Batch: 165329

	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Fluoride	12	D1	8 00	9.53	D1	ma/l		103	80 120	

Lab Sample ID: 550-115113-B-1 MS ^200 **Client Sample ID: Matrix Spike Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Spike Sample Sample MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits Sulfate 4300 D2 4000 8450 D2 mg/L 80 - 120

Lab Sample ID: 550-115113-B-1 MSD ^2 **Client Sample ID: Matrix Spike Duplicate** Prep Type: Total/NA

**Matrix: Water** Analysis Batch: 165329

MSD MSD **RPD** Sample Sample Spike %Rec. Analyte Result Qualifier Added Result Qualifier Limits RPD Unit %Rec Limit Fluoride 1.2 D1 8.00 9.49 D1 103 80 - 120 mg/L

Lab Sample ID: 550-115113-B-1 MSD ^200 **Client Sample ID: Matrix Spike Duplicate** Prep Type: Total/NA

**Matrix: Water** 

Analysis batch: 165329											
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Sulfate	4300	D2	4000	8420	D2	mg/L		102	80 - 120	0	20

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

#### Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 550-115114-1 MS Client Sample ID: FC-CCR-MW83-121518 **Matrix: Water Prep Type: Total/NA** 

Analysis Batch: 165329

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits Sulfate 4000 7370 D2 3400 D2 mg/L 100 80 - 120

Lab Sample ID: 550-115114-1 MSD Client Sample ID: FC-CCR-MW83-121518 Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 165329** 

-	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Sulfate	3400	D2	4000	7350	D2	mg/L		100	80 - 120	0	20

Lab Sample ID: 550-115115-B-1 MS ^200 **Client Sample ID: Matrix Spike Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 165329** 

	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	2300	D2	4000	6670	D2	mg/L		109	80 - 120	
Sulfate	14000	D2	4000	17200	D2	mg/L		86	80 - 120	

Lab Sample ID: 550-115115-B-1 MSD ^200 **Client Sample ID: Matrix Spike Duplicate Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	2300	D2	4000	6640	D2	mg/L		108	80 - 120	0	20
Sulfate	14000	D2	4000	17100	D2	mg/L		84	80 - 120	0	20

Lab Sample ID: MB 550-165473/1024 **Client Sample ID: Method Blank Prep Type: Total/NA** 

**Matrix: Water** 

Analysis Batch: 165473

	IVID	IVID						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		2.0	mg/L			12/26/18 20:42	1
Fluoride	ND		0.40	mg/L			12/26/18 20:42	1
Sulfate	ND		2.0	mg/L			12/26/18 20:42	1

Lab Sample ID: LCS 550-165473/25 **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 165473** 

•	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	20.0	21.3		mg/L		106	90 - 110	
Fluoride	4.00	4.09		mg/L		102	90 - 110	
Sulfate	20.0	20.3		ma/L		101	90 - 110	

Lab Sample ID: LCSD 550-165473/26 Client Sample ID: Lab Control Sample Dup **Matrix: Water Prep Type: Total/NA Analysis Batch: 165473** 

Spike LCSD LCSD %Rec. **RPD** Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit Chloride 20.0 106 90 - 110 21.3 mg/L 0

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1 SDG: Cholla

Prep Type: Total/NA

Prep Type: Total/NA

**Prep Type: Total/NA** 

Prep Type: Total/NA

**Prep Batch: 164986** 

**Prep Type: Total/NA** 

**Prep Batch: 164986** 

**Prep Type: Total/NA** Prep Batch: 164986

Analyzed

Client Sample ID: Lab Control Sample Dup

Client Sample ID: FC-CCR-MW83-121518

Client Sample ID: FC-CCR-MW83-121518

**Client Sample ID: Method Blank** 

**Client Sample ID: Method Blank** 

<u>12/20/18 10:34</u> <u>12/29/18 01:49</u>

**Client Sample ID: Lab Control Sample** 

%Rec.

Limite

Prepared

D %Pac

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 550-165473/26

**Matrix: Water** Analysis Batch: 165473

7 many one Date min 100 m									
-	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Fluoride	4.00	4.10		mg/L		102	90 - 110	0	20
Sulfate	20.0	20.3		ma/l		102	90 - 110	0	20

Lab Sample ID: 550-115114-1 MS

**Matrix: Water** 

Analysis Batch: 165473										
	Sample	Sample	Spike	MS	MS				%Rec.	
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Chloride	130	D2	40.0	168	D2	mg/L		89	80 - 120	
Fluoride	1.8	D1	8.00	9.94	D1	mg/L		101	80 - 120	

Lab Sample ID: 550-115114-1 MSD

**Matrix: Water** 

**Analysis Batch: 165473** 

	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Chloride	130	D2	40.0	168	D2	mg/L		89	80 - 120	0	20
Fluoride	1.8	D1	8.00	10.0	D1	mg/L		102	80 - 120	1	20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 550-164986/1-A

**Matrix: Water** 

Analysis Batch: 165571

	MB I	MB						
Analyte	Result (	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		2.0	mg/L		12/20/18 10:34	12/27/18 11:36	1
Magnesium	ND		2.0	mg/L		12/20/18 10:34	12/27/18 11:36	1
Potassium	ND		0.50	mg/L		12/20/18 10:34	12/27/18 11:36	1
Sodium	ND		0.50	mg/L		12/20/18 10:34	12/27/18 11:36	1

RL

0.050

Unit

mg/L

Lab Sample ID: MB 550-164986/1-A

**Matrix: Water** 

Analyte

Analysis Batch: 165722

analy 313 Datem.	1001 22	
	MB	MB

Boron	ND
Lab Sample ID: LCS 550-164986/2-A	

**Matrix: Water** 

Analysis Batch: 165571					
-		Spike	LCS	LCS	
Analyte		Added	Result	Qualifier	Un
Calcium		21.0	22.0		mo

Result Qualifier

ı	Allalyte	Audeu	Resuit	Qualifier Offic	ט	/orec	Lilling	
	Calcium	21.0	22.0	mg/L	. –	105	85 - 115	
ı	Magnesium	21.0	21.2	mg/L		101	85 - 115	
	Potassium	20.0	20.2	mg/L		101	85 - 115	
ı	Sodium	20.0	19.9	ma/l		99	85 115	

TestAmerica Phoenix

TestAmerica Job ID: 550-115114-1

Client: Arizona Public Service Company Project/Site: CCR

SDG: Cholla

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

Lab Sample ID: LCS 550-164986/2-A				Clie	nt Sar	nple ID	: Lab Control Sample
Matrix: Water							Prep Type: Total/NA
Analysis Batch: 165722							Prep Batch: 164986
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Boron	1.00	1.00		ma/L		100	85 - 115

Lab Sample ID: LCSD 550-164986/3-A Matrix: Water Analysis Batch: 165571							ole ID: Lab Control Sampl Prep Type: To Prep Batch: 1				
	Spike	LCSD	LCSD				%Rec.		RPD		
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit		
Calcium	21.0	21.6		mg/L		103	85 - 115	2	20		
Magnesium	21.0	20.9		mg/L		100	85 - 115	2	20		
Potassium	20.0	19.9		mg/L		100	85 - 115	2	20		
Sodium 	20.0	19.5		mg/L		98	85 - 115	2	20		

Lab Sample ID: LCSD 550-1	64986/3-A	Client Sample ID: Lab Control Sample I						<b>Dup</b>		
Matrix: Water								Prep Ty	pe: Tot	al/NA
Analysis Batch: 165722								Prep Ba	itch: 10	34986
-		Spike	LCSD	LCSD				%Rec.		RPD
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Boron		1.00	0.990		mg/L		99	85 - 115	1	20

Lab Sample ID: 550-115114 Matrix: Water Analysis Batch: 165571		Sample	Spike	MS	MS	Client	Samp	le ID: F	C-CCR-MW83-121518 Prep Type: Total/NA Prep Batch: 164986 %Rec.
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits
Calcium	470	M3	21.0	475	M3	mg/L		25	70 - 130
Magnesium	270	M3	21.0	285	M3	mg/L		56	70 - 130
Potassium	3.2		20.0	23.0		mg/L		99	70 - 130
Sodium	610	M3	20.0	606	M3	mg/L		-4	70 - 130

Lab Sample ID: 550-115114	I-1 MS					Client Sample ID: FC-CCR-MW83-12151						
Matrix: Water									Prep Typ	e: Total/NA		
Analysis Batch: 165722									Prep Ba	tch: 164986		
	Sample	Sample	Spike	MS	MS				%Rec.			
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits			
Boron	2.5		1.00	3.41		mg/L		94	70 - 130			

Lab Sample ID: 550-1151 Matrix: Water Analysis Batch: 165571  Analyte Calcium Magnesium Potassium	I-1 MSD				le ID: F	FC-CCR-MW83-121518 Prep Type: Total/NA Prep Batch: 164986					
	Sample	Sample	Spike	MSD	MSD				%Rec.		RPD
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Calcium	470	M3	21.0	467	M3	mg/L		-15	70 - 130	2	20
Magnesium	270	M3	21.0	281	M3	mg/L		33	70 - 130	2	20
Potassium	3.2		20.0	22.8		mg/L		98	70 - 130	1	20
Sodium	610	M3	20.0	595	M3	mg/L		-54	70 - 130	2	20

TestAmerica Phoenix

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

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

Lab Sample ID: 550-115114-1 MSD **Matrix: Water** 

**Analysis Batch: 165722** 

Sample	Sample	Spike
Result	Qualifier	Added
2.5		1.00

MSD MSD Result Qualifier 3.43

Unit D %Rec mg/L

Limits 96 70 - 130

%Rec.

**Client Sample ID: Method Blank** 

12/19/18 14:01

Prep Type: Total/NA

Prep Type: Total/NA

**Prep Type: Total/NA** 

**Client Sample ID: Lab Control Sample** 

D %Rec

100

Client Sample ID: Lab Control Sample Dup

Client Sample ID: FC-CCR-MW83-121518

%Rec. Limits

90 - 110

Client Sample ID: FC-CCR-MW83-121518

RPD Limit 0

Prep Type: Total/NA

Prep Type: Total/NA

**Prep Batch: 164986** 

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 550-164955/5

**Matrix: Water** 

Alkalinity as CaCO3

Analyte

Analyte

Boron

**Analysis Batch: 164955** 

Bicarbonate Alkalinity as CaCO3 Carbonate Alkalinity as CaCO3 Alkalinity, Phenolphthalein Hydroxide Alkalinity as CaCO3

ND

MB	MB						
Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
ND		6.0	mg/L			12/19/18 14:01	1
ND		6.0	mg/L			12/19/18 14:01	1
ND		6.0	mg/L			12/19/18 14:01	1
ND		6.0	ma/L			12/19/18 14:01	1

mg/L

Lab Sample ID: LCS 550-164955/4

**Matrix: Water** 

Analysis Batch: 164955

•		Spike	LCS	LCS	
Analyte		Added	Result	Qualifier	Unit
Alkalinity as CaCO3		250	249		mg/L

Lab Sample ID: LCSD 550-164955/17 **Matrix: Water** 

**Analysis Batch: 164955** 

	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Alkalinity as CaCO3	250	259		mg/L		104	90 - 110	4	20

6.0

Lab Sample ID: 550-115114-1 DU

**Matrix: Water** 

Analysis Batch: 164955

Allalysis Datcil. 104333								
_	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	250		242		mg/L			20
Bicarbonate Alkalinity as CaCO3	250		242		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

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 550-164875/1

**Matrix: Water** 

**Analysis Batch: 164875** 

MB MB

Analyte Result Qualifier RL Unit D Prepared Analyzed Dil Fac Total Dissolved Solids  $\overline{\mathsf{ND}}$ 20 mg/L 12/19/18 11:51

TestAmerica Phoenix

Prep Type: Total/NA

**Client Sample ID: Method Blank** 

**RPD** 

20

1/17/2019

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

## Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 550-164875/2	Client Sample ID: Lab Control Sample
Matrix: Water	Prep Type: Total/NA
Analysis Batch: 164875	

	Spike	LUS	LUS				70ReC.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Total Dissolved Solids	 1000	972		mg/L	_	97	90 - 110	

Lab Sample ID: LCSD 550-164875/3 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 164875** Spike LCSD LCSD %Rec. **RPD** 

Added Result Qualifier Unit Limits Analyte D %Rec RPD Limit Total Dissolved Solids 1000 97 90 - 110 974 mg/L

Lab Sample ID: 550-115113-B-1 DU **Client Sample ID: Duplicate Matrix: Water Prep Type: Total/NA Analysis Batch: 164875** 

Sample Sample DU DU **RPD** Result Qualifier Result Qualifier Analyte RPD Limit Unit Total Dissolved Solids 6600 D2 6310 D2 mg/L

Lab Sample ID: 550-115114-1 DU Client Sample ID: FC-CCR-MW83-121518 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 164875** 

•	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
Total Dissolved Solids	5200	D2	 5060	D2	mg/L		 3	10

#### Method: SM 4500 H+ B - pH

Lab Sample ID: LCSSRM 550-165356/1 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165356** 

		Spike	LCSSRM	LCSSRM				%Rec.	
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	
рН		7.00	7.0		SU		99.9	98.5 - 101.	
								_	

Lab Sample ID: LCSSRM 550-165356/13 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165356** 

	Spike	LCSSRM	LCSSRM				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
pH	 7.00	7.0		SU		100.0	98.5 - 101.	
							5	

Lab Sample ID: LCSSRM 550-165356/25 **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA

Analysis Batch: 165356

	Spike	LCSSRM	LCSSRM				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
pH	7.00	7.0		SU		100.4	98.5 - 101.	
							5	

TestAmerica Phoenix

## **QC Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

Method: SM 4500 H+ B - pH (Continued)

Lab Sample ID: 550-115114-1 DU

**Matrix: Water** 

**Analysis Batch: 165356** 

Client Sample ID: F	C-CCR-MW83-121518
	Prep Type: Total/NA

	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
pH	7.5	H5	 7.5	H5	SU	_	 0.1	5
Temperature	10.6	H5	11.0	H5	Degrees C		4	

Lab Sample ID: 550-115115-B-1 DU Client Sample ID: Duplicate Prep Type: Total/NA **Matrix: Water** 

Analysis Batch: 165356								
-	Sample	Sample	DU	DU				RPD
Analyte	Result	Qualifier	Result	Qualifier	Unit	D	RPD	Limit
pH	7.3	H5	7.3	H5	SU		 0	5
Temperature	13.4	H5	13.6	H5	Degrees C		1	

TestAmerica Job ID: 550-115114-1 SDG: Cholla

HPLC/IC

Project/Site: CCR

Analysis Batch: 165329

Client: Arizona Public Service Company

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	300.0	
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	300.0	
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	300.0	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	300.0	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	300.0	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	300.0	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	300.0	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	300.0	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	300.0	
MB 550-165329/2	Method Blank	Total/NA	Water	300.0	
LCS 550-165329/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-165329/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-115113-B-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-115113-B-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-115113-B-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-115113-B-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	300.0	
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	300.0	
550-115115-B-1 MS ^200	Matrix Spike	Total/NA	Water	300.0	
550-115115-B-1 MSD ^200	Matrix Spike Duplicate	Total/NA	Water	300.0	

**Analysis Batch: 165473** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	300.0	_
MB 550-165473/1024	Method Blank	Total/NA	Water	300.0	
LCS 550-165473/25	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-165473/26	Lab Control Sample Dup	Total/NA	Water	300.0	
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	300.0	
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	300.0	

Metals

**Prep Batch: 164986** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	200.7	
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	200.7	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	200.7	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	200.7	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	200.7	
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7	
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7	
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7	
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	200.7	
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	200.7	

Analysis Batch: 165571

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	200.7 Rev 4.4	164986

TestAmerica Phoenix

1/17/2019

Page 18 of 27

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115114-1 SDG: Cholla

## **Metals (Continued)**

#### **Analysis Batch: 165571 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	200.7 Rev 4.4	164986
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164986
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164986
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986

#### **Analysis Batch: 165722**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	200.7 Rev 4.4	164986
MB 550-164986/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	164986
LCS 550-164986/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	164986
LCSD 550-164986/3-A	Lab Control Sample Dup	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986

## **General Chemistry**

#### **Analysis Batch: 164875**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	SM 2540C	
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	SM 2540C	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	SM 2540C	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	SM 2540C	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	SM 2540C	
MB 550-164875/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 550-164875/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 550-164875/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
550-115113-B-1 DU	Duplicate	Total/NA	Water	SM 2540C	
550-115114-1 DU	FC-CCR-MW83-121518	Total/NA	Water	SM 2540C	

#### **Analysis Batch: 164955**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	SM 2320B	
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	SM 2320B	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	SM 2320B	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	SM 2320B	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	SM 2320B	
MB 550-164955/5	Method Blank	Total/NA	Water	SM 2320B	
LCS 550-164955/4	Lab Control Sample	Total/NA	Water	SM 2320B	
LCSD 550-164955/17	Lab Control Sample Dup	Total/NA	Water	SM 2320B	
550-115114-1 DU	FC-CCR-MW83-121518	Total/NA	Water	SM 2320B	

TestAmerica Phoenix

1/17/2019

Page 19 of 27

## **QC Association Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

# **General Chemistry (Continued)**

## Analysis Batch: 165356

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	SM 4500 H+ B	-
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	SM 4500 H+ B	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	SM 4500 H+ B	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	SM 4500 H+ B	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-165356/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-165356/13	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCSSRM 550-165356/25	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
550-115114-1 DU	FC-CCR-MW83-121518	Total/NA	Water	SM 4500 H+ B	
550-115115-B-1 DU	Duplicate	Total/NA	Water	SM 4500 H+ B	

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TestAmerica Job ID: 550-115114-1

SDG: Cholla

Client Sample ID: FC-CCR-MW83-121518

Date Collected: 12/15/18 11:50 Date Received: 12/18/18 12:33

Project/Site: CCR

Client: Arizona Public Service Company

Lab Sample ID: 550-115114-1

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		200	165329	12/21/18 21:30	NEL	TAL PHX
Total/NA	Analysis	300.0		2	165473	12/26/18 21:37	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:13	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 02:26	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 16:04	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164875		YET	TAL PHX
					,	12/19/18 11:51		
					(End) 1	12/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW84-121518

Date Collected: 12/15/18 11:04

Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-2

Lab Sample ID: 550-115114-3

Matrix: Water

4

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/21/18 22:26	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/21/18 22:44	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:38	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 04:32	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 16:46	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164875		YET	TAL PHX
					(Start) 1	2/19/18 11:51		
					(End) 1	2/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW85-121518

Date Collected: 12/15/18 10:05

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/21/18 23:02	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/21/18 23:21	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:44	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 04:53	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 16:56	DGS	TAL PHX

TestAmerica Phoenix

Page 21 of 27

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Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-1

SDG: Cholla

Client Sample ID: FC-CCR-MW85-121518

Date Collected: 12/15/18 10:05 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-3

**Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C			164875		YET	TAL PHX
					(Start) 1	2/19/18 11:51		
					(End) 1	2/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-MW86-121518

Date Collected: 12/15/18 08:51

Lab Sample ID: 550-115114-4

**Matrix: Water** 

Date Received: 12/18/18 12:33

_	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 00:16	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 00:34	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:50	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 04:59	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 17:05	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	164875		YET	TAL PHX
					(Start) 1	2/19/18 11:51		
					(End) 1	2/20/18 09:05		
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

Client Sample ID: FC-CCR-FD01-121518

Date Collected: 12/15/18 08:51

Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-5 **Matrix: Water** 

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 00:53	NEL	TAL PHX
Total/NA	Analysis	300.0		200	165329	12/22/18 01:11	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:56	SRA	TAL PH
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 05:10	SRA	TAL PHX
Total/NA	Analysis	SM 2320B		1	164955	12/19/18 17:15	DGS	TAL PHX
Total/NA	Analysis	SM 2540C		1	()	2/19/18 11:51 2/20/18 09:05	YET	TAL PH>
Total/NA	Analysis	SM 4500 H+ B		1	165356	12/26/18 14:18	MRR	TAL PHX

**Laboratory References:** 

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

TestAmerica Phoenix

## **Accreditation/Certification Summary**

Client: Arizona Public Service Company
Project/Site: CCR
TestAmerica Job ID: 550-115114-1
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: 550-115114-1

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

TestAmerica Phoenix

4625 E Cotton Center Blvd Suite 189

TestAmerica Phoenix

# Chain of Custody Record

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phone 602.437.3340 fax 602.454.9303	Regula	Regulatory Program:	ram:		-			1		CCR	1	1			1				₹	TestAmerica Laboratories, Inc.	ories, Inc.
Client Contact	Doug Lavarnway	way			Do	Doug Lavarnway	arnwa	~								4	12/17/2018	201		COC No:	
APS Cholla	928-587-0319				Lat	Lab Contact:	ict:					Carrier:	er:						T	_1 of1 COCs	Cs
4801 Cholla Lake Road	An	<b>Analysis Turnaround Time</b>	around Tir	me		,											-	-	S	Sampler:	
Joseph City, Az 86032					_	a, K		_					_				_	_	न	For Lab Use Only:	
(928) 587-0319 Phone	TAT	TAT if different from Below	Below			_							_				_		5	Walk-in Client:	
						Y /	4)				_		_					-	-	ab Sampling:	
CCR	_					_	SO4		<u> </u>				_			_	_	_		ſ	
Site: Cholla						_	F, 5	_	_				_			_	_		T	AL LODO NO.	
PO#							(CI, I				_	-	_					_	15	JOB / SUG NO.	
Sample Identification	Sample Date	Sample (	Type (C=Comp, G=Grab) N	# of Matrix Cont.	Filtered Sa	Perform M EPA 200.7 Mg)	EPA 300.0	SM 2540C SM 4500-H	SM 2320B	Alkalinity	Carbonate		-							Sample Specific Notes:	otes:
- I FC-CCR-MW83-121518	12/15/2018	1150 G	W	~	N Z	×	×	×	×	×	×		Н								
-2 FC-CCR-MW84-121518	12/15/2018	1104 G	×	2		×	×	×	×	×	×						-				
- 3 FC-CCR-MW85-121518	12/15/2018	1005 G	W	V 2	Z	×	×	×	×	×	×			171	ΤŢ						
-4 FC-CCR-MW86-121518	12/15/2018	851 G		W 2	Z	×	×	×	×	×	×			11		L					
-5 FC-CCR-FD01-121518	12/15/2018	851 G	V	2	z	×	×	×	×	×	×										f O7
																					Page 26
				$\mathbb{H}$				11			+		++			1	+++	+	+		
											-		-			-	-	1	-		
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	5=NaOH; 6= Oth	er		-	-						+							1			
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.	ase List any EPA W	aste Codes	for the san	nple in the		Sample Disposal	Disp		A fe	e ma	y be	assess	ed if s	amp	es a	Te 76	tain	edi	eng	( A fee may be assessed if samples are retained longer than 1 month)	
✓ Non-Hazard ☐ Flammable ☐ Skin Irritant	Poison B		Unknown	n		□ Re	Return to Client	Client		Ŀ	(L)	Disposal by Lab	by Lab				Archive for	for	W	Months	
Special Instructions/QC Requirements & Comments:									- 1						- 1		ا د	_	V		
Custody Seals Intact: Yes No	Custody Seal No.	No.:						Coole	rTer	np. (	ler Temp. (°C): Obs'd	bs'd:			Corr'd:	1	13	1	=	herm ID No.:	
NOON WELL	Company:	705	<b>,</b> 0	Date/Time:	3	Received by:	d by:						C	Company	пy				D	Date/Time:	
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## **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-115114-1

SDG Number: Cholla

Login Number: 115114 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

ordator: mayoodk, Elou		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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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: 550-115114-2

TestAmerica Sample Delivery Group: Cholla

Client Project/Site: CCR

#### For:

Arizona Public Service Company 4801 Cholla Lake Rd Joseph City, Arizona 86032

Attn: Doug Lavarnway

Sen Baken

Authorized for release by: 1/25/2019 8:54:33 AM

Ken Baker, Project Manager II (602)659-7624

ken.baker@testamericainc.com

.....LINKS .....

Review your project results through

Total Access

**Have a Question?** 



Visit us at: 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.

# **Table of Contents**

Cover Page	1
Table of Contents	2
Definitions/Glossary	3
Case Narrative	4
Sample Summary	5
Detection Summary	6
Client Sample Results	8
QC Sample Results	11
QC Association Summary	15
Lab Chronicle	17
Certification Summary	19
Method Summary	20
Chain of Custody	21
Receipt Checklists	24

4

6

9

10

12

13

## **Definitions/Glossary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

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.
D2	Sample required dilution due to high concentration of analyte

## **Glossary**

ND PQL

QC

**RER** 

RPD

TEF

TEQ

RL

<u> </u>	
Abbreviation	These commonly used abbreviations may or may not be present in this report.
n	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

Not Detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

**Quality Control** 

#### **Case Narrative**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

Job ID: 550-115114-2

Laboratory: TestAmerica Phoenix

**Narrative** 

Job Narrative 550-115114-2

#### Comments

No additional comments.

#### Receipt

The samples were received on 12/18/2018 12:33 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.2° C and 3.7° 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: FC-CCR-MW84-121518 (550-115114-2), FC-CCR-MW85-121518 (550-115114-3), FC-CCR-MW86-121518 (550-115114-4) and FC-CCR-FD01-121518 (550-115114-5). 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

Method(s) 200.8 LL: The following samples were diluted due to the nature of the sample matrix: FC-CCR-MW83-121518 (550-115114-1), FC-CCR-MW84-121518 (550-115114-2), FC-CCR-MW85-121518 (550-115114-3), FC-CCR-MW86-121518 (550-115114-4) and FC-CCR-FD01-121518 (550-115114-5). 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: 550-115114-2

SDG: Cholla

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-115114-1	FC-CCR-MW83-121518	Water	12/15/18 11:50	12/18/18 12:33
550-115114-2	FC-CCR-MW84-121518	Water	12/15/18 11:04	12/18/18 12:33
550-115114-3	FC-CCR-MW85-121518	Water	12/15/18 10:05	12/18/18 12:33
550-115114-4	FC-CCR-MW86-121518	Water	12/15/18 08:51	12/18/18 12:33
550-115114-5	FC-CCR-FD01-121518	Water	12/15/18 08:51	12/18/18 12:33

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

Lab Sample ID: 550-115114-1

Lab Sample ID: 550-115114-2

Lab Sample ID: 550-115114-3

SDG: Cholla

## Client Sample ID: FC-CCR-MW83-121518

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Fluoride	1.8	D1	0.80	mg/L		300.0	Total/NA
Magnesium	270		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
SiO2, Silica	21		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.022		0.0010	mg/L	5	200.8 LL	Total Recoverable
Cobalt	0.0040		0.0010	mg/L	5	200.8 LL	Total Recoverable
Molybdenum	0.010		0.0010	mg/L	5	200.8 LL	Total Recoverable

## Client Sample ID: FC-CCR-MW84-121518

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Magnesium	1800	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
SiO2, Silica	14		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.018		0.0010	mg/L	5	200.8 LL	Total Recoverable
Cobalt	0.011		0.0010	mg/L	5	200.8 LL	Total Recoverable
Lead	0.00067		0.00050	mg/L	5	200.8 LL	Total Recoverable
Molybdenum	0.0015		0.0010	mg/L	5	200.8 LL	Total Recoverable

## Client Sample ID: FC-CCR-MW85-121518

Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.25		0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	770		2.0	mg/L	1	200.7 Rev 4.4	Total/NA
SiO2, Silica	19		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Arsenic	0.0013		0.0010	mg/L	5	200.8 LL	Total Recoverable
Barium	0.026		0.0010	mg/L	5	200.8 LL	Total Recoverable
Cobalt	0.0017		0.0010	mg/L	5	200.8 LL	Total Recoverable
Lead	0.00058		0.00050	mg/L	5	200.8 LL	Total Recoverable
Molybdenum	0.0058		0.0010	mg/L	5	200.8 LL	Total Recoverable
Selenium	0.12		0.0030	mg/L	5	200.8 LL	Total Recoverable

## Client Sample ID: FC-CCR-MW86-121518

						•	
 Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.32		0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	1700	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
SiO2, Silica	20		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.019		0.0010	mg/L	5	200.8 LL	Total
							Recoverable
Cobalt	0.0092		0.0010	mg/L	5	200.8 LL	Total
							Recoverable

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

Page 6 of 26

Lab Sample ID: 550-115114-4

1/25/2019

## **Detection Summary**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

## Client Sample ID: FC-CCR-MW86-121518 (Continued)

Analyte	Result (	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.00065		0.00050	mg/L	5	_	200.8 LL	Total
								Recoverable
Molybdenum	0.0041		0.0010	mg/L	5		200.8 LL	Total
								Recoverable
Thallium	0.00053		0.00050	mg/L	5		200.8 LL	Total
								Recoverable

## Client Sample ID: FC-CCR-FD01-121518

Client Sample ID: F	C-CCR-FD01-12	Lab Sample ID: 550-115114-					
Analyte	Result	Qualifier	RL	Unit	Dil Fac D	Method	Prep Type
Lithium	0.31		0.20	mg/L		200.7 Rev 4.4	Total/NA
Magnesium	1700	D2	8.0	mg/L	4	200.7 Rev 4.4	Total/NA
SiO2, Silica	20		0.21	mg/L	1	200.7 Rev 4.4	Total/NA
Barium	0.017		0.0010	mg/L	5	200.8 LL	Total Recoverable
Cobalt	0.0087		0.0010	mg/L	5	200.8 LL	Total Recoverable
Molybdenum	0.0039		0.0010	mg/L	5	200.8 LL	Total Recoverable
Thallium _	0.00052		0.00050	mg/L	5	200.8 LL	Total Recoverable

Lab Sample ID: 550-115114-4

## **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

Client Sample ID: FC-CCR-MW83-121518

Date Collected: 12/15/18 11:50 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-1

**Matrix: Water** 

Method: 300.0 - Anions, Ion Ch	romatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	1.8	D1	0.80	mg/L			12/26/18 21:37	2
Method: 200.7 Rev 4.4 - Metals	(ICP)							

Method: 200.7 Rev 4.4 - Me	etals (ICP)						
Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND —	0.20	mg/L		12/20/18 10:34	12/27/18 12:13	1
Magnesium	270	2.0	mg/L		12/20/18 10:34	12/27/18 12:13	1
SiO2, Silica	21	0.21	mg/L		12/20/18 10:34	12/29/18 02:26	1

Analyte	Result Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	0.0025	mg/L		01/18/19 09:43	01/20/19 18:56	5
Arsenic	ND	0.0010	mg/L		01/18/19 09:43	01/20/19 18:56	5
Barium	0.022	0.0010	mg/L		01/18/19 09:43	01/20/19 18:56	5
Cadmium	ND	0.00050	mg/L		01/18/19 09:43	01/20/19 18:56	5
Chromium	ND	0.0025	mg/L		01/18/19 09:43	01/20/19 18:56	5
Cobalt	0.0040	0.0010	mg/L		01/18/19 09:43	01/20/19 18:56	5
Lead	ND	0.00050	mg/L		01/18/19 09:43	01/20/19 18:56	5
Molybdenum	0.010	0.0010	mg/L		01/18/19 09:43	01/20/19 18:56	5
Selenium	ND	0.0030	mg/L		01/18/19 09:43	01/20/19 18:56	5
Thallium	ND	0.00050	mg/L		01/18/19 09:43	01/20/19 18:56	5

Client Sample ID: FC-CCR-MW84-121518 Lab Sample ID: 550-115114-2

Date Collected: 12/15/18 11:04

Method: 300.0 - Anion	s, Ion Chromatogra	iphy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND ND	D1 D5	0.80	mg/L			12/21/18 22:26	2
- Method: 200.7 Rev 4.4	- Metals (ICP)							
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.20	mg/L		12/20/18 10:34	12/27/18 13:38	1
Magnesium	1800	D2	8.0	mg/L		12/20/18 10:34	12/29/18 04:32	4
SiO2, Silica	14		0.21	mg/L		12/20/18 10:34	12/29/18 04:38	1
- Method: 200.8 LL - Me	etals (ICP/MS) - Tota	ıl Recovera	ble					
Analyte	,	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.0025	mg/L		01/18/19 09:43	01/20/19 18:58	5
A : -	NE		0.0010			04/40/40 00:40	04/00/40 40:50	_

INICITION. 200.0 LL - INIC	tais (ICF/IVIS) - I Utai	Recoverable					
Analyte	Result (	Qualifier RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND	0.0025	mg/L		01/18/19 09:43	01/20/19 18:58	5
Arsenic	ND	0.0010	mg/L		01/18/19 09:43	01/20/19 18:58	5
Barium	0.018	0.0010	mg/L		01/18/19 09:43	01/20/19 18:58	5
Cadmium	ND	0.00050	mg/L		01/18/19 09:43	01/20/19 18:58	5
Chromium	ND	0.0025	mg/L		01/18/19 09:43	01/20/19 18:58	5
Cobalt	0.011	0.0010	mg/L		01/18/19 09:43	01/20/19 18:58	5
Lead	0.00067	0.00050	mg/L		01/18/19 09:43	01/20/19 18:58	5
Molybdenum	0.0015	0.0010	mg/L		01/18/19 09:43	01/20/19 18:58	5
Selenium	ND	0.0030	mg/L		01/18/19 09:43	01/20/19 18:58	5
Thallium	ND	0.00050	mg/L		01/18/19 09:43	01/20/19 18:58	5

## **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

Client Sample ID: FC-CCR-MW85-121518

Date Collected: 12/15/18 10:05 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-3

**Matrix: Water** 

Method: 300.0 - Anion	is, Ion Chromatogra	phy						
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Fluoride	ND ND	D1 D5	0.80	mg/L			12/21/18 23:02	
- Method: 200.7 Rev 4.4	I - Metals (ICP)							
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Lithium	0.25		0.20	mg/L		12/20/18 10:34	12/27/18 13:44	
Magnesium	770		2.0	mg/L		12/20/18 10:34	12/27/18 13:44	•
SiO2, Silica	19		0.21	mg/L		12/20/18 10:34	12/29/18 04:53	
Antimony	ND	- Gauinioi	0.0025	<u>mg/L</u>		01/18/19 09:43		
Analyte		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fa
Arsenic	0.0013		0.0010	mg/L			01/20/19 19:00	į
Barium	0.026		0.0010	mg/L			01/20/19 19:00	,
Cadmium						0 17 107 10 00:10	01720710 10.00	ļ
Chromium	ND		0.00050	ma/L		01/18/19 09:43	01/20/19 19:00	
	ND ND		0.00050 0.0025	mg/L ma/L			01/20/19 19:00 01/20/19 19:00	
Cobalt	ND		0.00050 0.0025 0.0010	mg/L		01/18/19 09:43	01/20/19 19:00	
Cobalt Lead			0.0025	mg/L mg/L		01/18/19 09:43 01/18/19 09:43	01/20/19 19:00	į
Cobalt Lead Molybdenum	ND <b>0.0017</b>		0.0025 0.0010	mg/L		01/18/19 09:43 01/18/19 09:43	01/20/19 19:00 01/20/19 19:00 01/20/19 19:00	ţ

0.00050

mg/L

Client Sample ID: FC-CCR-MW86-121518

ND

Date Collected: 12/15/18 08:51

Thallium

Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-4

01/18/19 09:43 01/20/19 19:00

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND	D1 D5	0.80	mg/L			12/22/18 00:16	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		12/20/18 10:34	12/27/18 13:50	1
Magnesium	1700	D2	8.0	mg/L		12/20/18 10:34	12/29/18 04:59	4
SiO2, Silica	20		0.21	mg/L		12/20/18 10:34	12/29/18 05:04	1
				Unit	_ n	Droporod	Analyzad	Dil Eco
Method: 200.8 LL - Meta	us (ICP/MS) - Tota	I Recovera	hle					
Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Analyte Antimony	Result ND		RL 0.0025	mg/L	D	01/18/19 09:43	01/20/19 19:02	5
Analyte Antimony Arsenic	Result ND ND		0.0025 0.0010	mg/L mg/L	<u>D</u>	01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02	5
Analyte Antimony Arsenic Barium			0.0025 0.0010 0.0010	mg/L mg/L mg/L	<u>D</u>	01/18/19 09:43 01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02 01/20/19 19:02	5 5 5
Analyte Antimony			0.0025 0.0010	mg/L mg/L	D_	01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02 01/20/19 19:02	5 5 5 5
Analyte Antimony Arsenic Barium			0.0025 0.0010 0.0010	mg/L mg/L mg/L	<u>D</u>	01/18/19 09:43 01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02 01/20/19 19:02	5 5 5
Analyte Antimony Arsenic Barium Cadmium			0.0025 0.0010 0.0010 0.00050	mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02	5 5 5 5
Analyte Antimony Arsenic Barium Cadmium Chromium	Result   ND   ND   ND   ND   ND   ND		RL 0.0025 0.0010 0.0010 0.00050 0.0025	mg/L mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02	5 5 5 5 5
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt Lead	Result ND ND 0.019 ND ND ND ND ND ND		RL 0.0025 0.0010 0.0010 0.00050 0.0025 0.0010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02	5 5 5 5 5 5
Analyte Antimony Arsenic Barium Cadmium Chromium Cobalt	Result ND ND 0.019 ND ND ND 0.0092		RL 0.0025 0.0010 0.0010 0.00050 0.0025 0.0010 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43 01/18/19 09:43	01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02 01/20/19 19:02	5 5 5 5 5 5

## **Client Sample Results**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

Client Sample ID: FC-CCR-FD01-121518

Date Collected: 12/15/18 08:51 Date Received: 12/18/18 12:33 Lab Sample ID: 550-115114-5

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	ND ND	D1 D5	0.80	mg/L			12/22/18 00:53	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		12/20/18 10:34	12/27/18 13:56	1
Magnesium	1700	D2	8.0	mg/L		12/20/18 10:34	12/29/18 05:10	4
SiO2, Silica	20		0.21	mg/L		12/20/18 10:34	12/29/18 05:16	1
		Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
	Docult	Ouglities	DI	llnit	_ n	Dronarod	Analyzod	Dil Eac
Analyte Antimony	Result ND	Qualifier	0.0025	Unit mg/L	D	Prepared 01/18/19 11:24		Dil Fac
Antimony	ND	Qualifier		mg/L	D	01/18/19 11:24		5
Antimony Arsenic	ND ND	Qualitier	0.0025	mg/L mg/L	<u>D</u>	01/18/19 11:24 01/18/19 11:24	01/20/19 19:05	
Antimony Arsenic Barium	ND	Qualifier	0.0025 0.0010	mg/L	<u>D</u>	01/18/19 11:24 01/18/19 11:24 01/18/19 11:24	01/20/19 19:05 01/20/19 19:05	5
Antimony Arsenic <b>Barium</b> Cadmium	ND ND 0.017	Qualifier	0.0025 0.0010 0.0010	mg/L mg/L mg/L	D_	01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24	01/20/19 19:05 01/20/19 19:05 01/20/19 19:05	5 5 5
	ND ND <b>0.017</b> ND	Qualitier	0.0025 0.0010 0.0010 0.00050	mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24	01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05	5 5 5 5
Antimony Arsenic Barium Cadmium Chromium Cobalt	ND ND <b>0.017</b> ND ND	Qualitier	0.0025 0.0010 0.0010 0.00050 0.0025	mg/L mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24	01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05	5 5 5 5 5
Antimony Arsenic Barium Cadmium Chromium Cobalt Lead	ND ND 0.017 ND ND 0.0087	Qualitier	0.0025 0.0010 0.0010 0.00050 0.0025 0.0010	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24	01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05	5 5 5 5 5 5
Antimony Arsenic Barium Cadmium Chromium	ND ND 0.017 ND ND 0.0087	Qualifier	0.0025 0.0010 0.0010 0.00050 0.0025 0.0010 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L	<u>D</u>	01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24 01/18/19 11:24	01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05 01/20/19 19:05	5 5 5 5 5 5 5

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 550-165329/2 Client Sample ID: Method Blank **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

MB MB Analyte Result Qualifier RL Unit D Analyzed Dil Fac Prepared 0.40 Fluoride ND mg/L 12/21/18 19:03

Lab Sample ID: LCS 550-165329/5 Client Sample ID: Lab Control Sample **Matrix: Water Prep Type: Total/NA** 

**Analysis Batch: 165329** 

Spike LCS LCS %Rec. Added Limits Analyte Result Qualifier Unit %Rec Fluoride 4.00 4.06 mg/L 101 90 - 110

Lab Sample ID: LCSD 550-165329/6 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA **Analysis Batch: 165329** 

Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Limits RPD Limit Analyte Unit D %Rec Fluoride 4.00 4.06 mg/L 101

Client Sample ID: Matrix Spike Lab Sample ID: 550-115113-B-1 MS ^2 **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Fluoride 1.2 D1 D5 8.00 9.53 D1 103 80 - 120 mg/L

Lab Sample ID: 550-115113-B-1 MSD ^2 Client Sample ID: Matrix Spike Duplicate **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165329** 

Spike MSD MSD %Rec. RPD Sample Sample Added Analyte Result Qualifier Result Qualifier Unit %Rec Limits RPD Limit Fluoride 1.2 D1 D5 8.00 9.49 D1 103 80 - 120 mg/L 20

Lab Sample ID: MB 550-165473/1024 Client Sample ID: Method Blank **Prep Type: Total/NA** 

**Matrix: Water** 

**Analysis Batch: 165473** 

MB MB Analyte Result Qualifier RL Unit Prepared D Analyzed Dil Fac Fluoride 0.40 mg/L 12/26/18 20:42 ND

Lab Sample ID: LCS 550-165473/25 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA

**Matrix: Water** 

Analysis Batch: 165473

Spike LCS LCS %Rec. Added Result Qualifier **Analyte** Unit %Rec Limits Fluoride 4.00 4.09 102 90 - 110

Lab Sample ID: LCSD 550-165473/26 Client Sample ID: Lab Control Sample Dup **Matrix: Water** Prep Type: Total/NA

**Analysis Batch: 165473** 

LCSD LCSD RPD Spike %Rec. Added Limits Limit Analyte Result Qualifier Unit D %Rec RPD Fluoride 4.00 4.10 mg/L 102 0

TestAmerica Phoenix

TestAmerica Job ID: 550-115114-2

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

Prep Type: Total/NA

Client Sample ID: FC-CCR-MW83-121518

Client Sample ID: FC-CCR-MW83-121518

Client Sample ID: FC-CCR-MW83-121518

Client Sample ID: FC-CCR-MW83-121518

SDG: Cholla

Lab Sample ID: 550-115114-1 MS

Client: Arizona Public Service Company

**Matrix: Water** 

Project/Site: CCR

**Analysis Batch: 165473** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits Fluoride 1.8 8.00 9.94 D1 80 - 120 mg/L 101

Lab Sample ID: 550-115114-1 MSD Client Sample ID: FC-CCR-MW83-121518 Prep Type: Total/NA

**Matrix: Water** 

**Analysis Batch: 165473** 

MSD MSD Sample Sample Spike %Rec. **RPD** Result Qualifier Added Result Qualifier Limits RPD Analyte Unit D %Rec Limit 80 - 120 Fluoride 1.8 8.00 10.0 D1 mg/L 102 20

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: 550-115114-1 MS Client Sample ID: FC-CCR-MW83-121518

**Matrix: Water** 

Analysis Batch: 165571

Prep Batch: 164986 Sample Sample Spike MS MS %Rec. Result Qualifier Added Result Qualifier Analyte Unit D %Rec Limits Lithium 0.149 1.00 1.12 mg/L 97 70 - 130 Magnesium 274 21.0 285 M3 mg/L 56 70 - 130

Lab Sample ID: 550-115114-1 MS

**Matrix: Water** 

**Analysis Batch: 165722** 

**Prep Batch: 164986** Sample Sample Spike MS MS %Rec. Result Qualifier Added Result Qualifier Analyte Unit D %Rec Limite 10.7 SiO2, Silica 21.2 31.9 mg/L 100 70 - 130

Lab Sample ID: 550-115114-1 MSD

**Matrix: Water** 

Analysis Batch: 165571 Prep Batch: 164986 MSD MSD Sample Sample Spike %Rec. **RPD** Result Qualifier Added Result Qualifier RPD Limit Analyte Unit %Rec Limits D Lithium 0.149 1.00 1.12 mg/L 97 70 - 130 0 20 Magnesium 274 21.0 281 M3 33 70 - 130 20 mg/L

Lab Sample ID: 550-115114-1 MSD

**Matrix: Water** 

**Analysis Batch: 165722** 

**Prep Batch: 164986** Sample Sample Spike MSD MSD %Rec. **RPD** Analyte Result Qualifier Added Result Qualifier Unit D %Rec Limits RPD Limit SiO2, Silica 10.7 32.1 101 70 - 130 21.2 mg/L n 20

Method: 200.8 LL - Metals (ICP/MS)

Lab Sample ID: MB 440-523365/1-A

**Client Sample ID: Method Blank Matrix: Water Prep Type: Total Recoverable** Analysis Batch: 523766 Prep Batch: 523365

	MB	MB						
Analyte	Result	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

TestAmerica Phoenix

Page 12 of 26

1/25/2019

TestAmerica Job ID: 550-115114-2

SDG: Cholla

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

Lab Sample ID: MB 440-523365/1-A

Lab Sample ID: LCS 440-523365/2-A

Lab Sample ID: LCSD 440-523365/3-A

Client: Arizona Public Service Company

**Matrix: Water** 

**Matrix: Water** 

Project/Site: CCR

**Analysis Batch: 523766** 

**Client Sample ID: Method Blank Prep Type: Total Recoverable** 

Prep Batch: 523365

	IVIB IV	/IB					
Analyte	Result Q	Qualifier F	RL Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND	0.000	10 mg/L		01/18/19 09:43	01/20/19 17:38	1
Chromium	ND	0.000	50 mg/L		01/18/19 09:43	01/20/19 17:38	1
Cobalt	ND	0.000	20 mg/L		01/18/19 09:43	01/20/19 17:38	1
Lead	ND	0.000	10 mg/L		01/18/19 09:43	01/20/19 17:38	1
Molybdenum	ND	0.000	20 mg/L		01/18/19 09:43	01/20/19 17:38	1
Selenium	ND	0.000	60 mg/L		01/18/19 09:43	01/20/19 17:38	1
Thallium	ND	0.000	10 mg/L		01/18/19 09:43	01/20/19 17:38	1

Client Sample ID: Lab Control Sample

**Prep Type: Total Recoverable** 

Prep Batch: 523365

**Analysis Batch: 523766** LCS LCS Spike %Rec. Analyte Added Result Qualifier Unit D %Rec Limits 0.0800 0.0834 mg/L 104 85 - 115 Antimony Arsenic 0.0800 0.0782 98 85 - 115 mg/L Barium 0.0800 0.0777 97 85 - 115 mg/L Cadmium 0.0800 0.0792 mg/L 99 85 - 115 Chromium 0.0800 0.0774 97 85 - 115 mg/L Cobalt 0.0800 0.0778 mg/L 97 85 - 115 Lead 0.0800 0.0780 mg/L 97 85 - 115 Molybdenum 0.0800 85 - 115 0.0791 mg/L 99 Selenium 0.0800 0.0772 mg/L 97 85 - 115 Thallium 0.0800 0.0772 mg/L 85 - 115

> Client Sample ID: Lab Control Sample Dup **Prep Type: Total Recoverable**

**Matrix: Water** Analysis Batch: 523766 **Prep Batch: 523365** Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Unit %Rec Limits RPD Limit Analyte 0.0800 0.0884 Antimony mg/L 111 85 - 115 6 20 Arsenic 0.0800 0.0792 mg/L 99 85 - 115 20 85 - 115 Barium 0.0800 0.0793 mg/L 99 20 Cadmium 0.0800 0.0803 mg/L 100 85 - 115 20 20 Chromium 0.0800 0.0798 100 85 - 115 mg/L 3 20 Cobalt 0.0800 0.0796 mg/L 99 85 - 115 Lead 0.0800 0.0795 mg/L 99 85 - 115 20 Molybdenum 0.0800 0.0796 mg/L 99 85 - 115 20 Selenium 0.0800 0.0797 100 85 - 115 20 mg/L 3 Thallium 0.0800 0.0790 mg/L 99 85 - 115 20

Lab Sample ID: 550-114628-F-10-F MS ^10

**Matrix: Water** 

Analysis Batch: 523766

**Client Sample ID: Matrix Spike Prep Type: Total Recoverable Prep Batch: 523365** 

Analysis Batch. 323700	Sample	Sample	Spike	MS	MS				%Rec.	tcii. 323303
Analyte	Result	Qualifier	Added	Result	Qualifier	Unit	D	%Rec	Limits	
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	

TestAmerica Phoenix

Page 13 of 26

1/25/2019

## **QC Sample Results**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

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

Lab Sample ID: 550-114628 Matrix: Water	-F-10-F MS	S ^10							mple ID: Matrix Spike oe: Total Recoverable
Analysis Batch: 523766	Samnle	Sample	Spike	MS	MS				Prep Batch: 523365 %Rec.
Analyte		Qualifier	Added	_	Qualifier	Unit	D	%Rec	Limits
Chromium	ND		0.0800	0.0776		mg/L		97	70 - 130
Cobalt	0.014		0.0800	0.0904		mg/L		96	70 - 130
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-F-10-G MSD ^10

Matrix: Water
Analysis Batch: 523766
Sample Sample Spike MSD MSD

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total Recoverable
Prep Batch: 523365
RPD

Analysis Batch: 523766	Samnle	Sample	Spike	MSD	MSD				Prep Ba	atch: 52	23365 RPD
Analyte	•	Qualifier	Added		Qualifier	Unit	D	%Rec	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

1/25/2019

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TestAmerica Job ID: 550-115114-2 SDG: Cholla

HPLC/IC

Project/Site: CCR

**Analysis Batch: 165329** 

Client: Arizona Public Service Company

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	300.0	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	300.0	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	300.0	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	300.0	
MB 550-165329/2	Method Blank	Total/NA	Water	300.0	
LCS 550-165329/5	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-165329/6	Lab Control Sample Dup	Total/NA	Water	300.0	
550-115113-B-1 MS ^2	Matrix Spike	Total/NA	Water	300.0	
550-115113-B-1 MSD ^2	Matrix Spike Duplicate	Total/NA	Water	300.0	

**Analysis Batch: 165473** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	300.0	_
MB 550-165473/1024	Method Blank	Total/NA	Water	300.0	
LCS 550-165473/25	Lab Control Sample	Total/NA	Water	300.0	
LCSD 550-165473/26	Lab Control Sample Dup	Total/NA	Water	300.0	
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	300.0	
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	300.0	

Metals

**Prep Batch: 164986** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	200.7	
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	200.7	
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	200.7	
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	200.7	
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	200.7	
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	200.7	
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	200.7	

**Analysis Batch: 165571** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986

**Analysis Batch: 165722** 

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-2	FC-CCR-MW84-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-3	FC-CCR-MW85-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-4	FC-CCR-MW86-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	200.7 Rev 4.4	164986

TestAmerica Phoenix

Page 15 of 26 1/25/2019

## **QC Association Summary**

Client: Arizona Public Service Company Project/Site: CCR

TestAmerica Job ID: 550-115114-2

SDG: Cholla

## **Metals (Continued)**

## **Analysis Batch: 165722 (Continued)**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-5	FC-CCR-FD01-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MS	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986
550-115114-1 MSD	FC-CCR-MW83-121518	Total/NA	Water	200.7 Rev 4.4	164986

#### **Prep Batch: 523365**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total Recoverable	Water	200.2	
550-115114-2	FC-CCR-MW84-121518	Total Recoverable	Water	200.2	
550-115114-3	FC-CCR-MW85-121518	Total Recoverable	Water	200.2	
550-115114-4	FC-CCR-MW86-121518	Total Recoverable	Water	200.2	
550-115114-5	FC-CCR-FD01-121518	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	
LCSD 440-523365/3-A	Lab Control Sample Dup	Total Recoverable	Water	200.2	
550-114628-F-10-F MS ^10	Matrix Spike	Total Recoverable	Water	200.2	
550-114628-F-10-G MSD ^10	Matrix Spike Duplicate	Total Recoverable	Water	200.2	

#### **Analysis Batch: 523766**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-115114-1	FC-CCR-MW83-121518	Total Recoverable	Water	200.8 LL	523365
550-115114-2	FC-CCR-MW84-121518	Total Recoverable	Water	200.8 LL	523365
550-115114-3	FC-CCR-MW85-121518	Total Recoverable	Water	200.8 LL	523365
550-115114-4	FC-CCR-MW86-121518	Total Recoverable	Water	200.8 LL	523365
550-115114-5	FC-CCR-FD01-121518	Total Recoverable	Water	200.8 LL	523365
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-F-10-F MS ^10	Matrix Spike	Total Recoverable	Water	200.8 LL	523365
550-114628-F-10-G MSD ^10	Matrix Spike Duplicate	Total Recoverable	Water	200.8 LL	523365

TestAmerica Phoenix

1/25/2019

TestAmerica Job ID: 550-115114-2

Client: Arizona Public Service Company

Project/Site: CCR

SDG: Cholla

Client Sample ID: FC-CCR-MW83-121518

Date Collected: 12/15/18 11:50 Date Received: 12/18/18 12:33

Lab Sample ID: 550-115114-1

Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165473	12/26/18 21:37	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 12:13	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 02:26	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		5	523766	01/20/19 18:56	MQP	TAL IRV

Client Sample ID: FC-CCR-MW84-121518 Lab Sample ID: 550-115114-2

Date Collected: 12/15/18 11:04 Date Received: 12/18/18 12:33

**Matrix: Water** 

10

Batch **Dilution** Batch Prepared Batch Prep Type Method Factor Number or Analyzed Type Run Analyst Lab Total/NA 300.0 165329 12/21/18 22:26 NEL TAL PHX Analysis Total/NA 200.7 TAL PHX Prep 164986 12/20/18 10:34 SGO Total/NA Analysis 200.7 Rev 4.4 165571 12/27/18 13:38 SRA TAL PHX 1 Total/NA Prep 200.7 164986 12/20/18 10:34 SGO TAL PHX Total/NA Analysis 200.7 Rev 4.4 165722 12/29/18 04:32 SRA TAL PHX Total/NA Prep 200.7 164986 12/20/18 10:34 SGO TAL PHX Analysis 200.7 Rev 4.4 165722 12/29/18 04:38 SRA TAL PHX Total/NA 1 TAL IRV Total Recoverable Prep 200.2 523365 01/18/19 09:43 BV Total Recoverable Analysis 200.8 LL 5 523766 01/20/19 18:58 MQP TAL IRV

Client Sample ID: FC-CCR-MW85-121518 Lab Sample ID: 550-115114-3

Date Collected: 12/15/18 10:05 Date Received: 12/18/18 12:33

**Matrix: Water** 

Prep Type Total/NA	Batch Type Analysis	Batch Method 300.0	Run	Dilution Factor 2	Batch Number	Prepared or Analyzed 12/21/18 23:02	Analyst	Lab TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	164986 165571	12/20/18 10:34 12/27/18 13:44	SGO	TAL PHX TAL PHX
Total/NA Total/NA	Prep Analysis	200.7 200.7 Rev 4.4		1	164986 165722	12/20/18 10:34 12/29/18 04:53		TAL PHX TAL PHX
Total Recoverable Total Recoverable	Prep Analysis	200.2 200.8 LL		5	0_0000	0 17 107 10 001 10		TAL IRV TAL IRV

Client Sample ID: FC-CCR-MW86-121518 Lab Sample ID: 550-115114-4

Date Collected: 12/15/18 08:51

**Matrix: Water** 

Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		2	165329	12/22/18 00:16	NEL	TAL PHX

TestAmerica Phoenix

Page 17 of 26

## **Lab Chronicle**

Client: Arizona Public Service Company

Project/Site: CCR

TestAmerica Job ID: 550-115114-2

Lab Sample ID: 550-115114-4

SDG: Cholla

Client Sample ID: FC-CCR-MW86-121518

Date Collected: 12/15/18 08:51 Matrix: Water Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:50	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 04:59	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 05:04	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 09:43	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		5	523766	01/20/19 19:02	MQP	TAL IRV

Client Sample ID: FC-CCR-FD01-121518

Lab Sample ID: 550-115114-5 Date Collected: 12/15/18 08:51

**Matrix: Water** Date Received: 12/18/18 12:33

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0			165329	12/22/18 00:53	NEL	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165571	12/27/18 13:56	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		4	165722	12/29/18 05:10	SRA	TAL PHX
Total/NA	Prep	200.7			164986	12/20/18 10:34	SGO	TAL PHX
Total/NA	Analysis	200.7 Rev 4.4		1	165722	12/29/18 05:16	SRA	TAL PHX
Total Recoverable	Prep	200.2			523365	01/18/19 11:24	BV	TAL IRV
Total Recoverable	Analysis	200.8 LL		5	523766	01/20/19 19:05	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 TestAmerica Job ID: 550-115114-2 Project/Site: CCR 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	<b>Expiration Date</b>
Arizona	State Program	9	AZ0671	10-14-19

## **Method Summary**

Client: Arizona Public Service Company

TestAmerica Job ID: 550-115114-2 Project/Site: CCR 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

4625 E Cotton Center Blvd Suite 189

TestAmerica Phoenix

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# Chain of Custody Record

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Project Name: CCR Site: Cholla PO#					mple (Y/	S/MSD (				(HCO3)	as CaCO:	e as CaC								15	Job / SDG No.:
Sample Identification	Sample Date	Sample	Sample Type (C=Comp, G=Grab)	Matrix C	C # Of Printered Sa	Perform M	Mg)	EPA 300.0 SM 2540C	SM 4500-H	SM 2320B Alkalinity	Carbonate	Bicarbonat									Sample Specific Notes:
- I FC-CCR-MW83-121518	12/15/2018	1150 G		W	2	×	×	×	×	×	×	×				-					
-2 FC-CCR-MVV84-121518	12/15/2018	1104 G		W	2 N	×	×	×	×	×	×	×									
- 3 FC-CCR-MW85-121518	12/15/2018	1005 G		V	2 N	×	×	×	×	×	×	×				-					
-4 FC-CCR-MVV86-121518	12/15/2018	851 G		W	2	×	×	×	×	×	×	×									
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																+					
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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.	ise List any EPA V	Vaste Codes	for the sa	mple in the	æ	Sami	Sample Disposal	spos	al (A	fee	may	be a	sess	d if s	mple	san	76	aine	0	gno	A fee may be assessed if samples are retained longer than 1 month)
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# TestAmerica

# **Chain of Custody Record**

4625 East Cotton Ctr Blvd Suite 189 **TestAmerica Phoenix** 

	SWINGSTON STATE OF ST
	COC No
- 1	Camer Tracking No(s)

	Matrix (Wester,	Baker, Ken E-Maul ken baker@testamericainc.com ken baker@testamericainc.com Accreditations Required (See in State Program - Anzona State Program - Anzona  And Anzona  And Anzona  Anz	Analy  Analy  Analy  Analy  Analy  Analy  Analy	Om State of Or Sta	State of Origin Arizona  Urested	550-23340.1 Page 1 of 1 Jub # 550-115114-2 Freservation Cod C - Zn Achatte D - Nitro Acid C - Zn Achatte D - Nitro Acid G - Amchlor H - Ascorbic Acid J - Di Water K - EDTA	des: M - Hexane M - None O - AsNaO2 P - NaZO4S Q - NaZSO3 R - NaZSO3 R - NaZSO3 R - VaZSO4 V - MCAA V - MCAA Z - Cother (specify)
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### TAT Requested (days):    2(Tel) 949-260-3297(Fax)   PO#	Matrix					B - NaOH C - Zn Acetate D - Nitro Acid E - NaHSO4 F - MeOH G - Amchlor H - Assorbic Acid J - Di Water K - EDTA	N - None O - Ashlad2 P - Na2O4S Q - Na2S03 R - Na2S23 S - H2SO4 U - Acetone U - Acetone W - pH 4-5 Z - other (specify)
12(Tel) 949-260-3297(Fax)   Project #   55009651   Sample   Tim	Matrix					D - Ninto Add E - NaHSO4 E - NaHSO4 G - Anchlor G - G - G - G - G - G - G - G - G - G -	P - NaZO4S Q - NaZSO3 Q - NaZSO3 R - NaZSO4 T - TSP Dodecahydrate U - Acekone U - Acekone W - MCAA W - PH 4-5 Z - other (specft)
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ona Public Service Sample Date Time Time Time Time Time Time Time Tim	Matrix (www.mater,	e de la composition				 L-EDA	
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	MS Water	×				AZ Sample! Do nol	AZ Sampfe! Do not dilute if at all possible!
	MSD Water	×				AZ Sample! Do noi	AZ Sample! Do not dilute if at all possible!
FC-CCR-MW84-121518 (550-115114-2) 12/15/18 Anzona	Water	×				AZ Sample! Do not	AZ Sample! Do not dilute if at all possible!
FC-CCR-MW85-121518 (550-115114-3) 12/15/18 Anzona	Water	×				AZ Sample! Do not	AZ Sample! Do not dilute if at all possible!
FC-CCR-MW86-121518 (550-115114-4) 12/15/18 Arzona	Water	×				AZ Sample! Do not	AZ Sample! Do not dilute if at all possible!
FC-CCR-FD01-121518 (550-115114-5) 12/15/18 Arizona	Water	×				AZ Sample! Do not	AZ Sample! Do not difute if at all possible!

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Uncanfirmed			Return To Client Disposal By Lab	I By Lab Archive For	Months
Deiverable Requested. I, II, III, IV, Other (specify)	Primary Deliverable Rank. 2	dS	Special Instructions/QC Requirements:		
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Relinquished by	Date/Time	Company	Received by	Date/Time	Company
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Custody Seals Intact.   Custody Seal No.:			Cooler (emperature(s) Cand Other Remarks	176/1	176/17.2 IR-941
				1	Ver 69/20/2016

### **Login Sample Receipt Checklist**

Client: Arizona Public Service Company

Job Number: 550-115114-2

SDG Number: Cholla

Login Number: 115114 List Source: TestAmerica Phoenix

List Number: 1

Creator: Maycock, Lisa

Cieator. Maycock, Lisa		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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.

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Client: Arizona Public Service Company

Job Number: 550-115114-2

SDG Number: Cholla

List Source: TestAmerica Irvine
List Number: 2
List Creation: 01/15/19 05:27 PM

Creator: Ornelas, Olga

oroator. Ornolas, orga		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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 <6mm (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: 550-115114-2

SDG Number: Cholla

List Source: TestAmerica Irvine
List Number: 3
List Creation: 01/18/19 03:37 PM

Creator: Escalante, Maria I

Creator. Escalante, Maria I		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	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?	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	

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### **APPENDIX F**

**2018 DATA VALIDATION REPORT** 



### **2018 DATA VALIDATION REPORT**

CCR Rule Compliance Groundwater Monitoring Data Four Corners Power Plant, Arizona Public Service Farmington, New Mexico

Prepared by:

### **Wood Environment & Infrastructure Solutions, Inc.**

4600 East Washington Street, Suite 600 Phoenix, Arizona 85034-1917 (602) 733-6000

January 31, 2019

Project No. 1420162024.4.3

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### **TABLE OF CONTENTS**

TADIE	05.601	ITENITO		Page
			JATIONS	
			VIATIONS	
1.0			N	
2.0			TION METHODOLOGY	
3.0			NOF DATA QUALITY INDICATORS	
	3.1		atory Control Sample Recoveries	
	3.2		Spike Recoveries	
	3.3		Concentrations	
	3.4		atory Duplicates	
4.0			OF DATA VALIDATION QUALIFIERS	
5.0			STODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION	
6.0			A VALIDATION FINDINGS	
	6.1		s By EPA Methods 200.7, 200.8, and 245.1	
		6.1.1	Holding Times	
		6.1.2	Laboratory Blanks	
		6.1.3	Laboratory Control Sample Accuracy and Precision	
		6.1.4	Matrix Spikes/Matrix Spike Duplicates	
		6.1.5	Analytical Sensitivity	
	6.2		s by EPA Method 300.0	
		6.2.1	Holding Times	
		6.2.2	Laboratory Blanks	
		6.2.3	Laboratory Control Samples	
		6.2.4	Matrix Spikes/Matrix Spike Duplicates	
		6.2.5	Laboratory Duplicates	
		6.2.6	Analytical Sensitivity	
	6.3		Dissolved Solids by SM 2540C	
		6.3.1	Holding Times	
		6.3.2	Laboratory Blanks	
		6.3.3	Laboratory Control Sample Accuracy and Precision	
		6.3.4	Laboratory Duplicates	
	6.4		nity by SM 2320B	
		6.4.1	Holding Times	
		6.4.2	Laboratory Blanks	
		6.4.3	Laboratory Control Sample Accuracy	
		6.4.4	Laboratory Duplicates	
	6.5		<sup>7</sup> SM 4500B	
		6.5.1	Holding Times	
		6.5.2	Laboratory Control Sample Accuracy	
		6.5.3	Laboratory Duplicates	
	6.6		m by EPA Methods 903.0 and 904.0	
		6.6.1	Holding Time	
		6.6.2	Laboratory Blanks	
		6.6.3	Laboratory Control Sample Accuracy	
		6.6.4	Carrier Accuracy	
		6.6.5	Analytical Sensitivity	6

January 31, 2019

7.0	FIELD DUPLICATES
8.0	SUMMARY AND CONCLUSIONS
9.0	REFERENCES
10.0	LIMITATIONS
	TABLES
Table 1	Field Samples Submitted to Analytical Laboratories
Table 2	Field Duplicate Detections Greater Than Analytical Reporting Limits
Table 3	Qualifiers Added During Data Validation
	APPENDICES
Append	lix A Data Assessment Checklists by Sample Delivery Group

### **ACRONYMS & ABBREVIATIONS**

% 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

GPS(s) Groundwater Protection Standard(s)

ID identification

LCS laboratory control sample
LCSD 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.

### 1.0 INTRODUCTION

Arizona Public Service (APS) collected groundwater Detection and Assessment Monitoring samples to support Coal Combustion Residuals (CCR) Rule Compliance during the 2018 calendar year (the reporting period) at the Four Corners Power Plant, located near Farmington, New Mexico. 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 2018 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:

- APS, 2018. Sampling and Analysis Plan, Coal Combustion Residual (CCR) Groundwater Monitoring, Four Corners Power Plant, Arizona Public Service, Farmington, New Mexico, (originally prepared by AECOM, Inc. in December 2015 and updated by APS in January 2018).
- 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.

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 2018 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, selenium, thallium, lead and mercury must be sufficiently low to meet the National Primary Drinking Water Regulation Maximum Contamination Limits (MCLs).

Boron, calcium, cobalt, lithium, magnesium, molybdenum, potassium, and sodium 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.

Pending development of applicable Background Threshold Values (BTVs) and/or Groundwater Protection Standards (GPSs) for the CCR groundwater monitoring program at Four Corners Power Plant, analytical sensitivity must also be evaluated for these site-specific comparison criteria.

### 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 Alkalinity by SM 2320B

### 6.4.1 Holding Times

All samples must be analyzed for alkalinity within the SAP-specified holding time of 14 days.

### 6.4.2 Laboratory Blanks

Alkalinity must not be detected in the laboratory blanks at concentrations above the reporting limit.

### 6.4.3 Laboratory Control Sample Accuracy

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 20%.

### 6.4.4 Laboratory Duplicates

Laboratories performed duplicate analysis for alkalinity 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 20% limit.

### 6.5 pH by SM 4500B

### 6.5.1 Holding Times

All samples must be analyzed for pH within 15 minutes of sample collection.

### 6.5.2 Laboratory Control Sample Accuracy

LCS recoveries must be within the laboratory-specified limits of 98.5 to 101.5%.

### 6.5.3 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.

### 6.6 Radium by EPA Methods 903.0 and 904.0

### 6.6.1 Holding Time

All samples must be analyzed for radium within the EPA-recommended holding time of 6 months.

### 6.6.2 Laboratory Blanks

Radium must not be detected in the laboratory blanks at concentrations above the reporting limit.

### **6.6.3 Laboratory Control Sample Accuracy**

LCS and LCSD recoveries must be within laboratory-specified limits.

### 6.6.4 Carrier Accuracy

Carrier recoveries must be within the laboratory-specified 40 to 110% limits.

### 6.6.5 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.

Page 6

### 9.0 REFERENCES

- APS, 2018. Sampling and Analysis Plan CCR Groundwater Monitoring Four Corners Power Plant Arizona Public Service, Farmington, New Mexico. Originally prepared by AECOM in December 2015 and updated by APS in January 2018.
- 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.

### 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 Four Corners 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.

January 31, 2019



**TABLES** 

# TABLE 1 FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES Coal Combustion Residuals Rule Groundwater Monitoring Program 2018 Detection and Assessment Monitoring

Sampling		Collection	Analytical	Field	Laboratory	Notes
Program	CCR Unit	Date	Laboratory	Sample ID	Sample ID	Notes
Assessment	URS	3/16/2018	TA - Phoenix	FC-CCR-MW66-31618	550-99692-1	
Assessment	URS	3/16/2018	TA - Phoenix	FC-CCR-MW67-31618	550-99692-2	
Assessment	URS	3/16/2018	TA - Phoenix	FC-CCR-MW68-31618	550-99692-3	
Assessment	URS	3/16/2018	TA - Phoenix	FC-CCR-MW69-31618	550-99692-4	
Assessment	URS	3/16/2018	TA - Phoenix	FC-CCR-MW70-31618	550-99692-5	
Assessment	URS/CWTP	3/16/2018	TA - Phoenix	FC-CCR-MW71-31618	550-99692-6	
Assessment	URS/CWTP	3/16/2018	TA - Phoenix	FC-CCR-MW72-31618	550-99692-7	
Assessment	URS/CWTP	3/16/2018	TA - Phoenix	FC-CCR-MW73-31618	550-99692-8	
Assessment	URS	3/16/2018	TA - Phoenix	FC-CCR-FD01-31618	550-99692-9	Field duplicate of sample FC-CCR-MW66-31618
Assessment	Multiunit	3/17/2018	TA - Phoenix	FC-CCR-MW49A-31718	550-99693-1	
Assessment	Multiunit	3/17/2018	TA - Phoenix	FC-CCR-MW61-31718	550-99693-2	
Assessment	Multiunit	3/17/2018	TA - Phoenix	FC-CCR-MW74-31718	550-99693-3	
Assessment	Multiunit	3/17/2018	TA - Phoenix	FC-CCR-MW75-31718	550-99693-4	
Assessment	Multiunit	3/17/2018	TA - Phoenix	FC-CCR-MW7-31718	550-99693-5	
Assessment	Multiunit	3/17/2018	TA - Phoenix	FC-CCR-FD02-31718	550-99693-6	Field duplicate of sample FC-CCR-MW61-31718
Detection	CWTP	4/6/2018	TA - Phoenix	FC-CCR-MW62-4618	550-100875-1	
Detection	CWTP	4/6/2018	TA - Phoenix	FC-CCR-MW63-4618	550-100875-2	
Assessment	URS	5/31/2018	TA - Phoenix	FC-CCR-MW-66-53118	550-103741-1	
Assessment	URS	6/2/2018	TA - Phoenix	FC-CCR-MW-67-6218	550-103741-2	
Assessment	URS	6/2/2018	TA - Phoenix	FC-CCR-MW-68-6218	550-103741-3	
Assessment	URS	6/2/2018	TA - Phoenix	FC-CCR-MW-69-6218	550-103741-4	
Assessment	URS	6/2/2018	TA - Phoenix	FC-CCR-FD02-6218	550-103741-5	Field duplicate of sample FC-CCR-MW-69-6218
Assessment	URS	5/31/2018	TA - Phoenix	FC-CCR-MW-70-53118	550-103741-6	
Assessment	URS/CWTP	6/2/2018	TA - Phoenix	FC-CCR-MW-71-6218	550-103741-7	
Assessment	URS/CWTP	6/2/2018	TA - Phoenix	FC-CCR-MW-72-6218	550-103741-8	
Assessment	URS/CWTP	6/2/2018	TA - Phoenix	FC-CCR-MW-73-6218	550-103741-9	
Assessment	Multiunit	6/1/2018	TA - Phoenix	FC-CCR-MW-7-6118	550-103742-1	
Assessment	Multiunit	6/1/2018	TA - Phoenix	FC-CCR-MW-8-6118	550-103742-2	
Assessment	Multiunit	6/1/2018	TA - Phoenix	FC-CCR-MW-49A-6118	550-103742-3	
Assessment	Multiunit	6/1/2018	TA - Phoenix	FC-CCR-MW-61-6118	550-103742-4	
Assessment	Multiunit	6/1/2018	TA - Phoenix	FC-CCR-FD01-6118	550-103742-5	Field duplicate of sample FC-CCR-MW-61-6118
Assessment	Multiunit	6/1/2018	TA - Phoenix	FC-CCR-MW-74-6118	550-103742-6	
Assessment	Multiunit	6/1/2018	TA - Phoenix	FC-CCR-MW-75-6118	550-103742-7	
Detection	CWTP	6/3/2018	TA - Phoenix	FC-CCR-MW-62-6318	550-103738-1	
Detection	CWTP	6/3/2018	TA - Phoenix	FC-CCR-MW-63-6318	550-103738-2	

# TABLE 1 FIELD SAMPLES SUBMITTED TO ANALYTICAL LABORATORIES Coal Combustion Residuals Rule Groundwater Monitoring Program 2018 Detection and Assessment Monitoring

Sampling		Collection	Analytical	Field	Laboratory	Notes
Program	CCR Unit	Date	Laboratory	Sample ID	Sample ID	Notes
Detection	CWTP	6/3/2018	TA - Phoenix	FC-CCR-MW-64-6318	550-103738-3	
Detection	CWTP	6/3/2018	TA - Phoenix	FC-CCR-MW-65-6318	550-103738-4	
Assessment	URS	11/2/2018	TA - Phoenix	FC-CCR-MW66-11218	550-113007-1	
Assessment	URS	11/3/2018	TA - Phoenix	FC-CCR-MW67-11318	550-113007-2	
Assessment	URS	11/3/2018	TA - Phoenix	FC-CCR-MW68-11318	550-113007-3	MS/MSD
Assessment	URS	11/3/2018	TA - Phoenix	FC-CCR-MW69-11318	550-113007-4	
Assessment	URS	11/2/2018	TA - Phoenix	FC-CCR-MW70-11218	550-113007-5	
Detection	CWTP	11/2/2018	TA - Phoenix	FC-CCR-MW62-11218	550-113007-6	
Detection	CWTP	11/2/2018	TA - Phoenix	FC-CCR-MW63-112818	550-113007-7	
Detection	CWTP	11/2/2018	TA - Phoenix	FC-CCR-MW64-11218	550-113007-8	
Detection	CWTP	11/2/2018	TA - Phoenix	FC-CCR-MW65-11218	550-113007-9	
Assessment	URS/CWTP	11/3/2018	TA - Phoenix	FC-CCR-MW71-11318	550-113007-10	
Assessment	URS/CWTP	11/3/2018	TA - Phoenix	FC-CCR-MW72-11318	550-113007-11	Field Duplicate of Sample FC-CCR-MW71-11318
Assessment	URS/CWTP	11/3/2018	TA - Phoenix	FC-CCR-MW73-11318	550-113007-12	Field Duplicate of Sample FC-CCR-MW72-11318
Assessment	URS	11/3/2018	TA - Phoenix	FC-CCR-FD01-11318	550-113007-13	
Assessment	URS	11/3/2018	TA - Phoenix	FC-CCR-FD02-11318	550-113007-14	
Assessment	Multiunit	11/4/2018	TA - Phoenix	FC-CCR-MW7-11418	550-113026-1	
Assessment	Multiunit	11/4/2018	TA - Phoenix	FC-CCR-MW8-11418	550-113026-2	
Assessment	Multiunit	11/3/2018	TA - Phoenix	FC-CCR-MW61-11318	550-113026-3	
Assessment	Multiunit	11/3/2018	TA - Phoenix	FC-CCR-MW75-11318	550-113026-4	MS/MSD
Assessment	Multiunit	11/4/2018	TA - Phoenix	FC-CCR-MW49A-11418	550-113026-5	

### Notes:

ID = identification

TA = TestAmerica

### TABLE 2A

# FIELD DUPLICATE DETECTIONS (Conventional Analyses) Coal Combustion Residuals Rule Groundwater Monitoring Program 2018 Detection and Assessment Monitoring

	I			ъ:		F1 1 1			
				Primary		Field			
Method	Analyte	RL		Sample		Duplicat		RPD	Notes
				Result	:	Result			
	FC-CCR-MW66-3			R-FD01-31	618				
EPA 300.0	Fluoride	6.0	mg/L	41		38		8%	
EPA 200.7 Rev 4.4	Lithium	0.20	mg/L	0.38		0.39		3%	
EPA 200.8 LL	Arsenic	0.0020	mg/L	0.0050		0.0067		29%	± RL
EPA 200.8 LL	Barium	0.0020	_	0.020		0.021		5%	
EPA 200.8 LL	Cobalt	0.0020		0.0085		0.0088		3%	
EPA 200.8 LL	Molybdenum	0.0020		0.022		0.022		0%	
EPA 200.8 LL	Thallium	0.00040	, i	0.00054		0.00048		12%	
	FC-CCR-MW61-3				718				
EPA 300.0	Fluoride		mg/L	1.6		1.6	U	NC	± RL
EPA 200.7 Rev 4.4	Lithium	0.20	mg/L	0.38		0.39		3%	
EPA 200.8 LL	Barium	0.0020		0.014		0.014		0%	
EPA 200.8 LL	Cadmium	0.00040	mg/L	0.0011		0.0010		10%	
EPA 200.8 LL	Cobalt	0.0020	mg/L	0.016		0.016		0%	
EPA 200.8 LL	Molybdenum	0.0020		0.079		0.079		0%	
	FC-CCR-MW-61	-6118 and	FC-C	CR-FD01-61	18				
EPA 300.0	Chloride	4.0	mg/L	330		330		0%	
EPA 300.0	Fluoride	0.80	mg/L	1.30		1.30		0%	
EPA 300.0	Sulfate	400	mg/L	3500		3500		0%	
EPA 200.7 Rev 4.4	Boron	0.050	mg/L	38		39		3%	
EPA 200.7 Rev 4.4	Clacium	2.0	mg/L	470.00		480		2%	
EPA 200.7 Rev 4.4	Magnesium	2.0	mg/L	120		120		0%	
EPA 200.7 Rev 4.4	Potassium	0.50	mg/L	19		20		5%	
EPA 200.7 Rev 4.4	Sodium		mg/L	980		980		0%	
SM 2320B	Alkalinity as CaCO3		mg/L	91		91		0%	
SM 2320B	Bicarbonate Alkalinity as CaCO3	6.0	mg/L	91		89		2%	
SM 2540C	TDS		mg/L	5600		5400		4%	
SM 4500 H+ B	рН		SU	8.50		8.50		0%	
EPA 200.7 Rev 4.4	Lithium	0.20	mg/L	0.36		0.36		0%	
EPA 200.8 LL	Barium	0.010	mg/L	0.014		0.014		0%	
EPA 200.8 LL	Cobalt	0.010	mg/L	0.017		0.017		0%	
EPA 200.8 LL	Molybdenum	0.010	mg/L	0.085		0.082		4%	
	FC-CCR-MW69	-6218 and	FC-CC	R-FD02-62	18				•
EPA 300.0	Chloride	400.0	mg/L	1400		1300		7%	
EPA 300.0	Fluoride	0.8	mg/L	21		21		0%	
EPA 300.0	Sulfate	400.0	mg/L	12000		12000		0%	
EPA 200.7 Rev 4.4	Boron	0.1	mg/L	120		130		8%	
EPA 200.7 Rev 4.4	Clacium	2.0	mg/L	430		430		0%	
EPA 200.7 Rev 4.4	Magnesium	8.0	mg/L	2600		2500		4%	
EPA 200.7 Rev 4.4	Potassium	0.5	mg/L	38		38		0%	
EPA 200.7 Rev 4.4	Sodium	0.5	mg/L	680		680		0%	
SM 2320B	Alkalinity as Caco3		mg/L	360		350		3%	
SM 2320B	Bicarbonate Alkalinity as Caco3		mg/L	360		350		3%	
SM 2540C	TDS	100.0		18000		18000		0%	
SM 4500 H+ B	pН		SÜ	7.3		7.3		0%	
EPA 200.7 Rev 4.4	Lithium	0.20	mg/L	0.49		0.49		0%	

### TABLE 2A

# FIELD DUPLICATE DETECTIONS (Conventional Analyses) Coal Combustion Residuals Rule Groundwater Monitoring Program 2018 Detection and Assessment Monitoring

Method	Analyte	RL		Primary Sample Result	Field Duplicate Result		Notes
EPA 200.8 LL	Barium		mg/L	0.016	0.014	13%	
EPA 200.8 LL	Molybdenum		mg/L	0.016	0.015	6%	
EPA 200.8 LL	Selenium		mg/L	0.014	0.013	7%	
	Sample FC-CCR-MW			C-CCR-FD01	-11318		
EPA 300.0	Chloride		mg/L	520	520	0%	
EPA 300.0	Sulfate		mg/L	11000	11000	0%	
EPA 200.7 Rev 4.4	Boron	0.050		0.56	0.54	4%	
EPA 200.7 Rev 4.4	Calcium		mg/L	470	450	4%	
SM 2540C	TDS		mg/L	16000	16000	0%	
SM 4500 H+ B	рН	1.7	SU	7.0	7.2	3%	
EPA 200.7 Rev 4.4	Lithium		mg/L	0.35	0.34	3%	
EPA 200.8 LL	Arsenic	0.0050	mg/L	0.0046	0.0068	39%	± RL
EPA 200.8 LL	Barium	0.0050	mg/L	0.0098	0.0095	3%	
EPA 200.8 LL	Molybdenum	0.0050	mg/L	0.00079	0.00065	19%	
EPA 200.8 LL	Selenium	0.0050	mg/L	0.27	0.31	14%	
EPA 200.8 LL	Thallium	0.0010	mg/L	0.00031	0.00030	3%	
	Sample FC-CCR-MW	/72-11318 a	and FC	C-CCR-FD02	-11318		
EPA 300.0	Chloride	10	mg/L	450	450	0%	
EPA 300.0	Sulfate	400	mg/L	11000	11000	0%	
EPA 200.7 Rev 4.4	Boron	0.050	mg/L	0.22	0.21	5%	
EPA 200.7 Rev 4.4	Calcium	2.0	mg/L	470	460	2%	
SM 2540C	TDS	100	mg/L	16000	16000	0%	
SM 4500 H+ B	рН	1.7	SU	7.0	7.1	1%	
EPA 200.7 Rev 4.4	Lithium	0.20	mg/L	0.37	0.37	0%	
EPA 200.8 LL	Arsenic	0.0050	mg/L	0.0031	0.0026	18%	
EPA 200.8 LL	Barium	0.0050		0.0075	0.0075	0%	
EPA 200.8 LL	Cobalt	0.0050		0.002	0.002	0%	
EPA 200.8 LL	Molybdenum	0.0050		0.00078	0.00078	0%	
EPA 200.8 LL	Selenium	0.0050	mg/L	0.13	0.15	14%	
EPA 200.8 LL	Thallium	0.0010	mg/L	0.00088	0.00087	1%	

### Notes:

mg/L = milligrams per liter

RL = reporting limit

RPD = relative percent difference

 $\pm$  RL = The difference between analyte concentrations is less than the RL, indicating acceptable analytical precision.

### Methods:

EPA 300.0 = lons

EPA 200.7 Rev 4.4 = Metals

EPA 200.8 LL = Metals

### **TABLE 2B**

# FIELD DUPLICATE DETECTIONS (Radiological Analyses) Coal Combustion Residuals Rule Groundwater Monitoring Program 2018 Detection and Assessment Monitoring

	Primary	Sample	Field Duplic	cate			
Analyte	Resul	t and	Result an	d	RPD	DER	Notes
	Uncer	tainty	Uncertain	ty			
	FC-	CCR-MW66	6-31618 and FC-	CCR-F	D01-31618		
Radium 226	1.5	U	1.4 ± 0	.1	NC	0.9	DER in limits
Radium 228	1.5	U	2.6 ± 0	.1	NC	2.4	UJ/J-FD
Total Radium	1.5	U	$4.0 \pm 0$	.1	NC	4.3	UJ/J-FD
	FC-	CCR-MW61	I-31718 and FC-	CCR-F	D02-31718		
No target analyte detections							
	FC	C-CCR-MW	69-6218 and FC-	CCR-F	D02-6218		
Radium 226	1.3	± 0.2	$0.9 \pm 0$	.2	36%	1.4	DER in limits
Radium 228	3.3	± 0.4	2.2 ± 0	.3	40%	2.2	J-FD
Total Radium	4.6	± 0.4	3.1 ± 0	.4	39%	2.7	J-FD
	FC-	CCR-MW61	I-61118 and FC-	CCR-F	D01-61118		
No target analyte detections							
	Sample	FC-CCR-M	IW71-11318 and	FC-CC	R-FD01-11	318	
Radium 226	1.2	± 0.2	1.8 ± 0	.2	40%	2.1	J-FD
Radium 228	0.7	U	0.7 U	l	NC	N/A	N/A
Total Radium	1.2	± 0.4	1.8 ± 0	.2	40%	1.3	DER in limits
Sample FC-CCR-MW72-11318 and FC-CCR-FD02-11318							
Radium 226	0.7	± 0.2	0.5 ± 0	.2	33%	0.7	DER in limits
Radium 228	1.0	± 0.3	1.5 0	.3	40%	1.2	DER in limits
Total Radium	1.7	± 0.4	2.0 ± 0	.4	16%	0.5	

### Notes:

DER = duplicate error ratio

NC = not calculable

RPD = relative percent difference

Units are picocuries per liter (pCi/L)

### Qualifiers:

- 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.
- UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

### **Reason Codes:**

DER in limits = 95% confidence of acceptable precision

FD = Imprecision between primary and field duplicate results.

# TABLE 3 QUALIFIERS ADDED DURING DATA VALIDATION Coal Combustion Residuals Rule Groundwater Monitoring Program 2018 Detection and Assessment Monitoring

Sample IDs	Methods	SDG	Analytes	Concentrations	Qualifiers and Reason Codes	
FC-CCR-FD01-3161818	Gamma Ray HPGE	550-99692-3	Radium 228	2.6 pCi/L	J FD	
FC-CCR-FD01-31618	Gamma Ray HPGE	550-99692-3	Total Radium	4.0 pCi/L	J FD	
FC-CCR-FD01-6118	SM 4500 H+ B	550-103742	pН	8.5 SU	J HT	
FC-CCR-FD02-6218	Gamma Ray HPGE	550-103741	Radium 228	2.2 pCi/L	J FD	
FC-CCR-FD02-6218	Gamma Ray HPGE	550-103741	Total Radium	3.1 pCi/L	J FD	
FC-CCR-FD02-6218	SM 4500 H+ B	550-103741	pН	7.3 SU	J HT	
FC-CCR-MW-49A-6118	SM 4500 H+ B	550-103742	pН	7.4 SU	J HT	
FC-CCR-MW-61-6118	SM 4500 H+ B	550-103742	pН	8.5 SU	J HT	
FC-CCR-MW-66-31618	Gamma Ray HPGE	550-99692-3	Radium 228	1.5 pCi/L	UJ FD	
FC-CCR-MW-66-31618	Gamma Ray HPGE	550-99692-3	Total Radium	1.5 pCi/L	UJ FD	
FC-CCR-MW-66-53118	SM 4500 H+ B	550-103741	рН	7.2 SU	J HT	
FC-CCR-MW-67-6218	SM 4500 H+ B	550-103741	pН	7.1 SU	J HT	
FC-CCR-MW-68-6218	SM 4500 H+ B	550-103741	pН	6.9 SU	J HT	
FC-CCR-MW-69-6218	Gamma Ray HPGE	550-103741-2	Radium 228	3.3 pCi/L	J FD	
FC-CCR-MW-69-6218	Gamma Ray HPGE	550-103741-2	Total Radium	4.6 pCi/L	J FD	
FC-CCR-MW-69-6218	SM 4500 H+ B	550-103741	рН	7.3 SU	J HT	
FC-CCR-MW-70-53118	SM 4500 H+ B	550-103741	pН	6.9 SU	J HT	
FC-CCR-MW-71-6218	SM 4500 H+ B	550-103741	pH	7.1 SU	J HT	
FC-CCR-MW-72-6218	SM 4500 H+ B	550-103741	pH	7.0 SU	J HT	
FC-CCR-MW-73-6218	SM 4500 H+ B	550-103741	pН	6.9 SU	J HT	
FC-CCR-MW-74-6118	SM 4500 H+ B	550-103742	pН	7.7 SU	J HT	
FC-CCR-MW-75-6118	SM 4500 H+ B	550-103742	pН	8.2 SU	J HT	
FC-CCR-MW-7-6118	SM 4500 H+ B	550-103742	pН	7.4 SU	J HT	
FC-CCR-MW-8-6118	SM 4500 H+ B	550-103742	pН	7.3 SU	J HT	
FC-CCR-MW66-11218	SM 4500 H+ B	550-113007	pH	7.30 SU	J HT	
FC-CCR-MW66-11218	EPA 200.7 Rev 4.4	550-113007	Selenium	0.0020 mg/L	J HM	
FC-CCR-MW67-11318	SM 4500 H+ B	550-113007	pН	7.40 SU	J HT	
FC-CCR-MW68-11318	SM 4500 H+ B	550-113007	pН	7.20 SU	J HT	
FC-CCR-MW69-11318	SM 4500 H+ B	550-113007	pН	7.30 SU	J HT	
FC-CCR-MW70-11218	SM 4500 H+ B	550-113007	pH	7.00 SU	J HT	
FC-CCR-MW71-11318	SM 4500 H+ B	550-113007	pН	6.80 SU	J HT	
FC-CCR-MW71-11318	Gamma Ray HPGE	550-113007	Radium 226	1.2 pCi/L	J FD	
FC-CCR-MW72-11318	SM 4500 H+ B	550-113007	pH	7.10 SU	J HT	
FC-CCR-MW73-11318	SM 4500 H+ B	550-113007	pН	7.80 SU	J HT	
FC-CCR-FD01-11318	SM 4500 H+ B	550-113007	pH	7.50 SU	J HT	
FC-CCR-FD01-11318	Gamma Ray HPGE	550-113007	Radium 226	1.8 pCi/L	J FD	
FC-CCR-FD02-11318	SM 4500 H+ B	550-113007	рН	7.00 SU	J HT	
FC-CCR-MW7-11418	SM 4500 H+ B	550-113026	pH	7.40 SU	J HT	
FC-CCR-MW8-11418	SM 4500 H+ B	550-113026	pH	7.30 SU	J HT	
FC-CCR-MW61-11318	SM 4500 H+ B	550-113026	pН	8.60 SU	J HT	
FC-CCR-MW75-11318	SM 4500 H+ B	550-113026	pH	8.30 SU	J HT	
FC-CCR-MW49A-11418	SM 4500 H+ B	550-113026	pH	7.40 SU	J HT	

### TABLE 3

# QUALIFIERS ADDED DURING DATA VALIDATION Coal Combustion Residuals Rule Groundwater Monitoring Program 2018 Detection and Assessment Monitoring

Sample Methods SDG Ana	lytes Concentrations	Qualifiers and Reason Codes
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### Notes:

ID = identification pCi/L = picoCuries/litre SDG = sample delivery grou|SU = standard units of pH

### Methods:

SM 4500 H+ B = pH Gamm Ray HPGE = radiochemical analysis EPA 200.7 Rev 4.4 = select metals

### **Qualifier Definitions:**

J = The analyte was positively identified; the associated numerical value is approximate.

### **Reason Codes:**

HM = High matrix spike recovery. Potential high analytical bias.

HT = Samples were analyzed outside of specified holding time.

FD = High field duplicate RPD. Potential sampling and/or analytical imprecision.



### **APPENDIX A**

DATA ASSESSMENT CHECKLISTS BY SAMPLE DELIVERY GROUP

Laboratory Name:	TestAmerica Phoenix					
Sample Delivery Group:	J99693-1	Date:	4/13/2018			
Validator's Name:	Nathalie Perry-Freer	Reviewed by:	Marie Bevier			

### **Sample Summary:**

Field Sample Identification	Collection Date	Laboratory Identification
FC-CCR-MW49A-31718	3/17/2018	550-99693-1
FC-CCR-MW61-31718	3/17/2018	550-99693-2
FC-CCR-MW74-31718	3/17/2018	550-99693-3
FC-CCR-MW75-31718	3/17/2018	550-99693-4
FC-CCR-MW7-31718	3/17/2018	550-99693-5
FC-CCR-FD02-31718	3/17/2018	550-99693-6

### **Analytical Methods:**

Analyte	Analyte Group	EPA Method
Beryllium, Lithium	Metals (ICP)	200.7
Antimony, Arsenic,	Metals (ICP/MS)	200.8
Barium, Cadmium,		
Chromium, Cobalt, Lead		
Molybdenum, Selenium		
Thallium		
Mercury	Mercury (CVAA)	245.1
Fluoride	Anions, Ion Chromotography	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.
- **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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



Method Reference: Anions by EPA Method 300.0

QC Criteria:

FC-CCR-MW7-31718

Fluoride

Samples analyzed within 28 days of sampling?

Y
N
N/A
Target analytes detected in the blank?
Y
N
N/A

If Yes:

Samples with analyte concentrations less than 5 times
the blank detection

Detected Analyte Concentration

LCS/LCSD recovery and pro	ecision within laborator	ry-specified limits?	Υ	N	N/A
Analyte	Recovery/Bias	Affected samples			
MS performed on a project	t-specific sample?		Y	N	N/A
If Yes:					
FC-CCR-MW49A-31718					
MS/MSD recovery and pre	ecision within laboratory	y-specified limits?	Y	N	N/A
If No:					
Analyte	Recovery/Bias				
Field duplicate(s) collected	<u></u> ;		Υ	N	N/A
If Yes:					
Parent Sample	Field Duplicate				
FC-CCR-MW61-31718	FC-CCR-FD02-31718				
Is relative percent difference	(%RPD) within SAP-specified	20% limit, or difference between values less			
	than RL?		Y	N	N/A
If No:					
Analyte	RPD				
Are all RLs for ND samples suffic	iently low to meet EPA prim	ary drinking water MCLs?	Y	N	N/A
If No:					
Sample	Analyte	Result	MCL		
Are all RLs for ND samples suffic	iently low to meet unit-speci	fic background threshold levels?	Y	N	N/A
If No:		<b>.</b>	D=- /		
Sample	Analyte	Result	BTV		

ND w/ RL of 4.0 mg/L

2.1 mg/L

**Method Reference:** Metals by EPA Methods 200.7 Rev 4.4 (ICP) or 200.8 LL (ICP/MS) QC Criteria: Samples analyzed within 180 days of sampling? N/A Ν Target analytes detected in the blank? N N/A Samples with analyte concentrations less than 5 If Yes: times the blank detection **Detected Analyte** Concentration LCS Recoveries within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW49A-31718 Are recoveries within laboratory-specified limits? N/A If No: Analyte Recovery/Bias **Effect** (131% MS, 132% MSD) None: Selenium ND Selenium Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW61-31718 FC-CCR-FD02-31718 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than Υ Ν N/A If No: RPD Analyte Ν N/A Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? N//A If No:

Result

**BTV** 

Sample

Analyte

**Method Reference:** Mercury by EPA method 245.1 QC Criteria: Samples analyzed within 28 days of sampling? N/A Ν Target analytes detected in the blank? N/A Samples with analyte concentrations less than 5 times If Yes: the blank detection **Detected Analyte** Concentration LCS Recoveries within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW49A-31718 Are recoveries within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A Ν If Yes: Parent Sample Field Duplicate FC-CCR-MW61-31718 FC-CCR-FD02-31718 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than N/A RL? If No: Analyte **RPD** N/A Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? N/A If No:

Result

**BTV** 

Sample

Analyte

Laboratory Name:	TestAmerica Phoenix					
Sample Delivery Group:	J99692-1	Date:	4/13/2018			
Reviewer's Name:	Nathalie Perry-Freer	Reviewed by:	Marie Bevier			

Field Sample Identification	Collection Date	Laboratory Identification
FC-CCR-MW66-31618	3/16/2018	550-99692-1
FC-CCR-MW67-31618	3/16/2018	550-99692-2
FC-CCR-MW68-31618	3/16/2018	550-99692-3
FC-CCR-MW69-31618	3/16/2018	550-99692-4
FC-CCR-MW70-31618	3/16/2018	550-99692-5
FC-CCR-MW71-31618	3/16/2018	550-99692-6
FC-CCR-MW72-31618	3/16/2018	550-99692-7
FC-CCR-MW73-31618	3/16/2018	550-99692-8
FC-CCR-FD01-31618	3/16/2018	550-99692-9

### **Analytical Methods:**

Analyte	Analyte Group	EPA Method
Beryllium, Lithium	Metals (ICP)	200.7
Antimony, Arsenic,	Metals (ICP/MS)	200.8
Barium, Cadmium,		
Chromium, Cobalt, Lead		
Molybdenum, Selenium		
Thallium		
Mercury	Mercury (CVAA)	245.1
Fluoride	Anions, Ion Chromotography	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.
- **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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



**Method Reference:** Anions by EPA Method 300.0

QC Criteria:

Samples analyzed within 28 days of sampling?

Y
N
N/A
Target analytes detected in the blank?
Y
N
N/A

If Yes:

Samples with analyte concentrations less than 5 times
the blank detection

If Yes:		the blank detection			
Detected Analyte	Concentration	the blank detection			
LCS/LCSD recovery and pre	ecision within laborator	y-specified limits?	Υ	N	N/A
Analyte	Recovery/Bias	Affected samples			
MS performed on a projec	t-specific sample?		Y	N	N/A
If Yes: FC-CCR-MW66-31618					
MS/MSD recovery and pre	cision within laboratory	v-specified limits?	Υ	N	N/A
If No:		, -			,
Analyte	Recovery/Bias				
Field duplicate(s) collected	1?		Y	N	N/A
If Yes:					
Parent Sample	Field Duplicate				
FC-CCR-MW66-31618	FC-CCR-FD01-31618				
Is relative percent difference (		20% limit, or difference between values less	v	N.	N1 / A
	than RL?		Υ	N	N/A
If No:					
Analyte	RPD				
Are all RLs for ND samples suffici	ently low to meet EPA prim	ary drinking water MCLs?	Y	N	N/A
If No:					
Sample	Analyte	Result	MCL		
Ave all Dia fam ND aggregates and the	and the land to the second to the second	fin handlers and threat old lavels?	Υ	N	NI/A
Are all RLs for ND samples suffici	rentity fow to meet unit-speci	nic packground threshold levels?	1	N	N/A
Sample	Analyte	Result	BTV		

**Method Reference:** Metals by EPA Methods 200.7 Rev 4.4 (ICP) or 200.8 LL (ICP/MS) QC Criteria: Samples analyzed within 180 days of sampling? Υ N/A Ν Target analytes detected in the blank? N N/A Samples with analyte concentrations less than 5 If Yes: times the blank detection **Detected Analyte** Concentration LCS Recoveries within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW66-31618 Are recoveries within laboratory-specified limits? Ν N/A

Analyte Recovery/Bias Effect

Field duplicate(s) collected?

If Yes:

Parent Sample Field Duplicate

FC-CCR-FD01-31618

Analyte

If No:

FC-CCR-MW66-31618

If No:

Sample

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

N N/A

RL? Y N

Analyte RPD

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

Y
N

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

If No:

Y

N

N/A

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Y

N

N//A

Result

MCL

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Y

N

N//A

Sample Analyte Result BTV

N/A

**Method Reference:** Mercury by EPA method 245.1 QC Criteria: Samples analyzed within 28 days of sampling? N/A Ν Target analytes detected in the blank? N/A Samples with analyte concentrations less than 5 times If Yes: the blank detection **Detected Analyte** Concentration LCS Recoveries within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? N/A Ν If Yes: FC-CCR-MW66-31618 Are recoveries within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A Ν If Yes: Parent Sample Field Duplicate FC-CCR-MW66-31618 FC-CCR-FD01-31618 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than Ν N/A RL? If No: RPD Analyte N/A Ν Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample **Analyte** Result MCL N/A Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? If No:

Result

BTV

Sample

Analyte

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:		Date:	4/16/2018
Validator's Name:	Nathalie Perry-Freer	Reviewed by:	Marie Bevier

Sample Summary:

Field Sample Identification	Collection Date	Laboratory Identification
FC-CCR-MW62-4618	4/6/2018	550-100875-1
FC-CCR-MW63-4618	4/6/2018	550-100875-2

**Analytical Methods:** 

Analyte	Analyte Group	EPA Method
Boron, Calcium	Metals (ICP)	200.7

### **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.

**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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



Method Reference: Metals by EPA Methods 200.7 Rev 4.4 (ICP)

QC Criteria:

If Yes:

Samples analyzed within 180 days of sampling?

Target analytes detected in the blank?

Samples with analyte concentrations less than 5 times the

blank detection

Detected Analyte Concentration

LCS Recoveries within laboratory-specified limits?

Y

N/A

N/A

N/A

Ν

N

If No:

Analyte Recovery/Bias Affected samples

MS performed on a project-specific sample?

Υ

Ν

N/A

If Yes:

FC-CCR-MW62-4618

Are recoveries within laboratory-specified limits?

v

N/A

If No:

Analyte Recovery/Bias Effect

Calcium (-44% MS, -44% MSD) None: Spike < 4x native sample detection

Field duplicate(s) collected?

/

N/A

If Yes:

Parent Sample Field Duplicate

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

Υ

Ν

N/A

If No:

Analyte RPD

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

Υ

N/A

If No:

Sample Analyte Result MCL

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Υ

N//A

If No:

Sample Analyte Result BTV

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:	J103738-1	Date:	6/25/2018
Validator's Name:	Nathalie Perry-Freer	Reviewed by:	Marie Bevier

### Sample Summary:

Field Sample Identification	Collection Date	Laboratory Identification
FC-CCR-MW-62-6318	6/3/2018	550-103738-1
FC-CCR-MW-63-6318	6/3/2018	550-103738-2
FC-CCR-MW-64-6318	6/3/2018	550-103738-3
FC-CCR-MW-65-6318	6/3/2018	550-103738-4

### **Analytical Methods:**

Analyte	Analyte Group	EPA Method/Standard Method (SM)
Boron, Calcium,	Metals (ICP)	200.7
Magnesium, Potassium,		
Sodium		
Chloride, Fluoride, Sulfate	Anions, Ion Chromotography	300.0
Alkalinity	General Chemisty Parameters	2320
Total Dissolved Solids	General Chemisty Parameters	2540
рН	General Chemisty Parameters	4500

#### **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.
- 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:**

Samples received at temperatures ≤ 6°C or within 8 hours of sampling?

COC signed and complete?

Sample login matches COC?



**Method Reference:** Metals by EPA Methods 200.7 Rev 4.4 (ICP)

**OC Criteria:** 

If Yes:

Samples analyzed within 180 days of sampling?

Target analytes detected in the blank?

Samples with analyte concentrations less than 5 times the

blank detection

Detected Analyte Concentration

LCS Recoveries within laboratory-specified limits?

N/A

N/A

N/A

Ν

N

Ν

If No:

Analyte Recovery/Bias Affected samples

MS performed on a project-specific sample?

Υ

N/A

If Yes:

FC-CCR-MW-62-6318

Are recoveries within laboratory-specified limits?

Υ

N

N/A

If No:

Analyte Recovery/Bias Effect

Calcium 49%/27% None: 4x spike < native sample detection Magnesium 61%/44% None: 4x spike < native sample detection

Sodium 59%/60% None: 4x spike < native sample detection

Field duplicate(s) collected?

1

N

Ν

N/A

If Yes:

Parent Sample Field Duplicate

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

Υ

N/A

If No:

Analyte RPD

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

Υ

N/A

If No:

Sample Analyte Result

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

v

MCL

N//A

If No:

Sample Analyte Result BTV

**Method Reference:** Anions by EPA Method 300.0 QC Criteria: Samples analyzed within 28 days of sampling? N/A Ν Target analytes detected in the blank? N N/A Samples with analyte concentrations less than 5 times the If Yes: blank detection **Detected Analyte** Concentration LCS/LCSD recovery and precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? N/A If Yes: FC-CCR-MW-62-6318 MS/MSD recovery and precision within laboratory-specified limits? N/A If No: Recovery/Bias Analyte Field duplicate(s) collected? N N/A If Yes: Parent Sample Field Duplicate Υ N/A Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? If No: Analyte **RPD** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ N/A If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? N/A

Result

If No: Sample

Analyte

**Method Reference:** Total Dissolved Solids by SM 2540C QC Criteria:

Samples analyzed within 7 days of sampling? N/A Target analytes detected in the blank? N/A N

Samples with analyte concentrations less than 5 times the

If Yes: blank detection **Detected Analyte** Concentration LCS/LCSD recovery and precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? N/A If Yes: FC-CCR-MW-62-6318 Duplicate precision within laboratory-specified limits? N/A If No: Recovery/Bias Analyte Field duplicate(s) collected? N N/A If Yes: Parent Sample Field Duplicate Υ N/A Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? If No: Analyte **RPD** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ N/A If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? N/A If No: Sample Result **BTV** Analyte

**Method Reference:** Alkalinity by SM 2320B QC Criteria: Samples analyzed within 14 days of sampling? N/A Ν Target analytes detected in the blank? N N/A Samples with analyte concentrations less than 5 times the If Yes: blank detection **Detected Analyte** Concentration LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? N/A If Yes: FC-CCR-MW-62-6318 Duplicate precision within laboratory-specified limits? Ν N/A If No: Recovery/Bias Analyte Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate N/A Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? If No: Analyte **RPD** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ N/A If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? N/A If No: Sample Analyte Result **BTV** 

**Method Reference:** pH by SM 4500 **OC Criteria:** Samples analyzed within 15 minutes of sampling? Υ N/A Target analytes detected in the blank? N/A Samples with analyte concentrations less than 5 times the If Yes: blank detection **Detected Analyte** Concentration LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? N/A If Yes: FC-CCR-MW-62-6318 Duplicate precision within laboratory-specified limits? N/A N If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? Υ N/A If No: RPD Analyte Υ N/A Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample Analyte Result MCL Υ N/A Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? If No:

Sample

Analyte

**BTV** 

Result

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:	J103742	Date:	7/5/2018
Validator's Name:	Nathalie Perry-Freer	Reviewed by:	Marie Bevier

### Sample Summary:

Field Sample Identification	Collection Date	Laboratory Identification
FC-CCR-MW-7-6118	6/1/2018	550-103742-1
FC-CCR-MW-8-6118	6/1/2018	550-103742-2
FC-CCR-MW-49A-6118	6/1/2018	550-103742-3
FC-CCR-MW-61-6118	6/1/2018	550-103742-4
FC-CCR-FD01-6118	6/1/2018	550-103742-5
FC-CCR-MW-74-6118	6/1/2018	550-103742-6
FC-CCR-MW-75-6118	6/1/2018	550-103742-7

#### **Analytical Methods:**

Analyte	Analyte Group	EPA Method
Radium-226	Radiochemical	903.0
Radium-228	Radiochemical	904.0
Boron, Calcium, Magnesium, Potassium, Sodium, Lithium	Metals (ICP)	200.7
Arsenic, Barium, Cadmium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals (ICP/MS)	200.8
Total Dissolved Solids	General Chemisty Parameters	2540
Alkalinity	General Chemisty Parameters	2320
рН	General Chemisty Parameters	4500
Chloride, Fluoride, Sulfate	Anions, Ion Chromotography	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.

**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:**

Samples received at temperatures ≤ 6°C or within 8 hours of sampling?

Y
N
COC signed and complete?
Y
N
Sample login matches COC?
Y
N

**Method Reference:** Anions by EPA Method 300.0

QC Criteria:

Samples analyzed within 28 days of sampling? Ν N/A Target analytes detected in the blank? Ν N/A

Samples with analyte concentrations less than 5 times If Yes: the blank detection

Detected Analyte	Concentration	the blank detection			
LCS/LCSD recovery and pro	ecision within laboratory	y-specified limits?	Υ	N	N/A
Analyte	Recovery/Bias	Affected samples			
MS performed on a project If Yes:	t-specific sample?		Y	N	N/A
FC-CCR-MW-7-6118					
MS/MSD recovery and pre	ecision within laboratory	r-specified limits?	Y	N	N/A
Analyte	Recovery/Bias				
Field duplicate(s) collected  If Yes:	?t		Y	N	N/A
Parent Sample FC-CCR-MW-61-6118	Field Duplicate FC-CCR-FD01-6118				
Is relative percent difference	(%RPD) within SAP-specified 2 than RL?	20% limit, or difference between values less	Υ	N	N/A
If No:					
Analyte	RPD				
Are all RLs for ND samples suffic	iently low to meet EPA prima	ary drinking water MCLs?	Y	N	N/A
If No:	Analyta	Dogudh	MCI		
Sample	Analyte	Result	MCL		
Are all RLs for ND samples suffic  If No:	iently low to meet unit-specif	ic background threshold levels?	Y	N	N/A
Sample	Analyte	Result	BTV		

**Method Reference:** Radiochemical analyses by EPA Methods 903.0 and 904.0 QC Criteria: Samples analyzed within 180 days of sampling? Ν N/A Target analytes detected in the blank? Ν N/A Samples with analyte concentrations less than 5 If Yes: times the blank detection **Detected Analyte** Concentration Barium carrier levels within laboratory specified limits? Υ Ν N/A Yttrium carrier levels within laboratory specified limits? N/A LCS Recoveries within laboratory-specified limits? Υ Ν N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Υ N/A Ν If Yes: N/A Are recoveries within laboratory-specified limits? Υ If No: Recovery/Bias Effect Analyte Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW-61-6118 FC-CCR-FD01-6118 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than Υ N/A RL? If No: RPD Analyte Target analytes were not detcted in either sample. Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Ν N/A If No: Analyte MCL Sample Result Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ N/A

Result

**BTV** 

If No:

Sample

**Method Reference:** Metals by EPA Methods 200.7 Rev 4.4 (ICP) QC Criteria: Samples analyzed within 180 days of sampling? N/A Ν Target analytes detected in the blank? N N/A Samples with analyte concentrations less than 5 times the If Yes: blank detection **Detected Analyte** Concentration LCS Recoveries within laboratory-specified limits? Ν N/A If No: Analyte Affected samples Recovery/Bias MS performed on a project-specific sample? N/A Ν If Yes: FC-CCR-MW-7-6118 Are recoveries within laboratory-specified limits? N/A If No: Recovery/Bias **Effect** Analyte Boron 64% MS None: 4x spike < native sample detection Calcium 19%/32% None: 4x spike < native sample detection Magnesium 26%/35% None: 4x spike < native sample detection Sodium -263%/-119% None: 4x spike < native sample detection Field duplicate(s) collected? Υ N/A Ν If Yes: Parent Sample Field Duplicate FC-CCR-MW-61-6118 FC-CCR-FD01-6118 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? N/A If No: Analyte **RPD** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Ν N/A If No: Sample Result MCL Analyte Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? N/A If No:

Result

Sample

Analyte

**Method Reference:** Alkalinity by SM 2320B QC Criteria: Samples analyzed within 14 days of sampling? N/A Ν Target analytes detected in the blank? N N/A Samples with analyte concentrations less than 5 times the If Yes: blank detection **Detected Analyte** Concentration LCS/LCSD recovery and precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? N/A If Yes: FC-CCR-MW-7-6118 Duplicate precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW-61-6118 FC-CCR-FD01-6118 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? N/A If No: **RPD** Analyte Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ N/A If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ N/A If No:

Result

Sample

Analyte

**Method Reference:** pH by SM 4500 QC Criteria: Samples analyzed within 15 minutes of sampling? Υ N/A Ν Target analytes detected in the blank? N/A Samples with analyte If Yes: concentrations less than 5 times the blank detection **Detected Analyte** Concentration LCS/LCSD recovery and precision within laboratory-specified limits? N/A Ν If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW-7-6118 FC-CCR-FD01-6118 Duplicate precision within laboratory-specified limits? N/A Υ Ν If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A Υ Ν If Yes: Parent Sample Field Duplicate FC-CCR-MW-61-6118 FC-CCR-FD01-6118 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values N/A Υ Ν less than RL? If No: **RPD** Analyte Υ Ν N/A Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample Analyte Result MCL Υ N/A Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Ν

Analyte

Result

**BTV** 

If No: Sample

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:	J103741-1	Date:	6/26/2018
Validator's Name:	Nathalie Perry-Freer	Reviewed by:	Marie Bevier

Field Sample Identification	Collection Date	Laboratory Identification
FC-CCR-MW-66-53118	5/31/2018	550-103741-1
FC-CCR-MW-67-6218	6/2/2018	550-103741-2
FC-CCR-MW-68-6218	6/2/2018	550-103741-3
FC-CCR-MW-69-6218	6/2/2018	550-103741-4
FC-CCR-FD02-6218	6/2/2018	550-103741-5
FC-CCR-MW-70-53118	5/31/2018	550-103741-6
FC-CCR-MW-71-6218	6/2/2018	550-103741-7
FC-CCR-MW-72-6218	6/2/2018	550-103741-8
FC-CCR-MW-73-6218	6/2/2018	550-103741-9

#### **Analytical Methods:**

Analyte	Analyte Group	EPA Method/Standard Method (SM)
Boron, Calcium, Magnesium, Potassium, Sodium	Metals (ICP)	200.7
Arsenic, Barium, Cadmium, Cobalt, Lead, Molybdenum, Selenium, Thallium	Metals (ICP/MS)	200.8
Total Dissolved Solids	General Chemisty Parameters	2540
Alkalinity	General Chemisty Parameters	2320
рН	General Chemisty Parameters	4500
Mercury	Mercury (CVAA)	245.1
	Anions, Ion Chromotography	300.0
<sup>226</sup> Ra, <sup>228</sup> Ra, Total Ra	Radiochemistry	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.
- **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:**

Samples received at temperatures ≤ 6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



**Method Reference:** Anions by EPA Method 300.0

QC Criteria:

Samples analyzed within 28 days of sampling?

Target analytes detected in the blank?

Y N N/A Y **N** N/A

If Yes:

Samples with analyte concentrations less than 5 times the blank detection

Detected Analyte Concentration

LCS/LCSD recovery and precision within laboratory-specified limits? N/A If No: Affected samples Analyte Recovery/Bias MS performed on a project-specific sample? N/A If Yes: FC-CCR-MW-66-53118 MS/MSD recovery and precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW-69-6218 FC-CCR-FD02-6218 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? N/A If No: Analyte **RPD** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ N N/A If No: Sample Analyte Result MCL

Result

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Analyte

If No: Sample N/A

Ν

**Method Reference:** Metals by EPA Methods 200.7 Rev 4.4 (ICP)/200.8 LL (ICP/MS) QC Criteria: Samples analyzed within 180 days of sampling? N/A Ν Target analytes detected in the blank? N N/A Samples with analyte concentrations less than 5 times the If Yes: blank detection **Detected Analyte** Concentration LCS Recoveries within laboratory-specified limits? N/A If No: **Analyte** Recovery/Bias Affected samples MS performed on a project-specific sample? N/A If Yes: FC-CCR-MW-66-53118 Are recoveries within laboratory-specified limits? If No: Effect Analyte Recovery/Bias Calcium -40%/-59% None: 4x spike < native sample detection -916%/-30% Boron None: 4x spike < native sample detection Magnesium -730%/-127% None: 4x spike < native sample detection Sodium -21%/-40% None: 4x spike < native sample detection Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW-69-6218 FC-CCR-FD02-6218 N/A Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL? If No: **RPD** Analyte Υ Ν N/A Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample Analyte Result MCL N/A Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ If No:

Result

Sample

Analyte

**Method Reference:** Mercury by EPA method 245.1

**OC Criteria:** 

Samples analyzed within 28 days of sampling?

Target analytes detected in the blank?

Samples with analyte concentrations less than 5 times the blank If Yes:

detection

**Detected Analyte** Concentration

LCS Recoveries within laboratory-specified limits?

N/A

N/A

N/A

If No:

Analyte Recovery/Bias Affected samples

MS performed on a project-specific sample?

N/A

If Yes:

FC-CCR-MW-66-53118

Are recoveries within laboratory-specified limits?

N/A

If No:

Analyte Recovery/Bias

Field duplicate(s) collected?

N/A

If Yes:

Parent Sample Field Duplicate FC-CCR-FD02-6218

FC-CCR-MW-69-6218

N/A

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

If No:

Analyte **RPD** 

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

N/A

If No:

Sample Analyte Result

MCL

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

N/A

If No:

Sample Analyte Result

**Method Reference:** Total Dissolved Solids by SM 2540C

QC Criteria:

If Yes:

Samples analyzed within 7 days of sampling?

Target analytes detected in the blank?

N/A N/A

Samples with analyte concentrations less than 5 times the

blank detection

**Detected Analyte** Concentration

LCS/LCSD recovery and precision within laboratory-specified limits?

N/A

If No:

Analyte Recovery/Bias

Affected samples

Lab duplicate performed on a project-specific sample?

N/A

FC-CCR-MW-66-53118

If Yes:

Duplicate precision within laboratory-specified limits?

N/A

If No:

Analyte Recovery/Bias

Field duplicate(s) collected?

N/A

If Yes:

Parent Sample Field Duplicate FC-CCR-MW-69-6218 FC-CCR-FD02-6218

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

N/A

If No:

Analyte **RPD** 

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Υ

MCL

Υ

**BTV** 

N/A

If No:

Sample Analyte Result

N/A

If No:

Sample Analyte Result

**Method Reference:** Alkalinity by SM 2320B

QC Criteria:

If Yes:

Samples analyzed within 14 days of sampling?

Target analytes detected in the blank?

N/A Ν N/A

Samples with analyte concentrations less than 5 times the

blank detection

**Detected Analyte** Concentration

LCS/LCSD recovery and precision within laboratory-specified limits?

N/A

If No:

Affected samples Analyte Recovery/Bias

Lab duplicate performed on a project-specific sample?

N/A

If Yes:

FC-CCR-MW-66-53118

Duplicate precision within laboratory-specified limits?

N/A

If No:

Analyte Recovery/Bias

Field duplicate(s) collected?

N/A

If Yes:

Parent Sample Field Duplicate FC-CCR-MW-69-6218 FC-CCR-FD02-6218

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

If No:

Analyte **RPD** 

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Υ

MCL

N/A

N/A

If No:

Sample Analyte Result

N/A

If No:

Sample Result BTV Analyte

**Method Reference:** pH by SM 4500

QC Criteria:

If Yes:

Samples analyzed within 15 minutes of sampling?

Target analytes detected in the blank?

Samples with analyte concentrations less than 5 times the blank

detection

**Detected Analyte** Concentration

LCS/LCSD recovery and precision within laboratory-specified limits?

N/A

N/A

N/A

If No:

Affected samples Analyte Recovery/Bias

Lab duplicate performed on a project-specific sample?

N/A

Ν

FC-CCR-MW-66-53118

If Yes:

FC-CCR-FD02-6218

Duplicate precision within laboratory-specified limits?

N/A

If No:

Analyte Recovery/Bias

Field duplicate(s) collected?

N/A

If Yes:

Parent Sample Field Duplicate

FC-CCR-MW-69-6218 FC-CCR-FD02-6218

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

N/A

If No:

Analyte **RPD** 

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs?

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Υ

N/A

If No:

Sample Analyte Result MCL

N/A

Ν

If No:

Sample Analyte Result

**Method Reference:** Radiochemical analyses by EPA Methods 903.0 and 904.0 **OC Criteria:** Samples analyzed within 180 days of sampling? Ν N/A Target analytes detected in the blank? Ν N/A Samples with analyte concentrations less than 5 If Yes: times the blank detection **Detected Analyte** Concentration Barium carrier levels within laboratory specified limits? Υ N/A Yttrium carrier levels within laboratory specified limits? N/A Ν LCS Recoveries within laboratory-specified limits? Υ Ν N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Υ N/A If Yes: N/A Are recoveries within laboratory-specified limits? If No: Analyte Recovery/Bias Effect Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW-69-6218 FC-CCR-FD02-6218 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than N/A RL? If No: Analyte RPD <sup>226</sup>RA, <sup>228</sup>Ra, Total Ra 36%, 40%, 39% Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Ν N/A If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ Ν N/A If No:

Result

Sample

Analyte

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:	J113007-1	Date:	12/21/2018
Validator's Name:	Caprielle Larsen	Reviewed by:	Marie Bevier

### Sample Summary:

Field Sample Identification	Collection Date	Laboratory Identification	Note
FC-CCR-MW66-11218	11/2/2018	550-113007-1	MS/MSD
FC-CCR-MW67-11318	11/3/2018	550-113007-2	
FC-CCR-MW68-11318	11/3/2018	550-113007-3	
FC-CCR-MW69-11318	11/3/2018	550-113007-4	
FC-CCR-MW70-11218	11/2/2018	550-113007-5	
FC-CCR-MW62-11218	11/2/2018	550-113007-6	
FC-CCR-MW63-112818	11/2/2018	550-113007-7	
FC-CCR-MW64-11218	11/2/2018	550-113007-8	
FC-CCR-MW65-11218	11/2/2018	550-113007-9	
FC-CCR-MW71-11318	11/3/2018	550-113007-10	
FC-CCR-MW72-11318	11/3/2018	550-113007-11	
FC-CCR-MW73-11318	11/3/2018	550-113007-12	
FC-CCR-FD01-11318	11/3/2018	550-113007-13	Field Duplicate of Sample FC-CCR-MW71-11318
FC-CCR-FD02-11318	11/3/2018	550-113007-14	Field Duplicate of Sample FC-CCR-MW72-11318

#### **Analytical Methods:**

Analyte	Analyte Group	EPA Method / Standard Method
		(SM)
226Ra, 228Ra, Total Ra	Radiochemistry	Gamma Ray HPGE
Boron, Calcium	Metals (ICP)	200.7 REV 4.4
Chloride, Fluoride, Sulfate	Anions, Ion Chromotography	300.0
Total Dissolved Solids	General Chemisty Parameters	2540 C
рН	General Chemisty Parameters	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.

**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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?

Y N N Y N

Correct ID (COC) Discrepancy (Lab) Explain Discrepancy

FC-CCR-MW63-11218 FC-CCR-MW63-112818 Laboratory mis-typed sample ID.

Method Reference: Metals by EPA Method 200.7 Rev 4.4 (ICP)

QC Criteria:

Samples analyzed within 180 days of sampling?

Y

N

N/A

Target analytes detected in the blank?

Y

N

N/A

**If Yes:** Samples with analyte concentrations less than 5

Detected Analyte Concentration times the blank detection

LCS Recoveries within laboratory-specified limits?

Analyte Recovery/Bias Affected samples

MS performed on a project-specific sample?

If Yes:

FC-CCR-MW66-11218
Are recoveries within laboratory-specified limits?

Y

N/A

If No:
Analyte Recovery/Bias Effect

Calcium -45%, 15% None: 4x spike < native sample detection
Boron -514%, 282% None: 4x spike < native sample detection

Field duplicate(s) collected?

Y

N

N/A

If Yes:

Parent Sample Field Duplicate
FC-CCR-MW71-11318 FC-CCR-FD01-11318
FC-CCR-MW72-11318 FC-CCR-FD02-11318

Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less than RL?

If No: Flag-Reason Code

Parent Sample Analyte RPD Parent Duplicate

Are all RLs for ND samples sufficiently low to meet EPA primary drinking water
MCLs?

N/A

If No:

Sample Analyte Result MCL

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Y

N/A

If No:

Sample Analyte Result BTV

**Method Reference:** Anions by EPA Method 300.0 QC Criteria: Samples analyzed within 28 days of sampling? Ν N/A Target analytes detected in the blank? Ν N/A If Yes: Samples with analyte concentrations Concentration less than 5 times the blank detection **Detected Analyte** LCS/LCSD recovery and precision within laboratory-specified limits? Υ Ν N/A If No: Recovery/Bias **Analyte** Affected samples MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW66-11218 MS/MSD recovery and precision within laboratory-specified limits? Ν N/A Υ If No: Analyte Recovery/Bias Field duplicate(s) collected? Ν N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW71-11318 FC-CCR-FD01-11318 FC-CCR-FD02-11318 FC-CCR-MW72-11318 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference Ν N/A between values less than RL? If No: Flag-Reason Code Parent Sample **RPD** Analyte **Parent** Duplicate Are all RLs for ND samples sufficiently low to meet EPA primary drinking water Υ Ν N/A MCLs? If No: MCL Sample Result Analyte Are all RLs for ND samples sufficiently low to meet unit-specific background Υ N/A threshold levels? If No:

Result

**BTV** 

Sample

**Method Reference:** Total Dissolved Solids by SM 2540C QC Criteria: Samples analyzed within 7 days of sampling? Ν N/A Target analytes detected in the blank? Ν N/A If Yes: Samples with analyte concentrations less than 5 Concentration times the blank detection **Detected Analyte** LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW66-11218 Duplicate precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias N/A Field duplicate(s) collected? Ν If Yes: Parent Sample Field Duplicate FC-CCR-MW71-11318 FC-CCR-FD01-11318 FC-CCR-MW72-11318 FC-CCR-FD02-11318 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference Υ Ν N/A between values less than RL? If No: Flag-Reason Code Parent Sample Analyte **RPD Parent** Duplicate Are all RLs for ND samples sufficiently low to meet EPA primary drinking water Υ N/A Ν MCLs? If No: Result Sample Analyte MCL Are all RLs for ND samples sufficiently low to meet unit-specific background N/A Υ Ν threshold levels? If No:

Result

**BTV** 

Sample

**Method Reference:** pH by SM 4500 H+ B QC Criteria: Samples analyzed within 15 minutes of sampling? Υ N N/A Samples were analyzed at the lab, at the time of receipt, and have been qualified J-HT. Target analytes detected in the blank? Υ N/A If Yes: Samples with analyte concentrations less than 5 Concentration times the blank detection **Detected Analyte** LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? Ν Υ N/A If Yes: FC-CCR-MW6611218 FC-CCR-MW72-11318 Duplicate precision within laboratory-specified limits? Ν N/A If No: **Analyte** Recovery/Bias Field duplicate(s) collected? Ν N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW71-11318 FC-CCR-FD01-11318 FC-CCR-MW72-11318 FC-CCR-FD02-11318 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference Υ N/A Ν between values less than RL? If No: Flag-Reason Code Parent Sample Analyte **RPD Parent** Duplicate Are all RLs for ND samples sufficiently low to meet EPA primary drinking water Υ N/A MCLs? If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background N/A Υ threshold levels?

Result

**BTV** 

If No: Sample

**Method Reference:** Radiochemical analyses by Gamma Ray HPGE QC Criteria: Samples analyzed within 180 days of sampling? Ν N/A Target analytes detected in the blank? Ν N/A If Yes: Samples with analyte concentrations Concentration less than 5 times the blank detection **Detected Analyte** Barium carrier levels within laboratory specified limits? N/A Υ Ν Yttrium carrier levels within laboratory specified limits? Υ Ν N/A N/A LCS Recoveries within laboratory-specified limits? Ν If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? N/A Υ Ν If Yes: Are recoveries within laboratory-specified limits? Υ Ν N/A If No: **Effect** Analyte Recovery/Bias Field duplicate(s) collected? Υ Ν N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW71-11318 FC-CCR-FD01-11318 FC-CCR-MW72-11318 FC-CCR-FD02-11318 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference Υ N N/A between values less than RL? If No: Flag-Reason Code Parent Sample Analyte **RPD Parent** Duplicate FC-CCR-MW71-11318 Radium 226 J-FD 40% J-FD Are all RLs for ND samples sufficiently low to meet EPA primary drinking water Ν N/A MCLs? If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background N/A Υ threshold levels? If No: Sample Analyte Result **BTV** 

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:	J113007-2	Date:	12/21/2018
Validator's Name:	Caprielle Larsen	Reviewed by:	Marie Bevier

#### **Sample Summary:**

Field Sample Identification	Collection Date	Laboratory Identification	Note
FC-CCR-MW66-11218	11/2/2018	550-113007-1	MS/MSD
FC-CCR-MW67-11318	11/3/2018	550-113007-2	
FC-CCR-MW68-11318	11/3/2018	550-113007-3	
FC-CCR-MW69-11318	11/3/2018	550-113007-4	
FC-CCR-MW70-11218	11/2/2018	550-113007-5	
FC-CCR-MW71-11318	11/3/2018	550-113007-10	
FC-CCR-MW72-11318	11/3/2018	550-113007-11	
FC-CCR-MW73-11318	11/3/2018	550-113007-12	
FC-CCR-FD01-11318	11/3/2018	550-113007-13	Field Duplicate of Sample FC-CCR- MW71-11318
FC-CCR-FD02-11318	11/3/2018	550-113007-14	Field Duplicate of Sample FC-CCR- MW72-11318

#### **Analytical Methods:**

Analyte	Analyte Gorup	EPA Method / Standard Method (SM)
Arsenic, Barium, Cobalt, Molybdenum, Selenium, Thallium, Lithium	Metals (ICP-MS)	200.8 Low Level
Lithium	Metals (ICP)	200.7 Rev 4.4
Fluoride	Anions, Ion Chromotography	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.

**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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



**Method Reference:** Metals by EPA Methods 200.7 Rev 4.4 (ICP), 200.8 (ICP-MS) QC Criteria: Samples analyzed within 180 days of sampling? Ν N/A Target analytes detected in the blank? Υ N/A If Yes: Samples with analyte concentrations less than 5 Concentration times the blank detection **Detected Analyte** LCS Recoveries within laboratory-specified limits? Ν N/A Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW66-11218 Are recoveries within laboratory-specified limits? Υ Ν N/A If No: **Analyte** Recovery/Bias **Effect** Flag - Reason Code Selenium 137%, 137% Potential High Analytical Bias J-HM Field duplicate(s) collected? N/A N If Yes: Parent Sample Field Duplicate FC-CCR-MW71-11318 FC-CCR-FD01-11318 FC-CCR-FD02-11318 FC-CCR-MW72-11318 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference N/A N between values less than RL? If No: Flag-Reason Code Parent Sample Analyte **RPD** Parent Duplicate Are all RLs for ND samples sufficiently low to meet EPA primary drinking water Υ N/A N MCLs? If No: MCL Sample Result Analyte Are all RLs for ND samples sufficiently low to meet unit-specific background Υ N/A N threshold levels? If No: Sample Analyte Result **BTV** 

**Method Reference:** Anions by EPA Method 300.0 QC Criteria: Samples analyzed within 28 days of sampling? Υ Ν N/A Target analytes detected in the blank? Υ N/A Samples with analyte If Yes: concentrations less than 5 times the Concentration **Detected Analyte** blank detection LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Recovery/Bias Affected samples Analyte MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW66-11218 MS/MSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? Ν N/A If Yes: Parent Sample Field Duplicate FC-CCR-MW71-11318 FC-CCR-FD01-11318 FC-CCR-MW72-11318 FC-CCR-FD02-11318 Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference N/A Ν between values less than RL? If No: Flag-Reason Code **RPD** Parent Sample Analyte **Parent** Duplicate Are all RLs for ND samples sufficiently low to meet EPA primary drinking water Υ N/A Ν MCLs? If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background Υ N/A N threshold levels? If No:

Result

**BTV** 

Sample

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:	113007-3 <b>Date</b> : 12/21/2018		
Validator's Name:	Caprielle Larsen	Reviewed by:	Marie Bevier

#### **Sample Summary:**

Field Sample Identification	Collection Date	Laboratory Identification	Note
FC-CCR-MW71-11318	11/3/2018	550-113007-10	
FC-CCR-MW72-11318	11/3/2018	550-113007-11	

#### **Analytical Methods:**

Analyte	Analyte Gorup	EPA Method / Standard Method (SM)
Fluoride	Anions, Ion Chromotography	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.

**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:**

Samples received at temperatures ≤ 6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



Correct ID (COC)

Discrepancy (Lab)

**Explain Discrepancy** 

FC-CCR-MW63-11218

FC-CCR-MW63-112818 Laboratory mis-typed sample ID.

Method Reference: Anions by EPA Method 300.0 QC Criteria: Samples analyzed within 28 days of sampling? N/A Ν Target analytes detected in the blank? N/A If Yes: Samples with analyte concentrations less than 5 times Concentration the blank detection **Detected Analyte** LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW66-11218 FC-CCR-MW72-11318 FC-CCR-FD02-11318 MS/MSD recovery and precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? Ν N/A If Yes: Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less N/A Ν than RL? If No: Flag-Reason Code Parent Sample Analyte **Duplicate RPD Parent** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ N/A Ν If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ N/A Ν If No:

Result

**BTV** 

Sample

Laboratory Name:	TestAmerica Phoenix		
Sample Delivery Group:	113026-1 Date: 12/21/2018		
Validator's Name:	Caprielle Larsen	Reviewed by:	Marie Bevier

#### **Sample Summary:**

Field Sample Identification	Collection Date	Laboratory Identification	Note
FC-CCR-MW7-11418	11/4/2018	550-113026-1	MS/MSD
FC-CCR-MW8-11418	11/4/2018	550-113026-2	
FC-CCR-MW61-11318	11/3/2018	550-113026-3	
FC-CCR-MW75-11318	11/3/2018	550-113026-4	MS/MSD
FC-CCR-MW49A-11418	11/4/2018	550-113026-5	

#### **Analytical Methods:**

Analyte	Analyte Gorup	EPA Method / Standard Method (SM)
Boron, Calcium	Metals (ICP)	200.7 REV 4.4
Chloride, Fluoride, Sulfate	Anions, Ion Chromotography	300.0
Total Dissolved Solids	General Chemisty Parameters	2540 C
рН	General Chemisty Parameters	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.

**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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



Method Reference: Metals by EPA Methods 200.7 Rev 4.4 (ICP) QC Criteria: Samples analyzed within 180 days of sampling? N/A Ν Target analytes detected in the blank? Υ Ν N/A If Yes: Samples with analyte concentrations less than 5 times the blank Concentration detection **Detected Analyte** LCS Recoveries within laboratory-specified limits? Ν N/A Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? N/A Ν If Yes: FC-CCR-MW7-11418 FC-CCR-MW75-11318 Are recoveries within laboratory-specified limits? Υ Ν N/A If No: Sample Analyte Recovery/Bias Effect FC-CCR-MW7-11418 Boron 61% MSD None: 4x spike < native sample detection 40% MSD None: 4x spike < native sample detection FC-CCR-MW7-11418 Calcium None: 4x spike < native sample detection FC-CCR-MW75-11318 Boron -578%, -623% FC-CCR-MW75-11318 Calcium None: 4x spike < native sample detection -172%, -115% Υ N/A Field duplicate(s) collected? N If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less N/A Ν than RL? If No: Flag-Reason Code Parent Sample Analyte **RPD Parent Duplicate** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ N/A Ν If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ N/A Ν If No: **BTV** Sample Analyte Result

**Method Reference:** Anions by EPA Method 300.0 QC Criteria: Samples analyzed within 28 days of sampling? N/A Ν Target analytes detected in the blank? Υ Ν N/A If Yes: Samples with analyte concentrations less than 5 times Concentration the blank detection **Detected Analyte** LCS/LCSD recovery and precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? N/A Ν If Yes: FC-CCR-MW7-11418 FC-CCR-MW75-11318 MS/MSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less N/A Ν than RL? If No: Flag-Reason Code Parent Sample **RPD Parent Duplicate** Analyte Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ Ν N/A If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? N/A Υ Ν If No:

Result

Sample

Analyte

BTV

Method Reference: Total Dissolved Solids by SM 2540C QC Criteria: Samples analyzed within 7 days of sampling? N/A Ν Target analytes detected in the blank? Υ Ν N/A If Yes: Samples with analyte concentrations less than 5 times the blank Concentration detection **Detected Analyte** LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Recovery/Bias Affected samples Analyte Lab duplicate performed on a project-specific sample? N/A Ν If Yes: FC-CCR-MW75-11318 Duplicate precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less N/A Ν than RL? If No: Flag-Reason Code Parent Sample Analyte **RPD** Parent **Duplicate** Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ Ν N/A If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ N/A If No:

Result

**BTV** 

Sample

Analyte

**Method Reference:** pH by SM 4500 H+ B QC Criteria: Samples analyzed within 15 minutes of sampling? N/A Samples were analyzed at the lab, at the time of receipt, and have been qualified J-HT. Target analytes detected in the blank? Υ Ν N/A If Yes: Samples with analyte concentrations less than 5 times the blank Concentration detection **Detected Analyte** LCS/LCSD recovery and precision within laboratory-specified limits? N/A Ν If No: Analyte Recovery/Bias Affected samples Lab duplicate performed on a project-specific sample? N/A If Yes: FC-CCR-MW75-11318 Duplicate precision within laboratory-specified limits? Ν N/A If No: Recovery/Bias Analyte Field duplicate(s) collected? N N/A If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less Υ N/A Ν than RL? If No: Flag-Reason Code **RPD Duplicate** Parent Sample Analyte **Parent** Υ Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? N/A Ν If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ N/A If No: Result BTV Sample Analyte

Laboratory Name:	TestAmerica Phoenix				
Sample Delivery Group:	J113026-2	Date:	12/21/2018		
Validator's Name:	Caprielle Larsen	Reviewed by:	Marie Bevier		

## **Sample Summary:**

Field Sample			
Identification	Collection Date	Laboratory Identification	Note
FC-CCR-MW7-11418	11/4/2018	550-113026-1	MS/MSD
FC-CCR-MW8-11418	11/4/2018	550-113026-2	
FC-CCR-MW61-11318	11/3/2018	550-113026-3	
FC-CCR-MW75-11318	11/3/2018	550-113026-4	MS/MSD
FC-CCR-MW49A-11418	11/4/2018	550-113026-5	

## **Analytical Methods:**

· · · · · · · · · · · · · · · · · · ·		
		EPA Method /
		Standard Method
Analyte	Analyte Gorup	(SM)
Arsenic, Barium, Cobarlt, Molybdenum, Selenium,	Metals (ICP-MS)	200.8 Low Level
Lithium	Metals (ICP)	200.7 Rev 4.4
Fluoride	Anions, Ion Chromotography	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.
- **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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



Metals by EPA Methods 200.7 Rev 4.4 (ICP), 200.8 (ICP-MS) **Method Reference:** QC Criteria: Samples analyzed within 180 days of sampling? N/A Ν Target analytes detected in the blank? Ν N/A If Yes: Samples with analyte concentrations less than 5 times the blank **Detected Analyte** Concentration detection 0.000556 None **Barium** N/A LCS Recoveries within laboratory-specified limits? Ν Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? N/A If Yes: FC-CCR-MW7-11418 FC-CCR-MW75-11318 Are recoveries within laboratory-specified limits? Υ Ν N/A If No: Sample Recovery/Bias Effect Analyte None: 4x spike < native sample detection FC-CCR-MW75-11318 Lithium 926%, 931% Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less N/A than RL? Ν If No: Flag-Reason Code Parent Sample **RPD Parent Duplicate** Analyte Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? Υ Ν N/A If No: Sample Analyte Result MCL

Result

Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels?

Analyte

**If No:** Sample

N/A

Υ

**BTV** 

**Method Reference:** Anions by EPA Method 300.0 QC Criteria: Samples analyzed within 28 days of sampling? N/A Ν Target analytes detected in the blank? N/A Samples with analyte concentrations less than 5 times If Yes: the blank detection **Detected Analyte** Concentration LCS/LCSD recovery and precision within laboratory-specified limits? Ν N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Ν N/A If Yes: FC-CCR-MW7-11418 FC-CCR-MW75-11318 MS/MSD recovery and precision within laboratory-specified limits? N/A If No: Analyte Recovery/Bias Field duplicate(s) collected? N N/A If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less N/A Υ If No: Flag-Reason Code RPD Duplicate Parent Sample Analyte **Parent** Υ N/A Ν Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample Analyte Result MCL Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ N/A If No:

Result

**BTV** 

Sample

Analyte

Laboratory Name:	TestAmerica Phoenix				
Sample Delivery Group:	J113026-3	Date:	12/21/2018		
Validator's Name:	Caprielle Larsen	Reviewed by:	Marie Bevier		

### **Sample Summary:**

Field Sample			
Identification	Collection Date	Laboratory Identification	Note
FC-CCR-MW7-11418	11/4/2018	550-113026-1	
FC-CCR-MW8-11418	11/4/2018	550-113026-2	
FC-CCR-MW61-11318	11/3/2018	550-113026-3	
FC-CCR-MW75-11318	11/3/2018	550-113026-4	MS/MSD
FC-CCR-MW49A-11418	11/4/2018	550-113026-5	

## **Analytical Methods:**

		EPA Method /
		Standard Method
Analyte	Analyte Gorup	(SM)
Radium 226, Radium 228, Total Radium	Radiochemistry	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.
- **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:**

Samples received at temperatures  $\leq$  6°C or within 8 hours of sampling? COC signed and complete? Sample login matches COC?



Radiochemical analyses by Gamma Ray HPGE **Method Reference:** QC Criteria: Samples analyzed within 180 days of sampling? Ν N/A Target analytes detected in the blank? Ν N/A If Yes: Samples with analyte concentrations less than 5 times the blank detection **Detected Analyte** Concentration N/A Barium carrier levels within laboratory specified limits? Υ Ν Yttrium carrier levels within laboratory specified limits? N/A Ν LCS Recoveries within laboratory-specified limits? Υ Ν N/A If No: Analyte Recovery/Bias Affected samples MS performed on a project-specific sample? Υ Ν N/A If Yes: Are recoveries within laboratory-specified limits? Υ N/A Ν If No: Effect Analyte Recovery/Bias Field duplicate(s) collected? N/A If Yes: Parent Sample Field Duplicate Is relative percent difference (%RPD) within SAP-specified 20% limit, or difference between values less N/A Υ than RL? If No: Flag-Reason Code **Duplicate** Parent Sample Analyte **RPD Parent** Ν N/A Are all RLs for ND samples sufficiently low to meet EPA primary drinking water MCLs? If No: Sample Result MCL Analyte N/A Are all RLs for ND samples sufficiently low to meet unit-specific background threshold levels? Υ If No:

Result

**BTV** 

Sample

Analyte



# **APPENDIX G**

WOOD TECHNICAL MEMORANDUM DOCUMENTING THE STATISTICAL ANALYSIS OF INITIAL DETECTION MONITORING APPENDIX III CONSTITUENT DATA

# **Technical Memorandum**

To: Michele Robertson, RG

Pamela Norris

From: Natalie Chrisman Lazarr, PE

Carla Landrum, PhD

Tel: (602) 733-6087 Project: 14-2016-2024

Fax: (602) 733-6100 Date: January 12, 2018 Revised: August 20, 2018

Subject: STATISTICAL ANALYSIS OF INITIAL DETECTION MONITORING

APPENDIX III CONSTITUENT DATA

Arizona Public Service Four Corners Power Plant – Fruitland, New Mexico

#### 1.0 INTRODUCTION

This Technical Memorandum (Memo) summarizes the methods and findings of a statistical analysis of Detection Monitoring Appendix III constituent data collected during eight initial rounds of sampling conducted by Arizona Public Service (APS) at the Four Corners Power Plant (FCPP). The methods and findings detailed herein were developed in accordance with Coal Combustion Residuals (CCR) groundwater monitoring requirements set forth in 40 Code of Federal Regulation Section 257.93 and the published Statistical Data Analysis Work Plan (SDAWP) for the site (Amec Foster Wheeler, 2017).

This Memo summarizes the subject analysis for CCR units where sampling was not precluded due to dry conditions (i.e., at the Dry Fly Ash Disposal Area). The CRR units evaluated herein are the Upper Retention Sump (URS), the Combined Waste Treatment Pond (CWTP) and Multiunit 1 (which consists of the Lined Ash Impoundment and the Lined Decant Water Pond).

# 2.0 DATA INPUTS

There are seven constituents of concern (COCs) listed in Appendix III for Detection Monitoring Assessment: boron, calcium, chloride, fluoride, pH, sulfate and total dissolved solids (TDS). Sampled data for each constituent were provided by APS in Excel format including analytical results, data qualifiers, well identifiers (IDs), and sampling dates. Field pH and laboratory pH data were included in the provided file; the former data were used for statistical analysis. Non-detect sample results were flagged for statistical analysis using the "U" qualifier in the APS-provided spreadsheet. Non-detect values were substituted using their respective reporting limit for ProUCL software upload. All samples flagged as duplicates were excluded from the analysis. For samples identified with the same sample date, well ID and constituent but were not flagged as duplicates, the maximum concentration value was retained for the analysis. The minimum requirement of eight samples collected from each monitoring well was met for each constituent.

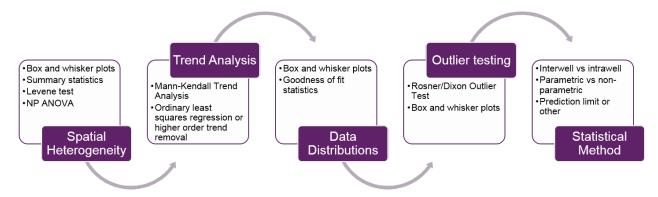
Amec Foster Wheeler Environment & Infrastructure, Inc. 4600 East Washington Street, Suite 600 Phoenix, AZ 85034-1917 (602) 733-6100 amecfw.com



The sampling dates for the data used in the analysis documented herein range between November 2015 and October 2017. The sampling frequency fluctuated over this duration from approximately semiannually to monthly or bimonthly.

## 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 prediction limit method with possible resampling to confirm if there is an SSI over background. Figure 2 (next page) generalizes the decision process for selecting an appropriate prediction limit method.

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.

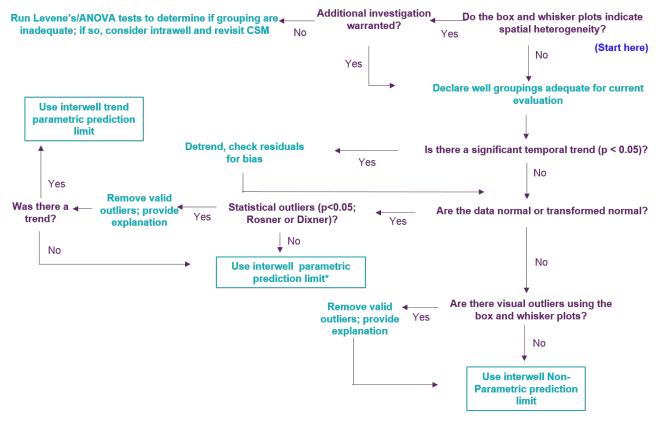


Figure 2. Generalized decision matrix for EDA and statistical prediction limit method selection. Matrix does not include resampling strategies. Any background constituent with a non-detect frequency 50%<ND<100% was automatically qualified for non-parametric prediction limit. Background constituents with 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 EDA RESULTS

The results of the Detection Monitoring Assessment EDA by CCR Unit follow. Reference to the FCPP conceptual site model (CSM) is necessary to support interpretation of results and is not within the scope of this analysis.

**URS** (*Pictured Cliffs Sandstone*). Appendix A includes box and whisker plots for the three background wells completed in the Pictured Cliffs Sandstone (MW-71, MW-72 and MW-73) for all seven COCs. The box and whisker plots provide evidence of spatial heterogeneity, meaning the wells are sampling unique statistical populations, for boron, sulfate, chloride and TDS. At this point in time, ongoing analysis is necessary to conclude if the observed spatial heterogeneity is

intrinsic to the Pictured Cliffs Sandstone groundwater system at the FCPP. For this data evaluation, the data from these three wells are assumed spatially representative of in situ spatial variability within in the Pictured Cliffs Sandstone groundwater system and are grouped to generate prediction limits for this lithologic unit.

Table 1 includes a ProUCL printout of summary statistics for the URS monitoring well network, consisting of sample observations from five distinct downgradient wells (MW-66, MW-67, MW-68, MW-69 and MW-70) and sample observations from three grouped background monitoring wells (MW-71, MW-72 and MW-73). Statistical parameters of interest include mean, variance, non-detect frequency and sample number.

Appendix B includes graphical results from Mann-Kendall trend analysis tests for the grouped background monitoring wells. No statistically significant trends (p<0.05) were detected except for pH and the trend is visibly trending downward over time. Considering no statistically significant trends are observed for the remaining COCs in the background dataset and the observed pH trend is generally weak, it is assumed the trend is due to temporal variations inherent to the groundwater system until proven otherwise. Multiple statistically significant trends were observed in the downgradient wells and are summarized in the informal Practitioner's Notes included as part of this Memo. Trend detection is sensitive to the sample number, detection and collection frequency. Trend behaviors and their significance can change as additional data are sampled over time.

Table 2 is a ProUCL printout of goodness-of-fit calculations for the grouped background dataset. Table 3 includes a ProUCL printout of the statistical outlier evaluation relevant to normally distributed background constituents; no significant (p <0.05) outliers are listed. Box and whisker plots (Appendix C) were used to assess for outliers in cases where the data distributions were not normal. Potential outliers are visible (as dots below or above the box and whisker diagrams) in the box and whisker plots for boron and these samples were collected from MW-73. Ongoing analysis is necessary to determine if these samples are representative of the spatial variability of boron concentrations within the Pictured Cliffs Sandstone. However, for this evaluation, the boron observations in MW-73 are considered adequate until proven otherwise.

Based on the URS EDA results, a non-parametric prediction limit with resampling was calculated for boron, sulfate and TDS. Parametric prediction limits with resampling were calculated for calcium and chloride. A trend parametric prediction limit with resampling was calculated for pH (upper and lower prediction limit). Fluoride qualified for the Double Quantification Rule (DQR). The DQR states that a confirmed exceedance is declared if downgradient wells exhibit quantifiable measurements at or above the reporting limit in two consecutive samples and resample events (U.S. EPA, 2009, page 6-11).

Calculations for the Pictured Cliffs Sandstone prediction limits and associated k values are included in the attached Practitioner's Notes. Table 4 lists wells and constituents that are in initial exceedance of their respective prediction limit at the URS. Boron, chloride and fluoride exhibit concentrations orders of magnitude above their respective prediction limits and/or reporting limits (per the DQR). The results from this evaluation suggest there is enough evidence to declare an SSI over background for boron, chloride and fluoride concentrations at the URS without the need

for resampling. Calcium and pH exhibit initial exceedances and resampling is advocated for these constituents (although not necessary based on the SSI declaration for boron, chloride and fluoride). Sulfate and TDS did not exhibit exceedances.

**CWTP** (**Pictured Cliffs Sandstone**). Appendices A and B and Tables 2 and 3 include EDA findings for the grouped Pictured Cliffs Sandstone background wells (MW-71, MW-72 and MW-73) for all seven COCs.

Table 5 includes a ProUCL printout of summary statistics for the CWTP monitoring well network, consisting of sample observations from four distinct downgradient wells (MW-62, MW-63, MW-64 and MW-65) and sample observations from three grouped background monitoring wells (MW-71, MW-72 and MW-73). Statistical parameters of interest include mean, variance, non-detect frequency and sample number.

Appendix D includes box and whisker plots for the CWTP downgradient and grouped background sample data. Box and whisker plots for chloride, TDS and sulfate suggest spatial heterogeneity between downgradient and background wells for the CWTP. Ongoing analysis is necessary to determine if the background well designations are representative of groundwater conditions beneath the CWTP. However, for this evaluation, the background designations are assumed adequate until proven otherwise.

Calculations for the Pictured Cliff Sandstone prediction limits and associated k values are included in the attached Practitioner's Notes. Table 6 lists wells and constituents that are in initial exceedance of their respective prediction limit at the CWTP. Boron, calcium and pH exhibit initial exceedances and resampling is advocated for these constituents; resampling is explained in the Conclusion section of this Memo. Chloride, sulfate and TDS did not exhibit exceedances.

As discussed previously for the URS, the prediction limit method is not applicable for fluoride due to its 100% non-detection frequency in background wells (MW-71, MW-72 and MW-73). According to the U.S. EPA's Unified Guidance (2009), the DQR is applicable in this instance. The DQR states that if the background dataset exhibits 100% non-detectable concentrations, then two consecutive detectable concentrations (i.e., at or above the reporting limit) in the downgradient wells provides sufficient evidence to declare an exceedance. However, the downgradient CWTP wells may exhibit a high frequency of detectable concentrations because the laboratory reporting limits are generally lower for fluoride data collected from these wells relative to background wells. As depicted in Appendix D, the reporting limit for the background wells varied but the maximum value was 2.0 mg/L in almost 50% of occurrences. This implies that the true background sample concentration has the potential to fall between zero and 2 mg/L in a large portion of the background data set. The detectable concentrations in the downgradient CWTP wells range from 1.2 mg/L to 2.7 mg/L which is no more than (+/-) 1 mg/L around the maximum background reporting limit (but still well below the Maximum Contaminant Level for fluoride [4 mg/L]). This suggests that the laboratory performance parameters may produce bias in declaring an SSI over background per the DQR. These findings suggest there is reasonable uncertainty in the sample data that prevent any definitive declaration of an exceedance in fluoride concentrations at the CWTP solely based on the frequency of detectable concentrations at this time. Recommendations

are made in Section 6.0 that establish proposed criteria that allow for a definitive declaration using the DQR method.

Multiunit 1 (Weathered Lewis Shale/Alluvium). Appendix E includes box and whisker plots for the three background wells completed in the Lewis Shale/Alluvium (MW-49a and MW-74) for all seven COCs. The box and whisker plots suggest spatial heterogeneity for several constituents, particularly TDS and sulfate. At this point in time, ongoing analysis is necessary to conclude if the observed spatial heterogeneity is intrinsic to the Weathered Lewis Shale/Alluvium groundwater system at the FCPP. However, for this data evaluation, the data from these two wells are assumed spatially representative of in situ spatial variability within in the Weathered Lewis Shale/Alluvium groundwater system and are grouped to generate prediction limits for this lithologic unit.

Table 7 includes a ProUCL printout of summary statistics for the Multiunit 1 monitoring well network, consisting of sample observations from four distinct downgradient wells (MW-7, MW-8, MW-61, and MW-75) and sample observations from the two grouped background monitoring wells (MW-49a and MW-74). Statistical parameters of interest include mean, variance, non-detect frequency and sample number.

Appendix F includes graphical results from Mann-Kendall trend analysis tests for the grouped background monitoring wells. No statistically significant trends (p<0.05) were detected except for fluoride. Fluoride exhibits a 56% non-detect frequency which is attributed to data collected from MW-49A. The statistically significant trend is believed to be an artifact of the non-detect frequency and not representative of the intrinsic temporal variability in the Weathered Lewis Shale/Alluvium groundwater system. On this basis, the trend is dismissed for this statistical evaluation. Multiple statistically significant trends were observed in the downgradient well data and are summarized in the attached Practitioner's Notes. Trend detection is sensitive to the sample number, detection and collection frequency. Trend behaviors and their significance can change as additional data are sampled over time.

Table 8 is a ProUCL printout of goodness-of-fit calculations for the grouped background dataset. Table 9 includes a ProUCL printout of the statistical outlier evaluation relevant to normally distributed background constituents; significant (p <0.05) outliers are listed for boron, chloride and pH and were not included in the analysis (also listed in the Practitioner's Notes). Box and whisker plots (Appendix G) were used to assess outliers in cases where the data distributions were not normal. Potential outliers are visible (as dots below or above the box and whisker diagrams) in the box and whisker plots for fluoride. For this evaluation, the potential outliers for fluoride were not excluded because these values were within range of the maximum non-detect value. The box and whisker plots in Appendix G suggest spatial heterogeneity exists between downgradient and background well designations for this CCR unit, particularly for TDS and sulfate. Ongoing analysis is necessary to determine if the background well designations are representative of groundwater conditions beneath Multiunit 1. However, for this evaluation, the background designations are assumed adequate until proven otherwise.

For the Weathered Lewis Shale/Alluvium, a non-parametric prediction limit with resampling was calculated for fluoride and sulfate. Parametric prediction limits with resampling were calculated for boron, calcium, pH, TDS and chloride. Calculations for the Weathered Lewis Shale/Alluvium

prediction limits and associated k values are included in the attached Practitioner's Notes. Table 10 lists wells and constituents that are in initial exceedance of their respective prediction limit at Multiunit 1. The results from this evaluation suggest there is enough evidence to declare an SSI over background for boron without the need for resampling. Calcium, chloride and fluoride exhibit initial exceedances and resampling is advocated for these constituents (although not necessary based on the SSI declaration for boron). Sulfate, TDS and pH did not exhibit exceedances. Notably, the initial exceedance for fluoride is attributed to the detection limit for the laboratory analysis and is not reflective of in situ variability of groundwater conditions.

## 5.0 UPDATES TO BACKGROUND

Results from this evaluation indicate a strong statistical dependence between sample observations. This means the sampling program is collecting redundant information over very short periods of time. Statistical dependence violates the sample independence assumption of the statistical methods listed in the 40 Code of Federal Regulation Section 257.93. A lower frequency sampling program is advised (quarterly or semi-annually) to reduce sample dependence in both background and downgradient sample data.

Ongoing analysis is necessary to better understand and explain in situ spatial and temporal variations in groundwater constituent concentrations at the FCPP. The results from this evaluation suggest spatial heterogeneity exists between background wells within their respective lithologies, in addition to upgradient and downgradient wells within their respective lithologies. Results from this work need CSM integration to help explain suspected spatial heterogeneity as it might relate to site geochemistry, hydrogeology, and management operations. Additional data evaluations are likely necessary to support ongoing decision making and complete any apparent CSM information gaps. The background well groupings and designations are valid if they sample groundwater representative of the spatial and temporal variation inherent to unimpacted groundwater beneath the respective CCR units.

Statistical method selection and background threshold values should be updated after adjustments are made to the monitoring program's sampling frequency. Background threshold values and statistical method selection should be updated if, after further investigation, background well groupings and designations prove inadequate.

# 6.0 CONCLUSIONS

This Memo summarizes methods, findings and recommendations of statistical analysis for Detection Monitoring Appendix III constituent data collected from the eight initial rounds of monitoring. The results from this evaluation suggest:

- There is enough evidence to declare an SSI over background for one or more Appendix III constituents at the URS CCR Unit.
- Boron, calcium and pH data exhibit initial exceedances at the CWTP CCR unit and resampling is advocated for these constituents. A 1 of 2 resampling strategy is in place for calcium and pH for this unit. A 1 of 2 resampling strategy means that one more statistically independent samples should be collected following the declaration of an initial

exceedance. 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 boron for the CWTP CCR unit. Boron requires 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 same general resampling criteria apply except a third statistically independent sample must be collected and all three samples, the initial exceedance, second sample and third sample, must be in exceedance to declare an SSI for boron at the CWTP CCR unit. If the second sample is not in exceedance, then the third sample is not necessary and Detection Monitoring should continue.

• Background fluoride concentrations are the basis for use of the DQR statistical method for assessment of this constituent in the CWTP CCR unit. However, due to variability in the magnitude of the reporting limit for associated data, the laboratory analysis introduces uncertainty in determining if there is an SSI over background in downgradient well fluoride concentrations using the DQR. To decrease the risk of falsely declaring an exceedance at the CWTP CCR unit for fluoride using the DQR statistical method, every effort should be made to maintain a single reporting limit for the groundwater monitoring network throughout the duration of the groundwater monitoring program (background and downgradient wells). Based on a review of collected data, it is recommended that the target reporting limit should be 0.8 mg/L for fluoride at the CWTP CCR unit. The target reporting limit is less than the detectable downgradient fluoride concentrations and analytically achievable in the background well data set based on previous results.

Maintenance of the target reporting limit for fluoride will be enforced starting in 2018. An SSI over background will be declared if two consecutive detectable concentrations are present at or above the target reporting limit of 0.8 mg/L in downgradient wells. If an SSI is not declared, then the detection monitoring program will continue in accordance with the CCR Rule. The DQR will no longer apply if detectable fluoride concentrations become apparent in the background wells.

 There is enough evidence to declare an SSI over background for one or more Appendix III constituents at the Multiunit 1 CCR Unit.

Statistical method selection and background threshold values should be updated after adjustments are made to the monitoring program's sampling frequency. Background threshold values and statistical method selection should be updated if, after further investigation, background well groupings and designations prove inadequate.

## 7.0 REFERENCES

- Amec Foster Wheeler (AMECFW), Environment and Infrastructure, Inc., 2017. Statistical Data Analysis Work Plan. Coal Combustion Residual Rule Groundwater Monitoring System Compliance. Four Corners Power Plant, Fruitland, New Mexico.
- U.S. 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.

# **ERRATA**

An omission to the Technical Memo dated January 12, 2018 which documented the methods and results of a Detection Monitoring statistical evaluation of Appendix III constituents was discovered on August 13, 2018. The omission was corrected by the following updates made on August 16, 2018:

- Updates to Section 2.0 include clarification regarding the sampling period and frequency. Updates also include data formatting clarification for software upload.
- Updates to Section 4.0 include a discussion of fluoride laboratory reporting limits that
  produce reasonable uncertainty in using the DQR to assess if fluoride concentrations
  beneath the CWTP exhibit an SSI over background concentrations. This uncertainty, with
  respect to the DQR, is not specifically addressed in the US EPA's Unified Guidance (U.S.
  EPA, 2009) nor the CCR Federal Rule.
- Finally, Section 6.0 includes an update recommending that the laboratory analysis maintain a single fluoride reporting limit for samples collected in background and downgradient CWTP wells over time. This recommendation is to rectify aforesaid uncertainty surrounding the use of the U.S. EPA's recommended DQR statistical method for collected site data.

# ATTACHMENTS (ELECTRONIC FILES PROVIDED ON CD)

Appendix A – Box and Whisker Plots for Background Wells in Pictured Cliffs Sandstone

Appendix B – Mann-Kendall Trend Tests for Background Wells in Pictured Cliffs Sandstone

Appendix C – Box and Whisker Plots for URS Wells in Pictured Cliffs Sandstone

Appendix D – Box and Whisker Plots for CWTP Wells in Pictured Cliffs Sandstone

Appendix E – Box and Whisker Plots for Background Wells in Lewis Shale/Alluvium

Appendix F – Mann-Kendall Trend Tests for Background Wells in Lewis Shale/Alluvium

Appendix G – Box and Whisker Plots for Multiunit 1 Wells in Lewis Shale/Alluvium

Practitioner's Notes (2 Excel Spreadsheets)



# **TABLES**

# TABLE 1 PRO UCL OUTPUT FOR GENERAL STATISTICS - URS IN PICTURED CLIFFS SANDSTONE

General Statistics on Uncensored Data

Date/Time of Computation ProUCL 5.11/4/2018 7:59:27 PM

**User Selected Options** 

From File AllWells\_URS\_Bckgrd\_PctClfSand\_12092016.xls

Full Precision OFF

From File: AllWells\_URS\_Bckgrd\_PctClfSand\_12092016.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
Boron (mw-66)	16	0	16	0	0.00%	N/A	N/A	125.2	494.4	22.24	0.178
Boron (mw-67)	16	0	16	0	0.00%	N/A	N/A	124.4	744.4	27.28	0.219
Boron (mw-68)	16	0	16	0	0.00%	N/A	N/A	120.8	141.2	11.88	0.0984
Boron (mw-69)	16	0	16	0	0.00%	N/A	N/A	123.1	423.4	20.58	0.167
Boron (mw-70)	16	0	16	0	0.00%	N/A	N/A	94.06	11	3.316	0.0353
Boron (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	0.712	0.349	0.591	0.83
Calcium (mw-66)	16	0	16	0	0.00%	N/A	N/A	468.8	425	20.62	0.044
Calcium (mw-67)	16	0	16	0	0.00%	N/A	N/A	490	2320	48.17	0.0983
Calcium (mw-68)	16	0	16	0	0.00%	N/A	N/A	465.6	466.3	21.59	0.0464
Calcium (mw-69)	16	0	16	0	0.00%	N/A	N/A	474.4	612.9	24.76	0.0522
Calcium (mw-70)	16	0	16	0	0.00%	N/A	N/A	498.8	585	24.19	0.0485
Calcium (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	465	1235	35.15	0.0756
Chloride (mw-66)	16	0	16	0	0.00%	N/A	N/A	1567	87690	296.1	0.189
Chloride (mw-67)	16	0	16	0	0.00%	N/A	N/A	1743	123623	351.6	0.202
Chloride (mw-68)	16	0	16	0	0.00%	N/A	N/A	1456	19958	141.3	0.097
Chloride (mw-69)	16	0	16	0	0.00%	N/A	N/A	1425	26000	161.2	0.113
Chloride (mw-70)	16	0	16	0	0.00%	N/A	N/A	1125	8667	93.09	0.0828
Chloride (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	508.6	8974	94.73	0.186
Fluoride (mw-66)	16	0	16	0	0.00%	N/A	N/A	21.81	18.16	4.262	0.195
Fluoride (mw-67)	16	0	16	0	0.00%	N/A	N/A	21.25	7.267	2.696	0.127
Fluoride (mw-68)	16	0	16	0	0.00%	N/A	N/A	9.131	2.261	1.504	0.165
Fluoride (mw-69)	16	0	16	0	0.00%	N/A	N/A	15.3	11.31	3.363	0.22
Fluoride (mw-70)	16	0	14	2	12.50%	0.4	0.4	1.812	0.917	0.958	0.529
Fluoride (mw71_72_73)	41	1	0	41	100.00%	0.05	2	N/A	N/A	N/A	N/A
Sulfate (mw-66)	16	0	16	0	0.00%	N/A	N/A	10031	4539625	2131	0.212
Sulfate (mw-67)	16	0	16	0	0.00%	N/A	N/A	9963	5873167	2423	0.243
Sulfate (mw-68)	16	0	16	0	0.00%	N/A	N/A	9506	1275292	1129	0.119
Sulfate (mw-69)	16	0	16	0	0.00%	N/A	N/A	10394	4615292	2148	0.207
Sulfate (mw-70)	16	0	16	0	0.00%	N/A	N/A	6869	2167625	1472	0.214
Sulfate (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	9045	7974518	2824	0.312
TDS (mw-66)	16	0	16	0	0.00%	N/A	N/A	16250	7133333	2671	0.164
TDS (mw-67)	16	0	16	0	0.00%	N/A	N/A	17125	11183333	3344	0.195
TDS (mw-68)	16	0	16	0	0.00%	N/A	N/A	16125	2250000	1500	0.093
TDS (mw-69)	16	0	16	0	0.00%	N/A	N/A	16750	7266667	2696	0.161
TDS (mw-70)	16	0	16	0	0.00%	N/A	N/A	11563	262500	512.3	0.0443
TDS (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	14529	11719164	3423	0.236
pH (mw-66)	16	0	16	0	0.00%	N/A	N/A	7.196	0.11	0.332	0.0461
pH (mw-67)	16	0	16	0	0.00%	N/A	N/A	6.856	0.0427	0.207	0.0302
pH (mw-68)	16	0	16	0	0.00%	N/A	N/A	6.731	0.141	0.375	0.0557
pH (mw-69)	16	0	16	0	0.00%	N/A	N/A	7.209	0.0552	0.235	0.0326
pH (mw-70)	16	0	16	0	0.00%	N/A	N/A	6.779	0.14	0.374	0.0552
pH (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	6.732	0.0822	0.287	0.0426

TABLE 1 PRO UCL OUTPUT FOR GENERAL STATISTICS - URS IN PICTURED CLIFFS SANDSTONE

	General Statistics for Raw Data Sets using Detected Data Only										
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Boron (mw-66)	16	0	86	150	125.2	130	494.4	22.24	14.83	-0.911	0.178
Boron (mw-67)	16	0	75	160	124.4	125	744.4	27.28	37.06	-0.253	0.219
Boron (mw-68)	16	0	93	140	120.8	120	141.2	11.88	14.83	-0.947	0.0984
Boron (mw-69)	16	0	80	150	123.1	125	423.4	20.58	14.83	-0.56	0.167
Boron (mw-70)	16	0	89	100	94.06	94	11	3.316	4.448	0.276	0.0353
Boron (mw71_72_73)	42	0	0.16	2	0.712	0.55	0.349	0.591	0.467	1.074	0.83
Calcium (mw-66)	16	0	440	510	468.8	470	425	20.62	14.83	0.713	0.044
Calcium (mw-67)	16	0	330	550	490	495	2320	48.17	22.24	-2.549	0.0983
Calcium (mw-68)	16	0	430	510	465.6	460	466.3	21.59	14.83	0.879	0.0464
Calcium (mw-69)	16	0	430	530	474.4	470	612.9	24.76	14.83	0.808	0.0522
Calcium (mw-70)	16	0	450	550	498.8	495	585	24.19	22.24	0.425	0.0485
Calcium (mw71_72_73)	42	0	400	570	465	460	1235	35.15	29.65	0.605	0.0756
Chloride (mw-66)	16	0	870	2000	1567	1700	87690	296.1	148.3	-1.243	0.189
Chloride (mw-67)	16	0	990	2300	1743	1750	123623	351.6	370.6	-0.405	0.202
Chloride (mw-68)	16	0	1200	1800	1456	1450	19958	141.3	74.13	0.585	0.097
Chloride (mw-69)	16	0	1000	1600	1425	1400	26000	161.2	148.3	-1.227	0.113
Chloride (mw-70)	16	0	1000	1400	1125	1100	8667	93.09	0	1.7	0.0828
Chloride (mw71_72_73)	42	0	290	750	508.6	505	8974	94.73	88.95	-0.025	0.186
Fluoride (mw-66)	16	0	12	26	21.81	24	18.16	4.262	2.965	-0.85	0.195
Fluoride (mw-67)	16	0	16	25	21.25	22	7.267	2.696	1.483	-0.887	0.127
Fluoride (mw-68)	16	0	6.4	11	9.131	9.65	2.261	1.504	1.779	-0.504	0.165
Fluoride (mw-69)	16	0	9	20	15.3	16	11.31	3.363	2.965	-0.52	0.22
Fluoride (mw-70)	14	0	0.66	3.2	2.014	2.2	0.779	0.882	0.964	-0.428	0.438
Fluoride (mw71_72_73)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sulfate (mw-66)	16	0	6500	13000	10031	11000	4539625	2131	1483	-0.437	0.212
Sulfate (mw-67)	16	0	6600	14000	9963	9900	5873167	2423	3113	0.106	0.243
Sulfate (mw-68)	16	0	7700	11000	9506	9900	1275292	1129	1186	-0.352	0.119
Sulfate (mw-69)	16	0	6600	13000	10394	11000	4615292	2148	2372	-0.445	0.207
Sulfate (mw-70)	16	0	5900	12000	6869	6450	2167625	1472	444.8	3.203	0.214
Sulfate (mw71_72_73)	42	0	610	14000	9045	9950	7974518	2824	1557	-0.913	0.312
TDS (mw-66)	16	0	11000	19000	16250	17000	7133333	2671	2965	-0.93	0.164
TDS (mw-67)	16	0	11000	22000	17125	17000	11183333	3344	3706	-0.33	0.195
TDS (mw-68)	16	0	12000	18000	16125	16000	2250000	1500	1483	-1.46	0.093
TDS (mw-69)	16	0	10000	20000	16750	18000	7266667	2696	1483	-1.307	0.161
TDS (mw-70)	16	0	11000	12000	11563	12000	262500	512.3	0	-0.279	0.101
TDS (mw71_72_73)	42	0	6100	21000	14529	15000	11719164	3423	2965	-0.279 -0.762	0.0443
pH (mw-66)	42 16		6.9	8.27	7.196	7.135	0.11	0.332	0.215	-0.762 2.474	0.230
	16	0	6.2	8.27 7.07	6.856	6.86	0.11	0.332	0.215	-2.474 -2.18	0.0461
pH (mw-67) pH (mw-68)	16	0	5.85		6.731	6.67	0.0427	0.207	0.126	-2.18 0.606	0.0302
, , , ,		0		7.75			0.141				
pH (mw-69)	16	0	6.52	7.63	7.209	7.235		0.235	0.163	-1.379	0.0326
pH (mw-70)	16	0	6.47	7.88	6.779	6.665	0.14	0.374	0.208	2.114	0.0552
pH (mw71_72_73)	42	0	6.17	7.73	6.732	6.7	0.0822	0.287	0.17	1.69	0.0426

TABLE 1
PRO UCL OUTPUT FOR GENERAL STATISTICS - URS IN PICTURED CLIFFS SANDSTONE

	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
Boron (mw-66)	16	0	88	100	115	130	140	140	145.5	150	150
Boron (mw-67)	16	0	88	100	107.5	125	150	150	160	160	160
Boron (mw-68)	16	0	105	120	120	120	130	130	130	132.5	138.5
Boron (mw-69)	16	0	94.5	110	117.5	125	132.5	140	150	150	150
Boron (mw-70)	16	0	90.5	91	91	94	96.25	97	98.5	99.25	99.85
Boron (mw71_72_73)	42	0	0.22	0.23	0.233	0.55	0.698	1.6	1.69	1.795	1.959
Calcium (mw-66)	16	0	445	450	457.5	470	480	480	495	510	510
Calcium (mw-67)	16	0	470	480	487.5	495	510	510	530	542.5	548.5
Calcium (mw-68)	16	0	450	450	450	460	472.5	480	495	510	510
Calcium (mw-69)	16	0	455	460	460	470	482.5	490	505	522.5	528.5
Calcium (mw-70)	16	0	480	480	487.5	495	510	510	530	542.5	548.5
Calcium (mw71_72_73)	42	0	421	442	450	460	480	490	509	519.5	557.7
Chloride (mw-66)	16	0	1150	1400	1475	1700	1700	1700	1800	1850	1970
Chloride (mw-67)	16	0	1350	1500	1500	1750	2000	2000	2150	2225	2285
Chloride (mw-68)	16	0	1300	1400	1400	1450	1500	1500	1600	1650	1770
Chloride (mw-69)	16	0	1250	1400	1400	1400	1525	1600	1600	1600	1600
Chloride (mw-70)	16	0	1050	1100	1100	1100	1125	1200	1200	1250	1370
Chloride (mw71_72_73)	42	0	430	450	450	505	570	578	608	658	717.2
Fluoride (mw-66)	16	0	17.5	18	18	24	25	25	26	26	26
Fluoride (mw-67)	16	0	17	19	20.5	22	23	23	24	24.25	24.85
Fluoride (mw-68)	16	0	6.9	8	8.225	9.65	10	10	11	11	11
Fluoride (mw-69)	16	0	10.4	13	13	16	17.25	18	19	20	20
Fluoride (mw-70)	16	0	0.53	0.69	0.878	2.1	2.6	2.6	2.95	3.05	3.17
Fluoride (mw71_72_73)	41	1	0.4	0.4	0.4	0.8	2	2	2	2	2
Sulfate (mw-66)	16	0	7150	7600	7900	11000	12000	12000	12000	12250	12850
Sulfate (mw-67)	16	0	6950	7500	7800	9900	12000	12000	13000	13250	13850
Sulfate (mw-68)	16	0	7950	8100	8400	9900	10000	10000	11000	11000	11000
Sulfate (mw-69)	16	0	7350	8500	8650	11000	12000	12000	13000	13000	13000
Sulfate (mw-70)	16	0	6000	6200	6200	6450	6800	6800	7600	9150	11430
Sulfate (mw71_72_73)	42	0	4680	6740	7625	9950	11000	11000	11000	12950	13590
TDS (mw-66)	16	0	12000	15000	15000	17000	18250	19000	19000	19000	19000
TDS (mw-67)	16	0	12500	15000	15750	17000	20250	21000	21000	21250	21850
TDS (mw-68)	16	0	14500	16000	16000	16000	17000	17000	17500	18000	18000
TDS (mw-69)	16	0	13000	16000	16000	18000	18250	19000	19000	19250	19850
TDS (mw-70)	16	0	11000	11000	11000	12000	12000	12000	12000	12000	12000
TDS (mw71_72_73)	42	0	9270	11200	12250	15000	17000	17000	17000	18900	20590
pH (mw-66)	16	0	6.935	6.98	6.995	7.135	7.278	7.3	7.43	7.7	8.156
pH (mw-67)	16	0	6.745	6.78	6.81	6.86	6.995	7.01	7.055	7.07	7.07
pH (mw-68)	16	0	6.575	6.6	6.6	6.67	6.833	6.84	6.975	7.27	7.654
pH (mw-69)	16	0	7.09	7.1	7.1	7.235	7.305	7.32	7.42	7.503	7.605
pH (mw-70)	16	0	6.5	6.54	6.548	6.665	6.84	6.87	7.19	7.505	7.805
pH (mw71_72_73)	42	0	6.473	6.582	6.613	6.7	6.83	6.856	6.927	7.038	7.722

#### Goodness-of-Fit Test Statistics for Data Sets with Non-Detects

#### **User Selected Options**

Date/Time of Computation ProUCL 5.112/21/2017 11:54:10 AM

From File BackgroundPctClfSand\_12092016\_a.xls

Full Precision OFF Confidence Coefficient 0.95

#### **Boron**

#### **Raw Statistics**

Number of Valid Observations 42 Number of Distinct Observations 23

> Minimum 0.16 Maximum 2

Mean of Raw Data 0.712

Standard Deviation of Raw Data 0.591

Khat 1.733

Theta hat 0.411

Kstar 1.625

Theta star 0.438
Mean of Log Transformed Data -0.656

Standard Deviation of Log Transformed Data 0.795

### Normal GOF Test Results

Correlation Coefficient R 0.88

Shapiro Wilk Test Statistic 0.722

Shapiro Wilk Critical (0.05) Value 0.942

Approximate Shapiro Wilk P Value 1.5124E-8

Lilliefors Test Statistic 0.276

Lilliefors Critical (0.05) Value 0.135

# Data not Normal at (0.05) Significance Level

### Gamma GOF Test Results

Correlation Coefficient R 0.931

A-D Test Statistic 2.518

A-D Critical (0.05) Value 0.763 K-S Test Statistic 0.187

K-S Critical(0.05) Value 0.139

Data not Gamma Distributed at (0.05) Significance Level

### **Lognormal GOF Test Results**

Correlation Coefficient R 0.943

Shapiro Wilk Test Statistic 0.819

Shapiro Wilk Critical (0.05) Value 0.942

Approximate Shapiro Wilk P Value 6.7102E-5

Lilliefors Test Statistic 0.189

Lilliefors Critical (0.05) Value 0.135

## 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 **Raw Statistics** Number of Valid Observations 42 Number of Distinct Observations 15 Minimum 400 Maximum 570 Mean of Raw Data 465 Standard Deviation of Raw Data 35.15 Khat 183 Theta hat 2.541 Kstar 169.9 Theta star 2.736 Mean of Log Transformed Data 6.139 Standard Deviation of Log Transformed Data 0.0746 Normal GOF Test Results Correlation Coefficient R 0.979 Shapiro Wilk Test Statistic 0.928 Shapiro Wilk Critical (0.05) Value 0.942 Approximate Shapiro Wilk P Value 0.26 Lilliefors Test Statistic 0.12 Lilliefors Critical (0.05) Value 0.135 Data appear Approximate Normal at (0.05) Significance Level **Gamma GOF Test Results** Correlation Coefficient R 0.984 A-D Test Statistic 0.474 A-D Critical (0.05) Value 0.747 K-S Test Statistic 0.124 K-S Critical(0.05) Value 0.136 Data appear Gamma Distributed at (0.05) Significance Level **Lognormal GOF Test Results** Correlation Coefficient R 0.985 Shapiro Wilk Test Statistic 0.937 Shapiro Wilk Critical (0.05) Value 0.942 Approximate Shapiro Wilk P Value 0.513 Lilliefors Test Statistic 0.129 Lilliefors Critical (0.05) Value 0.135 Data appear Approximate\_Lognormal at (0.05) Significance Level

#### Chloride **Raw Statistics Number of Valid Observations** 42 Number of Distinct Observations 24 Minimum 290 Maximum 750 Mean of Raw Data 508.6 Standard Deviation of Raw Data 94.73 Khat 27.95 18.19 Theta hat Kstar 25.97 Theta star 19.58 Mean of Log Transformed Data 6.214 Standard Deviation of Log Transformed Data 0.196 Normal GOF Test Results Correlation Coefficient R 0.98 Shapiro Wilk Test Statistic 0.918 Shapiro Wilk Critical (0.05) Value 0.942 Approximate Shapiro Wilk P Value 0.305 Lilliefors Test Statistic 0.125 Lilliefors Critical (0.05) Value 0.135 Data appear Approximate Normal at (0.05) Significance Level Gamma GOF Test Results Correlation Coefficient R 0.978 A-D Test Statistic 0.86 A-D Critical (0.05) Value 0.747 K-S Test Statistic 0.118 K-S Critical(0.05) Value 0.136 Data follow Appr. Gamma Distribution at (0.05) Significance Level **Lognormal GOF Test Results** Correlation Coefficient R 0.967 Shapiro Wilk Test Statistic 0.897 Shapiro Wilk Critical (0.05) Value 0.942 Approximate Shapiro Wilk P Value 0.0413 Lilliefors Test Statistic 0.131

Fluoride

Num Obs Num Miss Num Valid Detects NDs % NDs Raw Statistics 42 1 41 0 41 100.00%

0.135

Lilliefors Critical (0.05) Value

Data appear Approximate\_Lognormal at (0.05) Significance Level

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 Fluoride was not processed!

# Sulfate

#### **Raw Statistics**

Number of Valid Observations 42 Number of Distinct Observations 25

Minimum 610

Maximum 14000

Mean of Raw Data 9045

Standard Deviation of Raw Data 2824

Khat 5.973

Theta hat 1514

Kstar 5.563

Theta star 1626

Mean of Log Transformed Data 9.024

Standard Deviation of Log Transformed Data 0.521

#### Normal GOF Test Results

Correlation Coefficient R 0.958

Shapiro Wilk Test Statistic 0.883

Shapiro Wilk Critical (0.05) Value 0.942

Approximate Shapiro Wilk P Value 0.0071

Lilliefors Test Statistic 0.167

Lilliefors Critical (0.05) Value 0.135

Data not Normal at (0.05) Significance Level

# Gamma GOF Test Results

Correlation Coefficient R 0.902

A-D Test Statistic 2.603

A-D Critical (0.05) Value 0.751

K-S Test Statistic 0.203

K-S Critical(0.05) Value 0.137

Data not Gamma Distributed at (0.05) Significance Level

### Lognormal GOF Test Results

Correlation Coefficient R 0.803

Shapiro Wilk Test Statistic 0.659

Shapiro Wilk Critical (0.05) Value 0.942

Approximate Shapiro Wilk P Value 7.980E-11

Lilliefors Test Statistic 0.213

Lilliefors Critical (0.05) Value 0.135

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

#### **Raw Statistics**

Number of Valid Observations 42 Number of Distinct Observations 16

Minimum 6100

Maximum 21000

Mean of Raw Data 14529

Standard Deviation of Raw Data 3423

Khat 15.05

Theta hat 965.3

Kstar 13.99

Theta star 1038

Mean of Log Transformed Data 9.55

Standard Deviation of Log Transformed Data 0.279

#### Normal GOF Test Results

Correlation Coefficient R 0.957

Shapiro Wilk Test Statistic 0.876

Shapiro Wilk Critical (0.05) Value 0.942

Approximate Shapiro Wilk P Value 0.00345

Lilliefors Test Statistic 0.221

Lilliefors Critical (0.05) Value 0.135

## Data not Normal at (0.05) Significance Level

# Gamma GOF Test Results

Correlation Coefficient R 0.929

A-D Test Statistic 2.196

A-D Critical (0.05) Value 0.748

K-S Test Statistic 0.25

K-S Critical(0.05) Value 0.136

# Data not Gamma Distributed at (0.05) Significance Level

### **Lognormal GOF Test Results**

Correlation Coefficient R 0.919

Shapiro Wilk Test Statistic 0.816

Shapiro Wilk Critical (0.05) Value 0.942

Approximate Shapiro Wilk P Value 1.2137E-5

Lilliefors Test Statistic 0.26

Lilliefors Critical (0.05) Value 0.135

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	
F	
Raw Statistics	
Number of Valid Observations	42
Number of Distinct Observations	42
Minimum	-0.686
Maximum	0.745
Mean of Raw Data -	·1.810E-5
Standard Deviation of Raw Data	0.26
	Data contains values <= 0
	Data not gamma or lognormal
Normal GOF Test Results	
Correlation Coefficient R	0.949
Shapiro Wilk Test Statistic	0.897
Shapiro Wilk Critical (0.05) Value	0.942
Approximate Shapiro Wilk P Value	0.00611
Lilliefors Test Statistic	0.128
Lilliefors Critical (0.05) Value	0.135
Data appear Approximate Normal at (0.05) Significand	ce Level

### TABLE 3 PRO UCL OUTPUT FOR OUTLIER TEST RESULTS - PICTURED CLIFFS SANDSTONE DATA

## **Outlier Tests for Selected Uncensored Variables**

#### **User Selected Options**

Date/Time of Computation ProUCL 5.112/21/2017 12:19:53 PM

From File BackgroundPctClfSand\_12092016\_a.xls

OFF Full Precision

#### Rosner's Outlier Test for Calcium

465 Mean

Standard Deviation 35.15

Number of data 42

Number of suspected outliers

Potential Obs. Test Critical Critical outlier Number value /alue (5%) /alue (1%) Mean sd

465 34.73 570 19 3.024 3.06

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for Chloride

Mean 508.6

Standard Deviation 94.73

Number of data 42

Number of suspected outliers

Obs. Critical Critical Potential Test value /alue (5%) /alue (1%) Mean sd outlier Number 508.6 93.59 2.58 750 3 3.06 3.4

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

# Rosner's Outlier Test for pH

Mean -1.810E-5

Standard Deviation 0.26

Number of data 42

Number of suspected outliers

Obs. Critical Critical Potential Test value /alue (5%) /alue (1%) Mean sd outlier Number 1 -1.810E-5 0.257 2.898 3.06

2

3.4

0.745

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

# TABLE 3 PRO UCL OUTPUT FOR OUTLIER TEST RESULTS - PICTURED CLIFFS SANDSTONE DATA

#### Rosner's Outlier Test for TDS

Mean 14529
Standard Deviation 3423
Number of data 42
Number of suspected outliers 1

 Potential
 Obs.
 Test Critical Critical
 Critical Critical

 # Mean sd outlier Number value (5%) /alue (1%)

 1 14529 3382 6100 36 2.492 3.06 3.4

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for Sulfate

Mean 9045
Standard Deviation 2824
Number of data 42
Number of suspected outliers 1

 #
 Mean
 sd
 outlier
 Number
 value/alue (5%) /alue (1%)

 1
 9045
 2790
 610
 24
 3.023
 3.06
 3.4

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

TABLE 4
LIST OF INITIAL EXCEEDANCES FOR THE URS

Boron	Boron (upper prediction limit = 1.9 ppm)						
Well ID	Sample Date	Sample Value (ppm)					
MW-66	11/5/2015	87					
MW-66	4/27/2016	86					
MW-66	6/5/2016	89					
MW-66	8/20/2016	100					
MW-66	9/12/2016	120					
MW-66	10/19/2016	130					
MW-66	2/1/2017	130					
MW-66	4/16/2017	141					
MW-66	5/1/2017	140					
MW-66	5/29/2017	130					
MW-66	6/21/2017	130					
MW-66	7/21/2017	140					
MW-66	8/9/2017	140					
MW-66	8/16/2017	150					
MW-66	9/9/2017	140					
MW-66	10/13/2017	150					
MW-67	11/4/2015	75					
MW-67	4/27/2016	86					
MW-67	6/6/2016	90					
MW-67	8/20/2016	100					
MW-67	9/13/2016	110					
MW-67	10/20/2016	120					
MW-67	2/1/2017	120					
MW-67	4/17/2017	130					
MW-67	5/2/2017	130					
MW-67	5/29/2017	120					
MW-67	6/21/2017	130					
MW-67	7/21/2017	150					
MW-67	8/9/2017	160					
MW-67	8/16/2017	160					
MW-67	9/10/2017	150					
MW-67	10/13/2017	160					
MW-68	11/6/2015	93					
MW-68	4/26/2016	110					
MW-68	6/5/2016	100					
MW-68	8/20/2016	120					
MW-68	9/13/2016	120					
MW-68	10/20/2016	120					
MW-68	2/1/2017	120					
MW-68	4/17/2017	130					
MW-68	5/2/2017	130					
MW-68	5/29/2017	120					
MW-68	6/21/2017	120					
MW-68	7/21/2017	130					
MW-68	8/9/2017	120					
MW-68	8/16/2017	130					
MW-68	9/10/2017	130					
MW-68	10/13/2017	140					

Boro	Boron (upper prediction limit = 1.9 ppm)						
Well ID	Sample Date	Sample Value (ppm)					
MW-69	11/4/2015	80					
MW-69	4/26/2016	95					
MW-69	6/6/2016	94					
MW-69	8/20/2016	110					
MW-69	9/13/2016	120					
MW-69	10/20/2016	120					
MW-69	2/1/2017	130					
MW-69	4/17/2017	130					
MW-69	5/2/2017	130					
MW-69	5/29/2017	120					
MW-69	6/21/2017	120					
MW-69	7/21/2017	150					
MW-69	8/9/2017	140					
MW-69	8/16/2017	130					
MW-69	9/10/2017	150					
MW-69	10/13/2017	150					
MW-70	11/9/2015	95					
MW-70	4/27/2016	91					
MW-70	6/5/2016	89					
MW-70	8/20/2016	91					
MW-70	9/12/2016	96					
MW-70	10/19/2016	91					
MW-70	2/1/2017	90					
MW-70	4/16/2017	94					
MW-70	5/1/2017	95					
MW-70	5/29/2017	93					
MW-70	6/21/2017	92					
MW-70	7/21/2017	100					
MW-70	8/9/2017	98					
MW-70	8/16/2017	94					
MW-70	9/9/2017	99					
MW-70	10/13/2017	97					

TABLE 4
LIST OF INITIAL EXCEEDANCES FOR THE URS

Calcium (upper prediction limit = 540 ppm)								
Well ID	Sample Date	Sample Value (ppm)						
MW-70	MW-70 9/12/2016							

Chloric	Chloride (upper prediction limit = 710 ppm)									
Well ID	Sample Date	Sample Value (ppm)								
MW-69	6/21/2017	1400								
MW-69	7/21/2017	1600								
MW-69	8/9/2017	1600								
MW-69	8/16/2017	1500								
MW-69	9/10/2017	1600								
MW-69	10/13/2017	1600								
MW-70	11/9/2015	1200								
MW-70	4/27/2016	1000								
MW-70	6/5/2016	1200								
MW-70	8/20/2016	1100								
MW-70	9/12/2016	1100								
MW-70	10/19/2016	1100								
MW-70	2/1/2017	1100								
MW-70	4/16/2017	1100								
MW-70	5/1/2017	1400								
MW-70	5/29/2017	1100								
MW-70	6/21/2017	1000								
MW-70	7/21/2017	1100								
MW-70	8/9/2017	1100								
MW-70	8/16/2017	1100								
MW-70	9/9/2017	1100								
MW-70	10/13/2017	1200								

pH (time regression upper and lower prediction limit)									
Well ID	Well ID Sample Date Sample Value (ppm								
MW-66	8/20/2016	8.27							
MW-70	8/20/2016	7.88							
MW-68	9/13/2016	5.85							

Sulfate (upper prediction limit = 13,000 ppm)									
Well ID	Well ID Sample Date Sample Value (ppm)								

TDS (upper prediction limit = 20,000 ppm)									
Well ID	Sample Date	Sample Value (ppm)							

TABLE 4
LIST OF INITIAL EXCEEDANCES FOR THE URS

Fluoride (upper prediction limit = quantified measurements								
		nples [not resamples])						
Well ID	Sample Date	Sample Value (ppm)						
MW-66	11/5/2015	18						
MW-66	4/27/2016	18						
MW-66	6/5/2016	20						
MW-66	8/20/2016	20						
MW-66	9/12/2016	12						
MW-66	10/19/2016	17						
MW-66	2/1/2017	18						
MW-66	4/16/2017	25						
MW-66	5/1/2017	24						
MW-66	5/29/2017	25						
MW-66	6/21/2017	24						
MW-66	7/21/2017	25						
MW-66	8/9/2017	26						
MW-66	8/16/2017	25						
MW-66	9/9/2017	26						
MW-66	10/13/2017	26						
MW-67	11/4/2015	18						
MW-67	4/27/2016	19						
MW-67	6/6/2016	24						
MW-67	8/20/2016	23						
MW-67	9/13/2016	23						
MW-67	10/20/2016	16						
MW-67	2/1/2017	16						
MW-67	4/17/2017	22						
MW-67	5/2/2017	22						
MW-67	5/29/2017	21						
MW-67	6/21/2017	21						
MW-67	7/21/2017	22						
MW-67	8/9/2017	22						
MW-67	8/16/2017	22						
MW-67	9/10/2017	24						
MW-67	10/13/2017	25						
MW-68	11/6/2015	7						
MW-68	4/26/2016	8						
MW-68	6/5/2016	10						
MW-68	8/20/2016	8.6						
MW-68	9/13/2016	9.7						
MW-68	10/20/2016	6.8						
MW-68	2/1/2017	6.4						
MW-68	4/17/2017	10						
MW-68	5/2/2017	10						
MW-68	5/29/2017	8.3						
MW-68	6/21/2017	8.7						
MW-68	7/21/2017	9.6						
MW-68	8/9/2017	11						
MW-68	8/16/2017	11						
MW-68	9/10/2017	11						
MW-68	10/13/2017	10						

	Fluoride (upper prediction limit = quantified measurements [above RL] in two consecutive samples [not resamples])								
Well ID	Sample Date	Sample Value (ppm)							
MW-69	11/4/2015	9.8							
MW-69	4/26/2016	13							
MW-69	6/6/2016	13							
MW-69	8/20/2016	16							
MW-69	9/13/2016	16							
MW-69	10/20/2016	9							
MW-69	2/1/2017	11							
MW-69	4/17/2017	17							
MW-69	5/2/2017	18							
MW-69	5/29/2017	16							
MW-69	6/21/2017	14							
MW-69	7/21/2017	18							
MW-69	8/9/2017	17							
MW-69	8/16/2017	17							
MW-69	9/10/2017	20							
MW-69	10/13/2017	20							
MW-70	11/9/2015	2.6							
MW-70	4/27/2016	2.3							
MW-70	6/5/2016	2.1							
MW-70	4/16/2017	0.94							
MW-70	5/1/2017	1.6							
MW-70	5/29/2017	2.6							
MW-70	6/21/2017	2.9							
MW-70	7/21/2017	2.1							
MW-70	8/9/2017	3							
MW-70	8/16/2017	3.2							
MW-70	9/9/2017	2.5							
MW-70	10/13/2017	1							

# TABLE 5 PRO UCL OUTPUT FOR GENERAL STATISTICS - CWTP IN PICTURED CLIFFS SANDSTONE

General Statistics on Uncensored Data

Date/Time of Computation

ProUCL 5.11/5/2018 9:13:57 AM

**User Selected Options** 

From File AllWells\_CWTP\_Bckgrd\_PctClfSand\_12092016.xls

Full Precision OFF

From File: AllWells\_CWTP\_Bckgrd\_PctClfSand\_12092016.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
Boron (mw-62)	16	0	16	0	0.00%	N/A	N/A	2.106	0.03	0.173	0.0822
Boron (mw-63)	15	0	15	0	0.00%	N/A	N/A	1.673	0.055	0.234	0.14
Boron (mw-64)	16	0	16	0	0.00%	N/A	N/A	0.607	0.00164	0.0405	0.0667
Boron (mw-65)	16	0	16	0	0.00%	N/A	N/A	0.804	0.00447	0.0668	0.0831
Boron (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	0.712	0.349	0.591	0.83
Calcium (mw-62)	16	0	16	0	0.00%	N/A	N/A	533.8	998.3	31.6	0.0592
Calcium (mw-63)	15	0	15	0	0.00%	N/A	N/A	517.3	1464	38.26	0.074
Calcium (mw-64)	16	0	16	0	0.00%	N/A	N/A	87.38	8.383	2.895	0.0331
Calcium (mw-65)	16	0	16	0	0.00%	N/A	N/A	110.8	302.3	17.39	0.157
Calcium (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	465	1235	35.15	0.0756
Chloride (mw-62)	16	0	16	0	0.00%	N/A	N/A	122.4	209.7	14.48	0.118
Chloride (mw-63)	15	0	15	0	0.00%	N/A	N/A	97.87	58.55	7.652	0.0782
Chloride (mw-64)	16	0	16	0	0.00%	N/A	N/A	50.75	7.133	2.671	0.0526
Chloride (mw-65)	16	0	16	0	0.00%	N/A	N/A	56.19	48.43	6.959	0.124
Chloride (mw71_72_73	42	0	42	0	0.00%	N/A	N/A	508.6	8974	94.73	0.186
Fluoride (mw-62)	16	0	16	0	0.00%	N/A	N/A	1.431	0.0196	0.14	0.0979
Fluoride (mw-63)	15	0	15	0	0.00%	N/A	N/A	1.92	0.0474	0.218	0.113
Fluoride (mw-64)	16	0	16	0	0.00%	N/A	N/A	1.447	0.00382	0.0618	0.0427
Fluoride (mw-65)	16	0	16	0	0.00%	N/A	N/A	1.9	0.0133	0.115	0.0608
Fluoride (mw71_72_73)	41	1	0	41	100.00%	0.05	2	N/A	N/A	N/A	N/A
Sulfate (mw-62)	16	0	16	0	0.00%	N/A	N/A	3381	26958	164.2	0.0486
Sulfate (mw-63)	15	0	15	0	0.00%	N/A	N/A	2707	26381	162.4	0.06
Sulfate (mw-64)	16	0	16	0	0.00%	N/A	N/A	383.1	17316	131.6	0.343
Sulfate (mw-65)	16	0	16	0	0.00%	N/A	N/A	497.5	10793	103.9	0.209
Sulfate (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	9045	7974518	2824	0.312
TDS (mw-62)	16	0	16	0	0.00%	N/A	N/A	5544	814625	902.6	0.163
TDS (mw-63)	15	0	15	0	0.00%	N/A	N/A	4413	29810	172.7	0.0391
TDS (mw-64)	16	0	16	0	0.00%	N/A	N/A	797.5	726.7	26.96	0.0338
TDS (mw-65)	16	0	16	0	0.00%	N/A	N/A	1096	26413	162.5	0.148
TDS (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	14529	11719164	3423	0.236
pH (mw-62)	16	0	16	0	0.00%	N/A	N/A	6.621	0.0581	0.241	0.0364
pH (mw-63)	15	0	15	0	0.00%	N/A	N/A	6.781	0.0178	0.133	0.0196
pH (mw-64)	16	0	16	0	0.00%	N/A	N/A	7.468	0.0146	0.121	0.0162
pH (mw-65)	16	0	16	0	0.00%	N/A	N/A	7.286	0.095	0.308	0.0423
pH (mw71_72_73)	42	0	42	0	0.00%	N/A	N/A	6.732	0.0822	0.287	0.0426

TABLE 5
PRO UCL OUTPUT FOR GENERAL STATISTICS - CWTP IN PICTURED CLIFFS SANDSTONE

	General Statistics for Raw Data Sets using Detected Data Only										
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Boron (mw-62)	16	0	1.9	2.5	2.106	2.1	0.03	0.173	0.148	0.596	0.0822
Boron (mw-63)	15	0	1.3	2	1.673	1.7	0.055	0.234	0.297	-0.129	0.14
Boron (mw-64)	16	0	0.55	0.67	0.607	0.61	0.00164	0.0405	0.0445	0.0525	0.0667
Boron (mw-65)	16	0	0.75	0.98	0.804	0.78	0.00447	0.0668	0.0371	1.638	0.0831
Boron (mw71_72_73)	42	0	0.16	2	0.712	0.55	0.349	0.591	0.467	1.074	0.83
Calcium (mw-62)	16	0	480	590	533.8	525	998.3	31.6	22.24	0.533	0.0592
Calcium (mw-63)	15	0	420	580	517.3	520	1464	38.26	29.65	-0.983	0.074
Calcium (mw-64)	16	0	82	93	87.38	87.5	8.383	2.895	2.965	-0.0889	0.0331
Calcium (mw-65)	16	0	92	160	110.8	110	302.3	17.39	14.83	1.841	0.157
Calcium (mw71_72_73)	42	0	400	570	465	460	1235	35.15	29.65	0.605	0.0756
Chloride (mw-62)	16	0	99	150	122.4	120	209.7	14.48	14.83	0.69	0.118
Chloride (mw-63)	15	0	77	110	97.87	98	58.55	7.652	2.965	-1.101	0.0782
Chloride (mw-64)	16	0	44	53	50.75	52	7.133	2.671	1.483	-1.542	0.0526
Chloride (mw-65)	16	0	51	77	56.19	53.5	48.43	6.959	2.224	2.306	0.124
Chloride (mw71_72_73	42	0	290	750	508.6	505	8974	94.73	88.95	-0.025	0.186
Fluoride (mw-62)	16	0	1.2	1.6	1.431	1.5	0.0196	0.14	0.148	-0.64	0.0979
Fluoride (mw-63)	15	0	1.5	2.4	1.92	1.9	0.0474	0.218	0.148	0.0402	0.113
Fluoride (mw-64)	16	0	1.3	1.5	1.447	1.475	0.00382	0.0618	0.0371	-0.834	0.0427
Fluoride (mw-65)	16	0	1.7	2	1.9	1.95	0.0133	0.115	0.0741	-0.594	0.0608
Fluoride (mw71_72_73)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sulfate (mw-62)	16	0	3200	3800	3381	3300	26958	164.2	74.13	1.374	0.0486
Sulfate (mw-63)	15	0	2300	2900	2707	2700	26381	162.4	148.3	-1.046	0.06
Sulfate (mw-64)	16	0	320	870	383.1	350	17316	131.6	29.65	3.821	0.343
Sulfate (mw-65)	16	0	400	790	497.5	465	10793	103.9	37.06	2.2	0.209
Sulfate (mw71_72_73)	42	0	610	14000	9045	9950	7974518	2824	1557	-0.913	0.312
TDS (mw-62)	16	0	2400	6700	5544	5650	814625	902.6	370.6	-3.019	0.163
TDS (mw-63)	15	0	4100	4700	4413	4400	29810	172.7	148.3	0.148	0.0391
TDS (mw-64)	16	0	770	890	797.5	790	726.7	26.96	14.83	2.94	0.0338
TDS (mw-65)	16	0	960	1500	1096	1000	26413	162.5	51.89	1.638	0.148
TDS (mw71_72_73)	42	0	6100	21000	14529	15000	11719164	3423	2965	-0.762	0.236
pH (mw-62)	16	0	6.36	7.4	6.621	6.6	0.0581	0.241	0.148	2.361	0.0364
pH (mw-63)	15	0	6.53	7.03	6.781	6.8	0.0178	0.133	0.119	-0.315	0.0196
pH (mw-64)	16	0	7.29	7.68	7.468	7.485	0.0146	0.121	0.126	0.0404	0.0162
pH (mw-65)	16	0	6.96	8.27	7.286	7.225	0.095	0.308	0.193	2.329	0.0423
pH (mw71_72_73)	42	0	6.17	7.73	6.732	6.7	0.0822	0.287	0.17	1.69	0.0426

TABLE 5
PRO UCL OUTPUT FOR GENERAL STATISTICS - CWTP IN PICTURED CLIFFS SANDSTONE

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
Boron (mw-62)	16	0	1.9	1.9	1.975	2.1	2.2	2.2	2.3	2.35	2.47
Boron (mw-63)	15	0	1.4	1.4	1.45	1.7	1.85	1.9	1.96	2	2
Boron (mw-64)	16	0	0.55	0.58	0.58	0.61	0.64	0.64	0.66	0.67	0.67
Boron (mw-65)	16	0	0.75	0.76	0.76	0.78	0.83	0.83	0.89	0.935	0.971
Boron (mw71_72_73)	42	0	0.22	0.23	0.233	0.55	0.698	1.6	1.69	1.795	1.959
Calcium (mw-62)	16	0	505	510	517.5	525	547.5	570	580	590	590
Calcium (mw-63)	15	0	482	500	500	520	535	542	556	566	577.2
Calcium (mw-64)	16	0	84	85	85.75	87.5	89.25	90	90	90.75	92.55
Calcium (mw-65)	16	0	95.5	100	100	110	110	110	130	145	157
Calcium (mw71_72_73)	42	0	421	442	450	460	480	490	509	519.5	557.7
Chloride (mw-62)	16	0	110	110	110	120	130	130	145	150	150
Chloride (mw-63)	15	0	92	96.6	97	98	100	100	106	110	110
Chloride (mw-64)	16	0	47	49	50.5	52	52.25	53	53	53	53
Chloride (mw-65)	16	0	52	52	52.75	53.5	55.75	58	64	70.25	75.65
Chloride (mw71_72_73	42	0	430	450	450	505	570	578	608	658	717.2
Fluoride (mw-62)	16	0	1.2	1.3	1.375	1.5	1.5	1.5	1.6	1.6	1.6
Fluoride (mw-63)	15	0	1.64	1.78	1.85	1.9	2	2.02	2.1	2.19	2.358
Fluoride (mw-64)	16	0	1.4	1.4	1.4	1.475	1.5	1.5	1.5	1.5	1.5
Fluoride (mw-65)	16	0	1.75	1.8	1.8	1.95	2	2	2	2	2
Fluoride (mw71_72_73)	41	1	0.4	0.4	0.4	0.8	2	2	2	2	2
Sulfate (mw-62)	16	0	3250	3300	3300	3300	3425	3500	3600	3650	3770
Sulfate (mw-63)	15	0	2540	2600	2650	2700	2800	2820	2900	2900	2900
Sulfate (mw-64)	16	0	325	330	337.5	350	372.5	380	385	510	798
Sulfate (mw-65)	16	0	425	450	450	465	500	500	605	730	778
Sulfate (mw71_72_73)	42	0	4680	6740	7625	9950	11000	11000	11000	12950	13590
TDS (mw-62)	16	0	5400	5400	5475	5650	5900	5900	6050	6250	6610
TDS (mw-63)	15	0	4240	4300	4300	4400	4500	4520	4660	4700	4700
TDS (mw-64)	16	0	780	780	787.5	790	800	800	810	830	878
TDS (mw-65)	16	0	985	1000	1000	1000	1100	1100	1350	1425	1485
TDS (mw71_72_73)	42	0	9270	11200	12250	15000	17000	17000	17000	18900	20590
pH (mw-62)	16	0	6.41	6.46	6.49	6.6	6.683	6.69	6.75	6.928	7.306
pH (mw-63)	15	0	6.604	6.686	6.695	6.8	6.865	6.872	6.904	6.953	7.015
pH (mw-64)	16	0	7.3	7.36	7.375	7.485	7.533	7.54	7.625	7.65	7.674
pH (mw-65)	16	0	7.05	7.08	7.095	7.225	7.353	7.36	7.51	7.708	8.158
pH (mw71_72_73)	42	0	6.473	6.582	6.613	6.7	6.83	6.856	6.927	7.038	7.722

TABLE 6
LIST OF INITIAL EXCEEDANCES FOR THE CWTP

Boror	Boron (upper prediction limit = 1.9 ppm)									
Well ID	Sample Date	Sample Value (ppm)								
MW-62	11/9/2015	2.1								
MW-62	4/27/2016	2								
MW-62	6/5/2016	2								
MW-62	8/20/2016	2.3								
MW-62	9/12/2016	2.5								
MW-62	10/19/2016	2.2								
MW-62	2/1/2017	2.1								
MW-62	7/21/2017	2.1								
MW-62	8/9/2017	2.2								
MW-62	8/16/2017	2.1								
MW-62	9/9/2017	2.3								
MW-62	10/13/2017	2.2								
MW-63	9/12/2016	2								
MW-63	9/9/2017	2								

TDS (u	TDS (upper prediction limit = 20,000 ppm)								
Well ID	Sample Date	Sample Value (ppm)							

Calciun	Calcium (upper prediction limit = 540 ppm)								
Well ID	Sample Date	Sample Value (ppm)							
MW-62	9/12/2016	590							
MW-62	5/29/2017	570							
MW-62	8/16/2017	590							
MW-62	9/9/2017	570							
MW-63	9/12/2016	560							
MW-63	5/28/2017	550							
MW-63	8/16/2017	580							

pH (time reg	pH (time regression upper and lower prediction limit)							
Well ID	Sample Date	Sample Value (ppm)						
MW-65	8/20/2016	8.27						
MW-64	7/21/2017	7.61						

Chloride (upper prediction limit = 710 ppm)									
Well ID	/ell ID Sample Date Sample Value (ppm)								

Sulfate (	Sulfate (upper prediction limit = 13,000 ppm)									
Well ID	Sample Date	Sample Date Sample Value (ppm)								

Fluoride (upper prediction limit = quantified measurements								
[above RL] in two consecutive samples [not resamples])								
Well ID	Sample Date	Sample Value (ppm)						

### TABLE 7 PRO UCL OUTPUT FOR GENERAL STATISTICS - MULTIUNIT 1 IN WEATHERED LEWIS SHALE/ALLUVIUM

General Statistics on Uncensored Data

Date/Time of Computation ProUCL 5.11/7/2018 12:17:53 AM

**User Selected Options** 

From File AllWells\_MultiUnit1\_Bckgrd\_LewisShale\_01042018.xls

Full Precision OFF

From File: AllWells\_MultiUnit1\_Bckgrd\_LewisShale\_01042018.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
Boron (bckgrd_mw-49a_mw_74)	25	0	25	0	0.00%	N/A	N/A	2.396	1.05	1.025	0.428
Boron (mw-61)	16	0	16	0	0.00%	N/A	N/A	38.56	2.129	1.459	0.0378
Boron (mw-7)	16	0	16	0	0.00%	N/A	N/A	8.688	1.5	1.225	0.141
Boron (mw-75)	9	0	9	0	0.00%	N/A	N/A	24.56	0.278	0.527	0.0215
Boron (mw-8)	8	0	8	0	0.00%	N/A	N/A	18.13	2.411	1.553	0.0857
Calcium (bckgrd_mw-49a_mw_74	25	0	25	0	0.00%	N/A	N/A	407.6	519	22.78	0.0559
Calcium (mw-61)	16	0	16	0	0.00%	N/A	N/A	484.4	692.9	26.32	0.0543
Calcium (mw-7)	16	0	16	0	0.00%	N/A	N/A	413.8	478.3	21.87	0.0529
Calcium (mw-75)	9	0	9	0	0.00%	N/A	N/A	451.1	586.1	24.21	0.0537
Calcium (mw-8)	8	0	8	0	0.00%	N/A	N/A	455	857.1	29.28	0.0643
Chloride (bckgrd_mw-49a_mw_74	25	0	25	0	0.00%	N/A	N/A	502.4	14227	119.3	0.237
Chloride (mw-61)	16	0	16	0	0.00%	N/A	N/A	331.9	7576	87.04	0.262
Chloride (mw-7)	16	0	15	1	6.25%	400	400	483.3	20368	142.7	0.295
Chloride (mw-75)	9	0	9	0	0.00%	N/A	N/A	296.7	75	8.66	0.0292
Chloride (mw-8)	8	0	8	0	0.00%	N/A	N/A	1019	8470	92.03	0.0903
Fluoride (bckgrd_mw-49a_mw_74	25	0	11	14	56.00%	0.4	5	1.395	0.424	0.651	0.467
Fluoride (mw-61)	16	0	16	0	0.00%	N/A	N/A	1.216	0.00991	0.0995	0.0819
Fluoride (mw-7)	16	0	2	14	87.50%	0.4	2	0.36	5.0000E-4	0.0224	0.0621
Fluoride (mw-75)	9	0	0	9	100.00%	2	2	N/A	N/A	N/A	N/A
Fluoride (mw-8)	8	0	3	5	62.50%	2	5	0.693	0.00429	0.0655	0.0945
Sulfate (bckgrd_mw-49a_mw_74)	25	0	25	0	0.00%	N/A	N/A	14668	22988100	4795	0.327
Sulfate (mw-61)	16	0	16	0	0.00%	N/A	N/A	3613	54500	233.5	0.0646
Sulfate (mw-7)	16	0	16	0	0.00%	N/A	N/A	6625	268667	518.3	0.0782
Sulfate (mw-75)	9	0	9	0	0.00%	N/A	N/A	4489	91111	301.8	0.0672
Sulfate (mw-8)	8	0	8	0	0.00%	N/A	N/A	10125	10459286	3234	0.319
TDS (bckgrd_mw-49a_mw_74)	25	0	25	0	0.00%	N/A	N/A	20800	44416667	6665	0.32
TDS (mw-61)	16	0	16	0	0.00%	N/A	N/A	5556	18625	136.5	0.0246
TDS (mw-7)	16	0	16	0	0.00%	N/A	N/A	10150	185333	430.5	0.0424
TDS (mw-75)	9	0	9	0	0.00%	N/A	N/A	6478	29444	171.6	0.0265
TDS (mw-8)	8	0	8	0	0.00%	N/A	N/A	14750	500000	707.1	0.0479
pH (bckgrd_mw-49a_mw_74)	25	0	25	0	0.00%	N/A	N/A	7.222	0.17	0.412	0.057
pH (mw-61)	16	0	16	0	0.00%	N/A	N/A	8.584	0.0385	0.196	0.0229
pH (mw-7)	16	0	16	0	0.00%	N/A	N/A	7.002	0.0468	0.216	0.0309
pH (mw-75)	9	0	9	0	0.00%	N/A	N/A	8.257	0.0168	0.13	0.0157
pH (mw-8)	8	0	8	0	0.00%	N/A	N/A	6.819	0.0431	0.208	0.0304

TABLE 7
PRO UCL OUTPUT FOR GENERAL STATISTICS - MULTIUNIT 1 IN WEATHERED LEWIS SHALE/ALLUVIUM

General Statistics for Raw Data Sets using Detected Data Only											
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Boron (bckgrd_mw-49a_mw_74)	25	0	1.3	6	2.396	2.2	1.05	1.025	0.741	2.164	0.428
Boron (mw-61)	16	0	35	41	38.56	39	2.129	1.459	1.483	-0.729	0.0378
Boron (mw-7)	16	0	7.2	11	8.688	8.3	1.5	1.225	1.334	0.425	0.141
Boron (mw-75)	9	0	24	25	24.56	25	0.278	0.527	0	-0.271	0.0215
Boron (mw-8)	8	0	16	20	18.13	18	2.411	1.553	1.483	0.0334	0.0857
Calcium (bckgrd_mw-49a_mw_74	25	0	360	440	407.6	410	519	22.78	29.65	-0.276	0.0559
Calcium (mw-61)	16	0	420	520	484.4	485	692.9	26.32	22.24	-0.722	0.0543
Calcium (mw-7)	16	0	380	460	413.8	410	478.3	21.87	29.65	0.367	0.0529
Calcium (mw-75)	9	0	410	490	451.1	460	586.1	24.21	14.83	-0.234	0.0537
Calcium (mw-8)	8	0	420	500	455	450	857.1	29.28	37.06	0.342	0.0643
Chloride (bckgrd_mw-49a_mw_74	25	0	340	1000	502.4	490	14227	119.3	74.13	3.094	0.237
Chloride (mw-61)	16	0	280	650	331.9	310	7576	87.04	14.83	3.682	0.262
Chloride (mw-7)	15	0	320	880	492	430	21931	148.1	59.3	1.626	0.301
Chloride (mw-75)	9	0	280	310	296.7	300	75	8.66	0	-0.66	0.0292
Chloride (mw-8)	8	0	880	1100	1019	1040	8470	92.03	88.95	-0.406	0.0903
Fluoride (bckgrd_mw-49a_mw_74	11	0	0.65	2.1	1.714	1.9	0.198	0.445	0.148	-1.809	0.26
Fluoride (mw-61)	16	0	0.95	1.4	1.216	1.2	0.00991	0.0995	0	-0.9	0.0819
Fluoride (mw-7)	2	0	0.35	0.41	0.38	0.38	0.0018	0.0424	0.0445	N/A	0.112
Fluoride (mw-75)	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fluoride (mw-8)	3	0	0.61	0.77	0.693	0.7	0.00643	0.0802	0.104	-0.371	0.116
Sulfate (bckgrd_mw-49a_mw_74)	25	0	7100	22000	14668	16000	22988100	4795	4448	-0.411	0.327
Sulfate (mw-61)	16	0	3400	4400	3613	3550	54500	233.5	74.13	2.774	0.0646
Sulfate (mw-7)	16	0	5900	7500	6625	6500	268667	518.3	593	0.359	0.0782
Sulfate (mw-75)	9	0	4100	5200	4489	4400	91111	301.8	148.3	1.714	0.0672
Sulfate (mw-8)	8	0	8400	18000	10125	8850	10459286	3234	518.9	2.655	0.319
TDS (bckgrd_mw-49a_mw_74)	25	0	12000	30000	20800	22000	44416667	6665	8895	-0.187	0.32
TDS (mw-61)	16	0	5300	5800	5556	5600	18625	136.5	148.3	-0.15	0.0246
TDS (mw-7)	16	0	9700	11000	10150	10000	185333	430.5	0	1.584	0.0424
TDS (mw-75)	9	0	6100	6700	6478	6500	29444	171.6	148.3	-1.279	0.0265
TDS (mw-8)	8	0	13000	15000	14750	15000	500000	707.1	0	-2.828	0.0479
pH (bckgrd_mw-49a_mw_74)	25	0	6.21	8.5	7.222	7.16	0.17	0.412	0.311	0.716	0.057
pH (mw-61)	16	0	8.17	9.01	8.584	8.58	0.0385	0.196	0.111	-0.00842	0.0229
pH (mw-7)	16	0	6.48	7.46	7.002	6.99	0.0468	0.216	0.133	-0.226	0.0309
pH (mw-75)	9	0	8.05	8.49	8.257	8.24	0.0168	0.13	0.148	0.269	0.0157
pH (mw-8)	8	0	6.48	7.17	6.819	6.78	0.0431	0.208	0.119	0.226	0.0304

TABLE 7
PRO UCL OUTPUT FOR GENERAL STATISTICS - MULTIUNIT 1 IN WEATHERED LEWIS SHALE/ALLUVIUM

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
Boron (bckgrd_mw-49a_mw_74)	25	0	1.6	1.6	1.7	2.2	2.7	2.74	3.28	4.2	5.616
Boron (mw-61)	16	0	37	38	38	39	39.25	40	40	40.25	40.85
Boron (mw-7)	16	0	7.4	7.6	7.6	8.3	10	10	10	10.25	10.85
Boron (mw-75)	9	0	24	24	24	25	25	25	25	25	25
Boron (mw-8)	8	0	16.7	17	17	18	19.25	19.6	20	20	20
Calcium (bckgrd_mw-49a_mw_74	25	0	380	390	390	410	420	422	440	440	440
Calcium (mw-61)	16	0	460	470	470	485	502.5	510	515	520	520
Calcium (mw-7)	16	0	390	390	397.5	410	430	430	435	445	457
Calcium (mw-75)	9	0	426	430	430	460	460	464	474	482	488.4
Calcium (mw-8)	8	0	427	430	430	450	480	480	486	493	498.6
Chloride (bckgrd_mw-49a_mw_74	25	0	414	420	430	490	530	532	556	584	901.6
Chloride (mw-61)	16	0	300	300	300	310	320	320	350	440	608
Chloride (mw-7)	16	0	370	400	415	430	532.5	540	660	775	859
Chloride (mw-75)	9	0	288	290	290	300	300	300	302	306	309.2
Chloride (mw-8)	8	0	908	940	957.5	1040	1100	1100	1100	1100	1100
Fluoride (bckgrd_mw-49a_mw_74	25	0	0.71	1.5	1.8	2	2.1	4	4	4	4.76
Fluoride (mw-61)	16	0	1.15	1.2	1.2	1.2	1.3	1.3	1.3	1.325	1.385
Fluoride (mw-7)	16	0	0.4	0.4	0.4	8.0	0.8	0.8	8.0	1.1	1.82
Fluoride (mw-75)	9	0	2	2	2	2	2	2	2	2	2
Fluoride (mw-8)	8	0	0.673	0.728	0.753	2	2	2	2.9	3.95	4.79
Sulfate (bckgrd_mw-49a_mw_74)	25	0	7740	8340	10000	16000	18000	19000	19600	20000	21520
Sulfate (mw-61)	16	0	3450	3500	3500	3550	3700	3700	3700	3875	4295
Sulfate (mw-7)	16	0	6000	6200	6275	6500	7100	7100	7350	7425	7485
Sulfate (mw-75)	9	0	4260	4360	4400	4400	4500	4540	4720	4960	5152
Sulfate (mw-8)	8	0	8540	8600	8600	8850	9775	9880	12400	15200	17440
TDS (bckgrd_mw-49a_mw_74)	25	0	12000	12000	13000	22000	27000	28000	29000	29000	29760
TDS (mw-61)	16	0	5400	5400	5475	5600	5625	5700	5700	5725	5785
TDS (mw-7)	16	0	9850	10000	10000	10000	10000	10000	11000	11000	11000
TDS (mw-75)	9	0	6340	6400	6400	6500	6600	6600	6620	6660	6692
TDS (mw-8)	8	0	14400	15000	15000	15000	15000	15000	15000	15000	15000
pH (bckgrd_mw-49a_mw_74)	25	0	6.896	6.984	6.99	7.16	7.46	7.502	7.56	7.672	8.308
pH (mw-61)	16	0	8.36	8.46	8.52	8.58	8.653	8.66	8.79	8.86	8.98
pH (mw-7)	16	0	6.84	6.88	6.91	6.99	7.075	7.18	7.225	7.303	7.429
pH (mw-75)	9	0	8.122	8.176	8.2	8.24	8.35	8.35	8.378	8.434	8.479
pH (mw-8)	8	0	6.634	6.724	6.745	6.78	6.9	6.956	7.065	7.118	7.16

Goodnose of Eit	Tost Statistics for F	ata Sate with Non-Detacte

User Selected Options

Date/Time of Computation ProUCL 5.11/7/2018 12:36:43 AM

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Full Precision OFF
Confidence Coefficient 0.95

#### **Boron**

#### **Raw Statistics**

Number of Valid Observations 25 Number of Distinct Observations 17

> Minimum 1.3 Maximum 6

Mean of Raw Data 2.396
rd Deviation of Raw Data 1.025

Standard Deviation of Raw Data 1.025 Khat 7.66

Theta hat 0.313
Kstar 6.768
Theta star 0.354

Mean of Log Transformed Data 0.807

Standard Deviation of Log Transformed Data 0.353

#### **Normal GOF Test Results**

Correlation Coefficient R 0.88
Shapiro Wilk Test Statistic 0.79
Shapiro Wilk Critical (0.05) Value 0.918

Approximate Shapiro Wilk P Value 8.5799E-5 Lilliefors Test Statistic 0.183

Lilliefors Critical (0.05) Value 0.173

### Data not Normal at (0.05) Significance Level

### Gamma GOF Test Results

 Correlation Coefficient R
 0.939

 A-D Test Statistic
 0.747

 A-D Critical (0.05) Value
 0.746

 K-S Test Statistic
 0.144

 K-S Critical (0.05) Value
 0.175

### Data appear Gamma Distributed at (0.05) Significance Level

### Lognormal GOF Test Results

Correlation Coefficient R 0.964
Shapiro Wilk Test Statistic 0.934
Shapiro Wilk Critical (0.05) Value 0.918
Approximate Shapiro Wilk P Value 0.117
Lilliefors Test Statistic 0.121
Lilliefors Critical (0.05) Value 0.173

Data appear Lognormal at (0.05) Significance Level

Ln_Boron	
Raw Statistics	
Number of Valid Observations	25
Number of Distinct Observations	17
Minimum	0.262
Maximum	1.792
Mean of Raw Data	0.807
Standard Deviation of Raw Data	0.353
Khat	5.703
Theta hat	0.142
Kstar	5.045
Theta star	0.16
Mean of Log Transformed Data	-0.305
Standard Deviation of Log Transformed Data	0.44
Normal GOF Test Results	
Correlation Coefficient R	0.964
Shapiro Wilk Test Statistic	0.934
Shapiro Wilk Critical (0.05) Value	0.918
Approximate Shapiro Wilk P Value	0.117
Lilliefors Test Statistic	0.121
Lilliefors Critical (0.05) Value	0.173
Data appear Normal at (0.05) Significance Level	0.170
Data appear Normal at (0.00) digitilicance Edver	
Gamma GOF Test Results	
Correlation Coefficient R	0.991
A-D Test Statistic	0.24
A-D Critical (0.05) Value	0.747
K-S Test Statistic	0.106
K-S Critical(0.05) Value	0.100
· '	
Data appear Gamma Distributed at (0.05) Significance	Level
Lognormal COE Test Possilte	
Lognormal GOF Test Results	
Correlation Coefficient R	0.989
	0.989
Shapiro Wilk Critical (0.05) Value	
Shapiro Wilk Critical (0.05) Value	0.918
Approximate Shapiro Wilk P Value	0.903
Lilliefors Test Statistic	0.105
Lilliefors Critical (0.05) Value	0.173
Data appear Lognormal at (0.05) Significance Level	

Calcium	
Raw Statistics	
Number of Valid Observations	25
Number of Distinct Observations	9
Minimum	360
Maximum	440
Mean of Raw Data	407.6
Standard Deviation of Raw Data	22.78
Khat	329.4
Theta hat	1.237
Kstar	289.9
Theta star	1.406
Mean of Log Transformed Data	6.009
Standard Deviation of Log Transformed Data	0.0564
Normal GOF Test Results	
Correlation Coefficient R	0.976
Shapiro Wilk Test Statistic	0.94
Shapiro Wilk Critical (0.05) Value	0.918
Approximate Shapiro Wilk P Value	0.16
Lilliefors Test Statistic	0.147
Lilliefors Critical (0.05) Value	0.173
Data appear Normal at (0.05) Significance Level	0.170
Data appear Normal at (0.00) digitilicance cover	
Gamma GOF Test Results	
Correlation Coefficient R	0.972
A-D Test Statistic	0.585
A-D Critical (0.05) Value	0.742
K-S Test Statistic	0.154
K-S Critical(0.05) Value	0.174
Data appear Gamma Distributed at (0.05) Significance	
Lognormal GOF Test Results	
Correlation Coefficient R	0.974
Shapiro Wilk Test Statistic	0.938
Shapiro Wilk Critical (0.05) Value	0.918
Approximate Shapiro Wilk P Value	0.141
Lilliefors Test Statistic	0.152
Lilliefors Critical (0.05) Value	0.132
Data appear Lognormal at (0.05) Significance Level	0.170

Ln_Calcium		
Raw Statistics		
Number of Valid Observations	25	
Number of Distinct Observations	9	
Minimum	5.886	
Maximum	6.087	
Mean of Raw Data	6.009	
Standard Deviation of Raw Data	0.0564	
Khat	11780	
Theta hat	5.1006E-4	
Kstar	10367	
Theta star	5.7962E-4	
Mean of Log Transformed Data	1.793	
Standard Deviation of Log Transformed Data	0.00941	
Normal GOF Test Results		
Correlation Coefficient R	0.974	
Shapiro Wilk Test Statistic	0.938	
Shapiro Wilk Critical (0.05) Value	0.918	
Approximate Shapiro Wilk P Value	0.141	
Lilliefors Test Statistic	0.152	
Lilliefors Critical (0.05) Value	0.173	
Data appear Normal at (0.05) Significance Level		
Gamma GOF Test Results		
Correlation Coefficient R	0.972	
A-D Test Statistic	0.844	
A-D Critical (0.05) Value	0.742	
K-S Test Statistic	0.184	
K-S Critical(0.05) Value	0.174	
Data not Gamma Distributed at (0.05) Significance Le		
Lognormal GOF Test Results		
0	0.074	
Correlation Coefficient R	0.974	
Shapiro Wilk Test Statistic	0.937	
Shapiro Wilk Critical (0.05) Value	0.918	
Approximate Shapiro Wilk P Value	0.137	
Lilliefors Test Statistic	0.154	
Lilliefors Critical (0.05) Value	0.173	
Data appear Lognormal at (0.05) Significance Level		

#### Chloride **Raw Statistics** Number of Valid Observations **Number of Distinct Observations** 14 Minimum 340 Maximum 1000 Mean of Raw Data 502.4 Standard Deviation of Raw Data 119.3 Khat 24.55 Theta hat 20.47 21.63 Kstar 23.23 Theta star Mean of Log Transformed Data 6.199 Standard Deviation of Log Transformed Data 0.195 Normal GOF Test Results Correlation Coefficient R 0.807 Shapiro Wilk Test Statistic 0.686 Shapiro Wilk Critical (0.05) Value 0.918 Approximate Shapiro Wilk P Value 1.2219E-6 Lilliefors Test Statistic 0.235 Lilliefors Critical (0.05) Value 0.173 Data not Normal at (0.05) Significance Level Gamma GOF Test Results Correlation Coefficient R 0.84 A-D Test Statistic 1.346 A-D Critical (0.05) Value 0.743 K-S Test Statistic 0.189 K-S Critical(0.05) Value 0.174 Data not Gamma Distributed at (0.05) Significance Level **Lognormal GOF Test Results** Correlation Coefficient R 0.896 Shapiro Wilk Test Statistic 0.834 Shapiro Wilk Critical (0.05) Value 0.918 Approximate Shapiro Wilk P Value 6.4181E-4 Lilliefors Test Statistic 0.174 Lilliefors Critical (0.05) Value 0.173 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

Ln_Chloride	
En_onionde	
Raw Statistics	
Number of Valid Observations	25
Number of Distinct Observations	23 14
	5.829
Minimum	
Maximum	6.908
Mean of Raw Data	6.199
Standard Deviation of Raw Data	0.195
Khat	1084
Theta hat	0.00572
Kstar	954.3
Theta star	0.0065
Mean of Log Transformed Data	1.824
Standard Deviation of Log Transformed Data	0.0308
Normal GOF Test Results	
1.0	
Correlation Coefficient R	0.896
Shapiro Wilk Test Statistic	0.834
Shapiro Wilk Critical (0.05) Value	0.918
1	
Approximate Shapiro Wilk P Value	
Lilliefors Test Statistic	0.174
Lilliefors Critical (0.05) Value	0.173
Data not Normal at (0.05) Significance Level	
Gamma GOF Test Results	
Correlation Coefficient R	0.903
A-D Test Statistic	1.025
A-D Critical (0.05) Value	0.742
K-S Test Statistic	0.165
K-S Critical(0.05) Value	0.174
Data follow Appr. Gamma Distribution at (0.05) Signifi	icance Leve
Lognormal GOF Test Results	
Lognormal dol Post Novako	
Correlation Coefficient R	0.907
Shapiro Wilk Test Statistic	0.853
Shapiro Wilk Critical (0.05) Value	0.918
Approximate Shapiro Wilk P Value	0.00157
Lilliefors Test Statistic	0.167
Lilliefors Critical (0.05) Value	0.173
Data appear Approximate_Lognormal at (0.05) Signifi	icance Level

Fluoride						
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs
Raw Statistics	25	0	25	11	14	56.00%
	Number	Minimum	Maximum	Mean	Median	SD
Statistics (Non-Detects Only)	14	0.4	5	2.614	2	1.526
Statistics (Non-Detects Only)	11	0.65	2.1	1.714	1.9	0.445
Statistics (All: NDs treated as DL value)	25	0.4	5	2.218	2	1.246
Statistics (All: NDs treated as DL/2 value)	25	0.2	2.5	1.486	1.9	0.664
Statistics (Normal ROS Imputed Data)	25	0.65	2.1	1.502	1.569	0.427
Statistics (Gamma ROS Imputed Data)	25	0.65	2.1	1.53	1.561	0.389
Statistics (Lognormal ROS Imputed Data)	25	0.65	2.1	1.469	1.471	0.435
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV
Statistics (Non-Detects Only)	11.02	8.072	0.156	0.493	0.354	0.718
Statistics (NOII-Detects Offly) Statistics (NDs = DL)	2.905	2.583	0.763	0.493	0.554	1.091
Statistics (NDs = DL/2)	3.107	2.761	0.703	0.015	0.704	3.107
Statistics (NDS - DL/2) Statistics (Gamma ROS Estimates)	14.04	12.38	0.478	0.227	0.704	0.736
Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	14.04	12.30	0.109	0.337	0.286	0.730
Citationics (Edgitormal NOS Estimates)				0.557	0.020	0.300
	Normal G	OF Test Re	esults			
	No NDs	NDs = DL	NDs = DL/2	Normal ROS		
Correlation Coefficient R	0.857	0.929	0.933	0.971		
	Test value	Crit. (0.05)	Co	onclusion with	Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.746	0.85	Data Not No	rmal		
Shapiro-Wilk (NDs = DL)	0.859	0.918	Data Not No	rmal		
Shapiro-Wilk (NDs = DL/2)	0.862	0.918	Data Not No	rmal		
Shapiro-Wilk (Normal ROS Estimates)	0.93	0.918	Data Appear	Normal		
Lilliefors (Detects Only)	0.304	0.251	Data Not No	rmal		
Lilliefors (NDs = DL)	0.298	0.173	Data Not No	rmal		
Lilliefors (NDs = DL/2)	0.254	0.173	Data Not No	rmal		
Lilliefors (Normal ROS Estimates)	0.144	0.173	Data Appear	Normal		
	Gamma G	OF Test R	esults			
	No NDs	NDs = DL	NDs = DL/2	Gamma ROS		
Correlation Coefficient R	0.796	0.937	0.852	0.951		
	Test value	Crit. (0.05)	Co	onclusion with	Alpha(0.05)	
Anderson-Darling (Detects Only)	1.559	0.729				
Kolmogorov-Smirnov (Detects Only)	0.332	0.255	Data Not Ga	mma Distribute	ed	
Anderson-Darling (NDs = DL)	1.371	0.752				
Kolmogorov-Smirnov (NDs = DL)	0.218	0.176	Data Not Ga	mma Distribute	ed	
Anderson-Darling (NDs = DL/2)	2.066	0.751				
Kolmogorov-Smirnov (NDs = DL/2)	0.264	0.176	Data Not Ga	mma Distribute	ed	
derson-Darling (Gamma ROS Estimates)	0.661	0.744				
Kolmogorov-Smirnov (Gamma ROS Est.)	0.144	0.174	Data Appear	Gamma Distri	buted	

Larmarmal COF Task Daville							
Lognormal GOF Test Results							
	No NDs	NDe - DI	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.805	0.929	0.867	0.963			
Correlation Coefficient IV	0.000	0.323	0.007	0.505			
	Test value	Crit. (0.05)	C	Conclusion with	Alpha(0.05)		
Shapiro-Wilk (Detects Only)	0.666	` '	Data Not Lo		,pa(0.00)		
Shapiro-Wilk (NDs = DL)	0.861		Data Not Lo	•			
Shapiro-Wilk (NDs = DL/2)	0.751		Data Not Lo	-			
Shapiro-Wilk (Lognormal ROS Estimates)	0.918		Data Not Lo	-			
Lilliefors (Detects Only)	0.333		Data Not Lo	-			
Lilliefors (NDs = DL)	0.244		Data Not Lo	-			
Lilliefors (NDs = DL/2)	0.256	0.173	Data Not Lo	gnormal			
Lilliefors (Lognormal ROS Estimates)	0.145			r Lognormal			
,							
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Ln_Fluoride							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	25	0	25	11	14	56.00%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	14	-0.916	1.609	0.711	0.693	0.844	
Statistics (Non-Detects Only)	11	-0.431	0.742	0.493	0.642	0.354	
Statistics (All: NDs treated as DL value)	25	-0.916	1.609	0.615	0.693	0.671	
Statistics (All: NDs treated as DL/2 value)	25	N/A	N/A	N/A	N/A	N/A	
Statistics (Normal ROS Imputed Data)	25	-0.431	0.742	0.337	0.386	0.326	
	Normal G	OF Test Re	esults				
	No NDs	NDs = DL	NDs = DL/2	Normal ROS			
Correlation Coefficient R	0.805	0.929	0.884	0.963			
	Test value	Crit. (0.05)	C	Conclusion with	Alpha(0.05)		
Shapiro-Wilk (Detects Only)	0.666		Data Not No				
Shapiro-Wilk (NDs = DL)	0.861	0.918	Data Not No	ormal			
Shapiro-Wilk (NDs = DL/2)	0.772		Data Not No				
Shapiro-Wilk (Normal ROS Estimates)	0.918		Data Not No				
Lilliefors (Detects Only)	0.333	0.251	Data Not No	ormal			
Lilliefors (NDs = DL)	0.244	0.173	Data Not No	ormal			
Lilliefors (NDs = DL/2)	0.238		Data Not No				
Lilliefors (Normal ROS Estimates)	0.145	0.173	Data Appea	r Normal			

Gamma	a GOF Test Re	sults	
No NE	os NDs = DL	NDs = [	DL/2 Gamma ROS
Correlation Coefficient R N/A	N/A	N/A	N/A
T4	O.:: (0.0E)		Construit Alaba (0.05)
Anderson-Darling (Detects Only) N/A	lueCrit. (0.05) N/A		Conclusion with Alpha(0.05)
Kolmogorov-Smirnov (Detects Only) N/A	N/A		
Anderson-Darling (NDs = DL) N/A	N/A		
Kolmogorov-Smirnov (NDs = DL) N/A	N/A		
Anderson-Darling (NDs = DL/2) N/A	N/A		
Kolmogorov-Smirnov (NDs = DL/2) N/A	N/A		
,	N/A		
,	N/A N/A		
Colmogorov-Smirnov (Gamma ROS Est.) N/A	IN/A		
ote: Substitution methods such as DL or DL/2 ar	e not recomme	ended.	
ulfate			
unate			
Raw Statistics			
Number of Valid Observation	ns 25		
Number of Distinct Observation	ns 16		
Minimo	um 7100		
Maximu	ım 22000		
Mean of Raw Da	ata 14668		
Standard Deviation of Raw Da	ata 4795		
KI	nat 8.28		
Theta I	nat 1772		
Ks	tar 7.313		
Theta s	tar 2006		
Mean of Log Transformed Da	eta 9.532		
Standard Deviation of Log Transformed Da	ata 0.375		
Normal GOF Test Results			
Correlation Coefficien	t R 0.951		
Shapiro Wilk Test Statis			
Shapiro Wilk Critical (0.05) Va			
Approximate Shapiro Wilk P Va			
Lilliefors Test Statis			
Lilliefors Critical (0.05) Va			
ata not Normal at (0.05) Significance Level			
Gamma GOF Test Results			
Canina Go. For Hours			
Correlation Coefficien			
A-D Test Statis			
A-D Critical (0.05) Val			
K-S Test Statis			
K-S Critical(0.05) Val	ue 0.175		

### Lognormal GOF Test Results

Correlation Coefficient R 0.929
Shapiro Wilk Test Statistic 0.847
Shapiro Wilk Critical (0.05) Value 0.918
Approximate Shapiro Wilk P Value 0.00121
Lilliefors Test Statistic 0.214

Lilliefors Critical (0.05) Value 0.173

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

Ln\_Sulfate

#### **Raw Statistics**

Number of Valid Observations 25 Number of Distinct Observations 16

Minimum 8.868

Maximum 9.999 Raw Data 9.532

Mean of Raw Data 9.532
Standard Deviation of Raw Data 0.375

Khat 660.8

Theta hat 0.0144

Kstar 581.5 Theta star 0.0164

Mean of Log Transformed Data 2.254

Standard Deviation of Log Transformed Data 0.0399

#### **Normal GOF Test Results**

Correlation Coefficient R 0.929

Shapiro Wilk Test Statistic 0.847

Shapiro Wilk Critical (0.05) Value 0.918 Approximate Shapiro Wilk P Value 0.00121

Lilliefors Test Statistic 0.214

Lilliefors Critical (0.05) Value 0.173

Data not Normal at (0.05) Significance Level

### Gamma GOF Test Results

Correlation Coefficient R 0.924

A-D Test Statistic 1.663 A-D Critical (0.05) Value 0.742

K-S Test Statistic 0.22

K-S Critical(0.05) Value 0.174

### Lognormal GOF Test Results

Correlation Coefficient R 0.927
Shapiro Wilk Test Statistic 0.842
Shapiro Wilk Critical (0.05) Value 0.918
Approximate Shapiro Wilk P Value 9.6163E-4
Lilliefors Test Statistic 0.218

Lilliefors Critical (0.05) Value 0.173

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

#### **Raw Statistics**

Number of Valid Observations 25 Number of Distinct Observations 13

> Minimum 12000 Maximum 30000

Mean of Raw Data 20800

Standard Deviation of Raw Data 6665

Khat 9.163
Theta hat 2270
Kstar 8.09

Theta star 2571

Mean of Log Transformed Data 9.887

Standard Deviation of Log Transformed Data 0.351

#### **Normal GOF Test Results**

Correlation Coefficient R 0.947

Shapiro Wilk Test Statistic 0.872 Shapiro Wilk Critical (0.05) Value 0.918

Approximate Shapiro Wilk P Value 0.00422

Lilliefors Test Statistic 0.171
Lilliefors Critical (0.05) Value 0.173

Data appear Approximate Normal at (0.05) Significance Level

### Gamma GOF Test Results

Correlation Coefficient R 0.929

A-D Test Statistic 1.346
A-D Critical (0.05) Value 0.745
K-S Test Statistic 0.211

K-S Critical(0.05) Value 0.175

### Lognormal GOF Test Results

Correlation Coefficient R 0.931
Shapiro Wilk Test Statistic 0.842
Shapiro Wilk Critical (0.05) Value 0.918
Approximate Shapiro Wilk P Value 9.4424E-4
Lilliefors Test Statistic 0.225

Lilliefors Critical (0.05) Value 0.173

Data not Lognormal at (0.05) Significance Level

### Ln\_TDS

#### **Raw Statistics**

Number of Valid Observations 25 Number of Distinct Observations 13

> Minimum 9.393 Maximum 10.31

Mean of Raw Data 9.887

Standard Deviation of Raw Data 0.351

Khat 820.6

Theta hat 0.012 Kstar 722.1

Theta star 0.0137

Mean of Log Transformed Data 2.291

Standard Deviation of Log Transformed Data 0.0357

### Normal GOF Test Results

Correlation Coefficient R 0.931 Shapiro Wilk Test Statistic 0.842

Shapiro Wilk Critical (0.05) Value 0.918

Approximate Shapiro Wilk P Value 9.4424E-4

Lilliefors Test Statistic 0.225

Lilliefors Critical (0.05) Value 0.173

Data not Normal at (0.05) Significance Level

### Gamma GOF Test Results

Correlation Coefficient R 0.926

A-D Test Statistic 1.519

A-D Critical (0.05) Value 0.742

K-S Test Statistic 0.231 K-S Critical(0.05) Value 0.174

### Lognormal GOF Test Results

Correlation Coefficient R 0.929
Shapiro Wilk Test Statistic 0.838
Shapiro Wilk Critical (0.05) Value 0.918
Approximate Shapiro Wilk P Value 7.8800E-4
Lilliefors Test Statistic 0.23

Lilliefors Critical (0.05) Value 0.173

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

#### **Outlier Tests for Selected Uncensored Variables**

#### **User Selected Options**

Date/Time of Computation ProUCL 5.11/7/2018 12:40:18 AM

From File BackgroundLewisShale\_DATEORDERED\_\_01062018.xls

Full Precision OFF

#### Rosner's Outlier Test for Boron

Mean 2.396

Standard Deviation 1.025

Number of data 25

Number of suspected outliers 1

 #
 Mean
 sd
 outlier
 Number
 value /alue (5%) /alue (1%)

 1
 2.396
 1.004
 6
 1
 3.589
 2.82
 3.14

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 6

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 6

### Rosner's Outlier Test for Ln\_B

Mean 0.807

Standard Deviation 0.353

Number of data 25

Number of suspected outliers 1

 #
 Mean
 sd
 outlier
 Number
 value /alue (5%) /alue (1%)

 1
 0.807
 0.346
 1.792
 1
 2.848
 2.82
 3.14

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1.792

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for Calcium

Mean 407.6
Standard Deviation 22.78
Number of data 25

Number of suspected outliers 1

Obs. Test Critical Critical Potential outlier Number value /alue (5%) /alue (1%) sd Mean 407.6 22.32 360 10 2.132 2.82 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for Ln\_Ca

Mean 6.009
Standard Deviation 0.0564
Number of data 25

Number of suspected outliers 1

# Mean sd outlier Number value (5%) /alue (1%)
1 6.009 0.0553 5.886 10 2.218 2.82 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

### Rosner's Outlier Test for Chloride

Mean 502.4
Standard Deviation 119.3
Number of data 25
Number of suspected outliers 1

 #
 Mean
 sd
 outlier
 Number
 value /alue (5%) /alue (1%)

 1
 502.4
 116.9
 1000
 9
 4.258
 2.82
 3.14

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1000

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 1000

Rosner's Outlier Test for Ln\_Chloride

Mean 6.199
Standard Deviation 0.195
Number of data 25

Number of suspected outliers 1

 Potential
 Obs.
 Test Critical Critical
 Critical Critical

 # Mean sd outlier Number value (5%) /alue (1%)

 1 6.199 0.191 6.908 9 3.708 2.82 3.14

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 6.908

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 6.908

Rosner's Outlier Test for Fluoride

Mean 2.218
Standard Deviation 1.246
Number of data 25

Number of suspected outliers 1

# Mean sd outlier Number value /alue (5%) /alue (1%)
1 2.218 1.221 5 1 2.279 2.82 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for Ln\_F

Mean 0.615
Standard Deviation 0.671
Number of data 25
Number of suspected outliers 1

 #
 Mean
 sd
 outlier
 Number
 value/alue (5%) /alue (1%)

 1
 0.615
 0.657
 -0.916
 6
 2.329
 2.82
 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for Sulfate

Mean 14668 Standard Deviation 4795

Number of data 25
Number of suspected outliers 1

 Potential
 Obs.
 Test
 Critical
 Critical

 #
 Mean
 sd
 outlier
 Number
 value/alue (5%) /alue (1%)

 1
 14668
 4698
 7100
 11
 1.611
 2.82
 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for Ln\_Sulfate

Mean 9.532

Standard Deviation 0.375

Number of data 25

Number of suspected outliers

 #
 Mean
 sd
 outlier
 Number
 value /alue (5%) /alue (1%)

 1
 9.532
 0.368
 8.868
 11
 1.806
 2.82
 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

#### Rosner's Outlier Test for TDS

Mean 20800

Standard Deviation 6665

Number of data 25

Number of suspected outliers

 Potential
 Obs.
 Test
 Critical
 Critical

 #
 Mean
 sd
 outlier
 Number
 value /alue (5%) /alue (1%)

 1
 20800
 6530
 30000
 2
 1.409
 2.82
 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for Ln\_TDS

Mean 9.887
Standard Deviation 0.351
Number of data 25

Number of suspected outliers 1

 #
 Mean
 sd
 outlier
 Number
 value /alue (5%) /alue (1%)

 1
 9.887
 0.343
 9.393
 8
 1.44
 2.82
 3.14

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for pH

Mean 7.222
Standard Deviation 0.412
Number of data 25

Number of suspected outliers 1

 Potential
 Obs.
 Test Test Test Critical Critical Critical
 Critical Critical Critical

 # Mean sd outlier Number value (5%) /alue (1%)

 1 7.222 0.404 8.5 24 3.165 2.82 3.14

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 8.5

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 8.5

TABLE 10
LIST OF INITIAL EXCEEDANCES FOR MULTIUNIT 1

Boron	Boron (upper prediction limit = 3.95 ppm)			
Well ID	Sample Date	Sample Value (ppm)		
MW-61	11/6/2015	35		
MW-61	4/26/2016	39		
MW-61	6/6/2016	38		
MW-61	8/21/2016	38		
MW-61	9/13/2016	40		
MW-61	10/20/2016	37		
MW-61	2/2/2017	37		
MW-61	4/18/2017	39		
MW-61	5/3/2017	39		
MW-61	5/30/2017	40		
MW-61	6/22/2017	38		
MW-61	7/22/2017	39		
MW-61	8/10/2017	40		
MW-61	8/17/2017	39		
MW-61	9/10/2017	41		
MW-61	10/12/2017	38		
MW-7	11/7/2015	9.4		
MW-7	4/26/2016	10		
MW-7	6/6/2016	10		
MW-7	8/21/2016	11		
MW-7	9/13/2016	10		
MW-7	10/20/2016	10		
MW-7	2/2/2017	9		
MW-7	4/18/2017	8.6		
MW-7	5/3/2017	8		
MW-7	5/30/2017	7.3		
MW-7	6/22/2017	7.6		
MW-7	7/22/2017	7.6		
MW-7	8/10/2017	7.8		
MW-7	8/17/2017	7.5		
MW-7	9/10/2017	8		
MW-7	10/12/2017	7.2		
MW-75	4/18/2017	24		
MW-75	5/3/2017	25		
MW-75	5/30/2017	24		
MW-75	6/22/2017	25		
MW-75	7/22/2017	25		
MW-75	8/10/2017	25		
MW-75 MW-75	8/17/2017 9/10/2017	25 24		
MW-75	· · · · · ·			
MW-8	10/12/2017 12/1/2015	24 17		
MW-8	4/26/2016	20		
MW-8	6/7/2016	20		
MW-8	8/21/2016	19		
MW-8	9/13/2016	19		
MW-8	4/18/2017	17		
MW-8	5/3/2017	17		
MW-8	5/30/2017	16		
17.177 0	3/30/2017	1 10		

Calcium	Calcium (upper prediction limit = 454.1 ppm)				
Well ID	Sample Date	Sample Value (ppm)			
MW-7	8/17/2017	460			
MW-75	5/3/2017	460			
MW-75	7/22/2017	460			
MW-75	8/10/2017	460			
MW-75	8/17/2017	490			
MW-75	9/10/2017	470			
MW-8	12/1/2015	500			
MW-8	4/26/2016	480			
MW-8	8/21/2016	460			
MW-8	9/13/2016	480			

TABLE 10
LIST OF INITIAL EXCEEDANCES FOR MULTIUNIT 1

Chlorid	Chloride (upper prediction limit = 604.7ppm)				
Well ID	Sample Date	Sample Value (ppm)			
MW-7	4/26/2016	740			
MW-7	6/6/2016	880			
MW-8	12/1/2015	880			
MW-8	4/26/2016	920			
MW-8	6/7/2016	1100			
MW-8	8/21/2016	980			
MW-8	9/13/2016	970			
MW-8	4/18/2017	1100			
MW-8	5/3/2017	1100			
MW-8	5/30/2017	1100			

pH (upper prediction limit = 7.88 SU; lower prediciton limit =				
6.52 SU)				
Well ID	Sample Date	Sample Value (SU)		

Fluoride (upper prediction limit = 2.1 ppm)					
Well ID	Sample Date	Sample Value (ppm)			
MW-8	MW-8 12/1/2015 5				

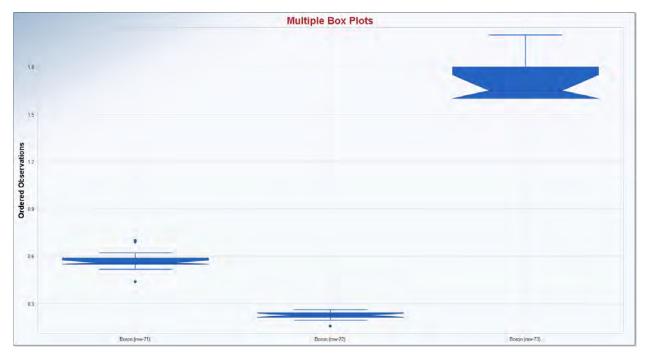
TDS (upper prediction limit = 34,396.6 ppm)		
Well ID	Sample Date	Sample Value (ppm)

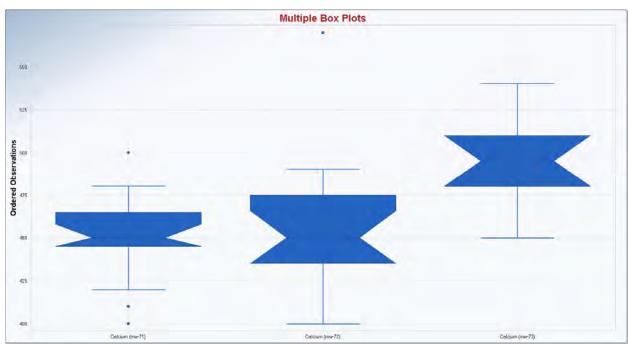
Sulfate (upper prediction limit = 22,000 ppm)		
Well ID	Sample Date	Sample Value (ppm)

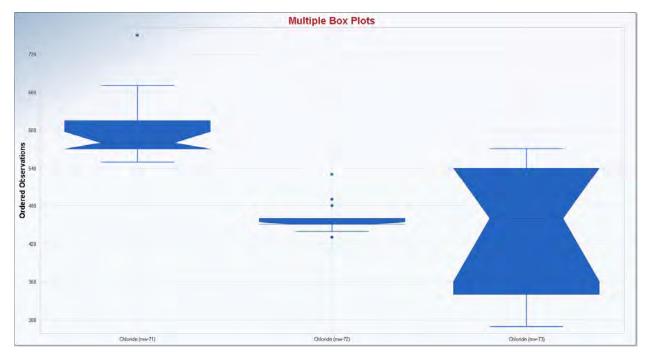


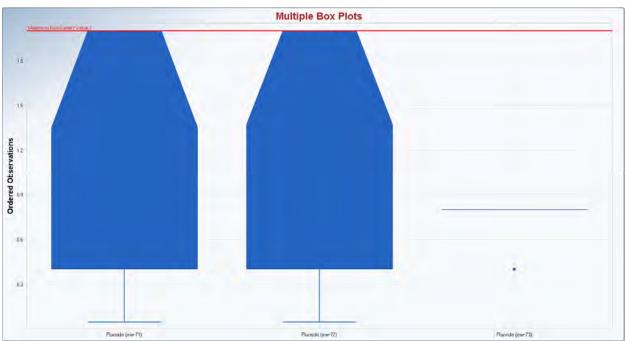
### **APPENDIX A**

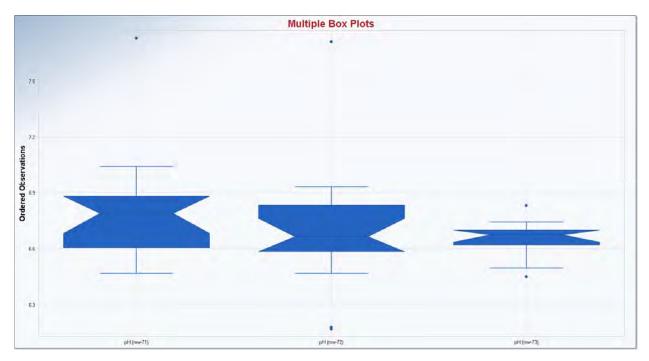
BOX AND WHISKER PLOTS FOR BACKGROUND WELLS IN PICTURED CLIFFS SANDSTONE

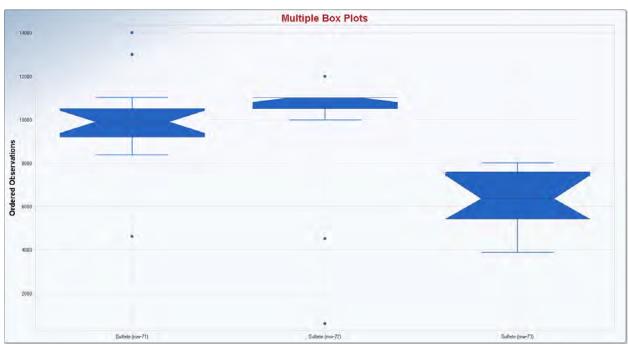


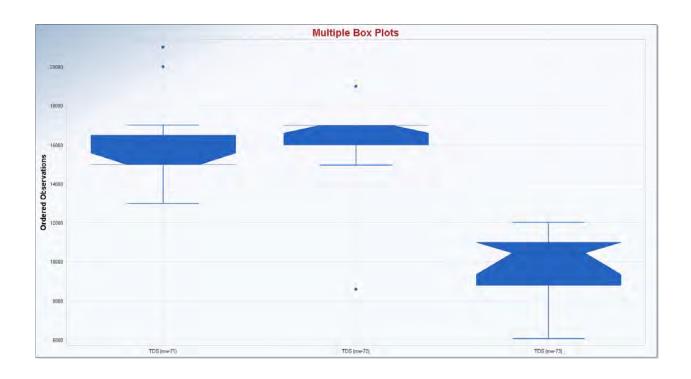








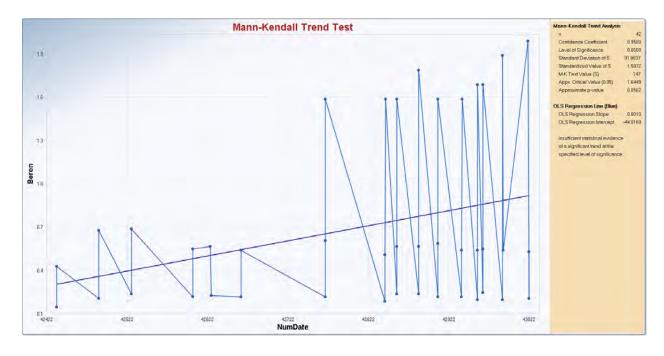


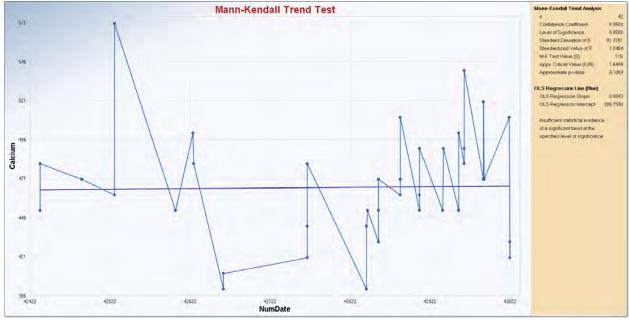


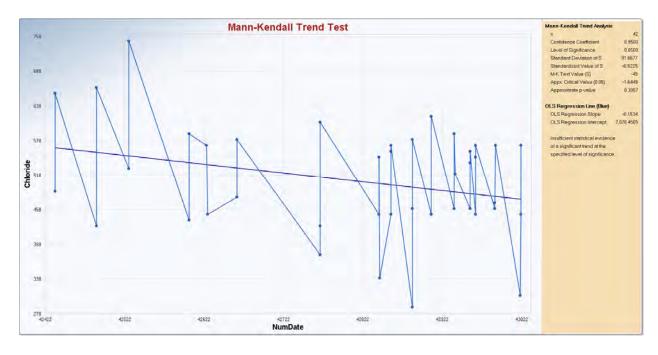


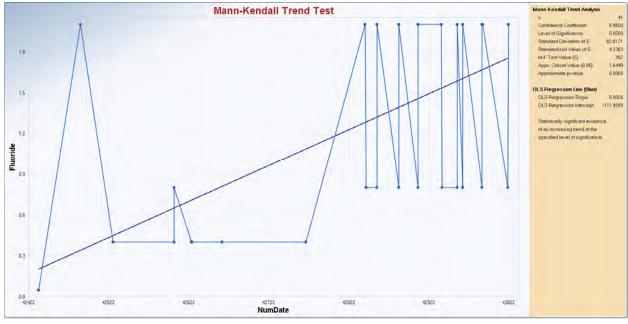
### **APPENDIX B**

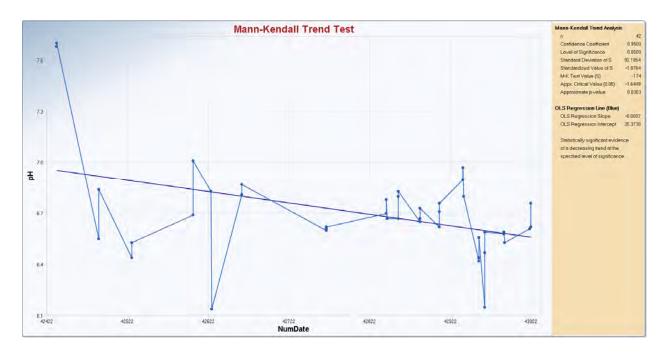
MANN-KENDALL TREND TESTS FOR BACKGROUND WELLS IN PICTURED CLIFFS SANDSTONE

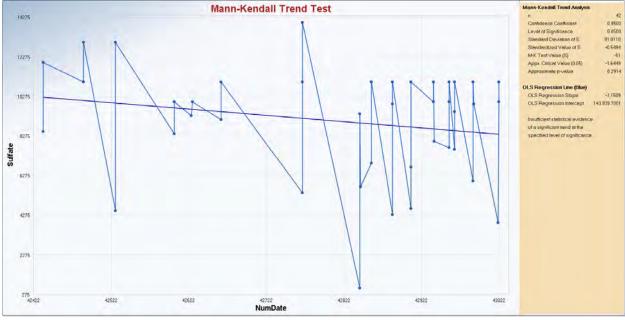


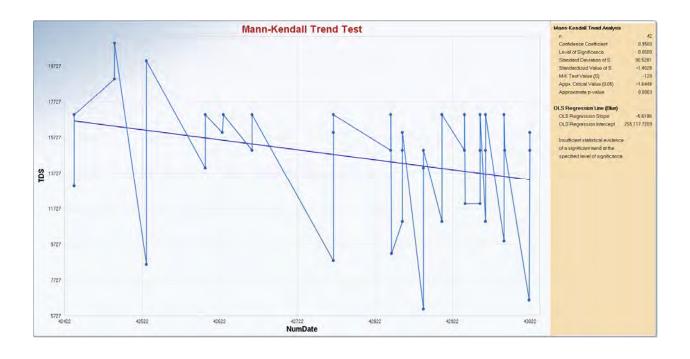








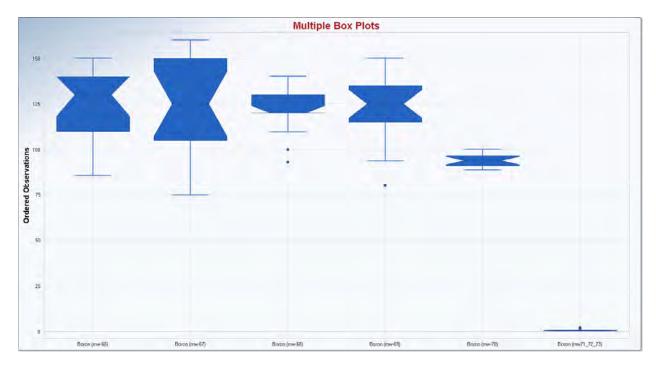


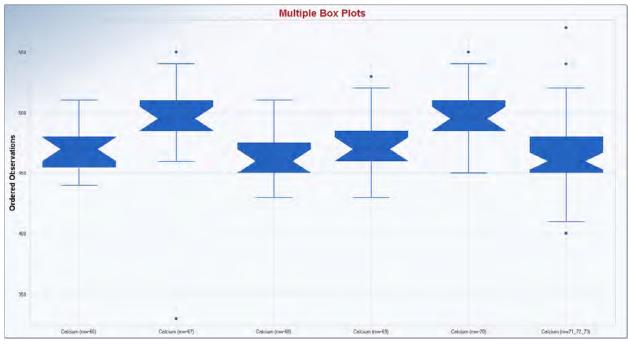


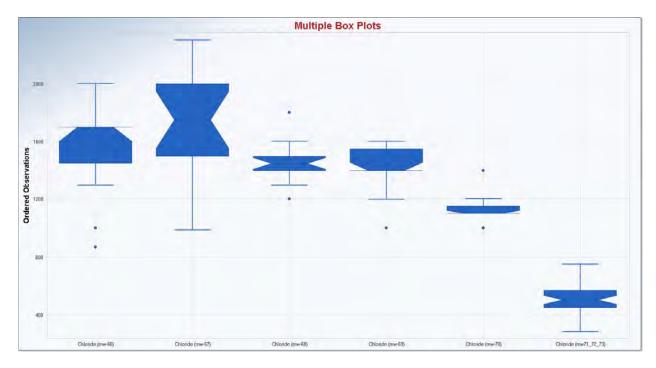


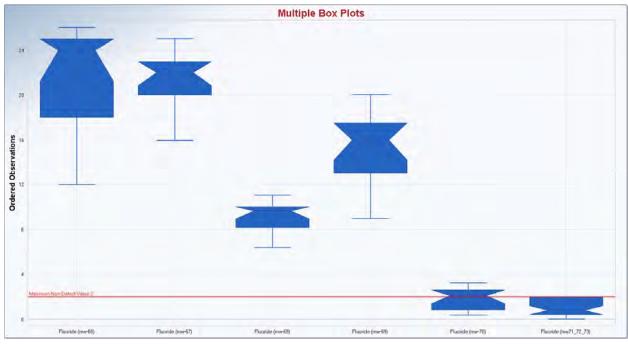
### **APPENDIX C**

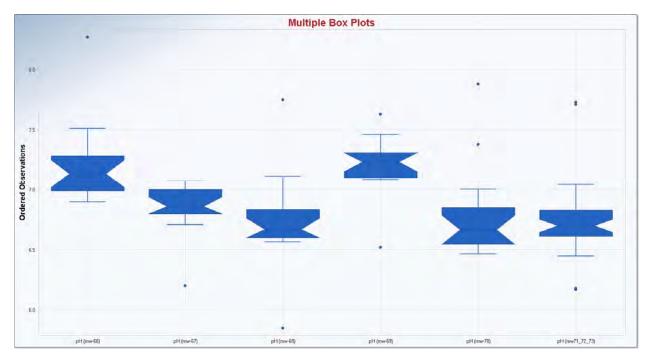
BOX AND WHISKER PLOTS FOR URS WELLS IN PICTURED CLIFFS SANDSTONE

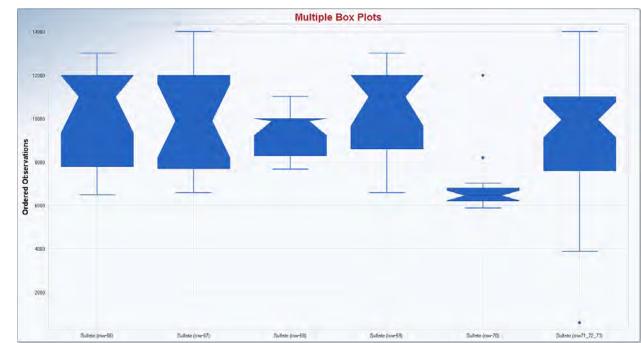


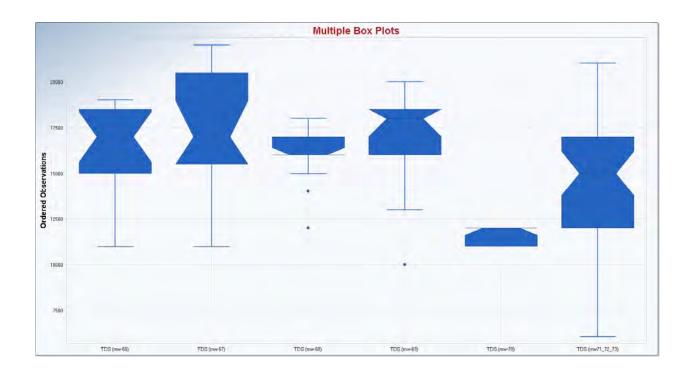








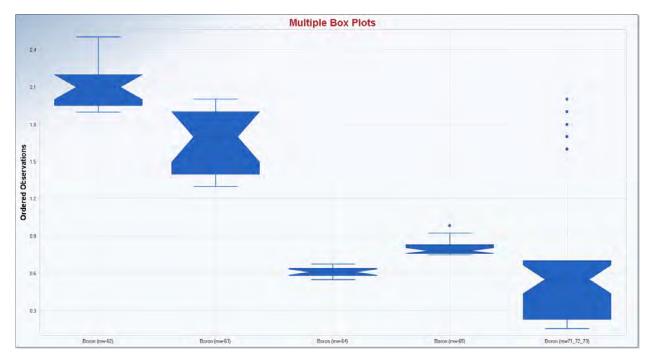


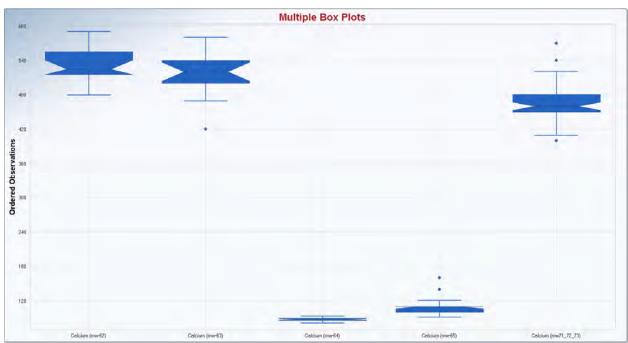


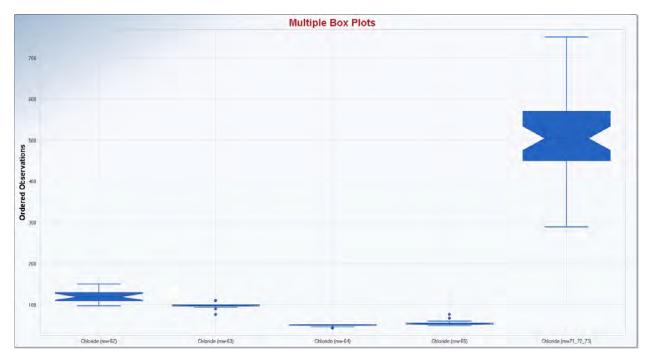


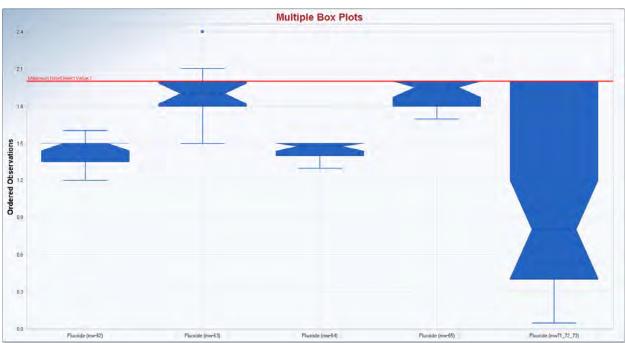
## **APPENDIX D**

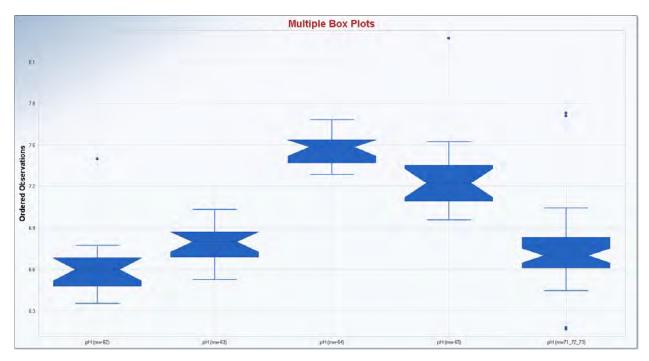
BOX AND WHISKER PLOTS FOR CWTP WELLS IN PICTURED CLIFFS SANDSTONE

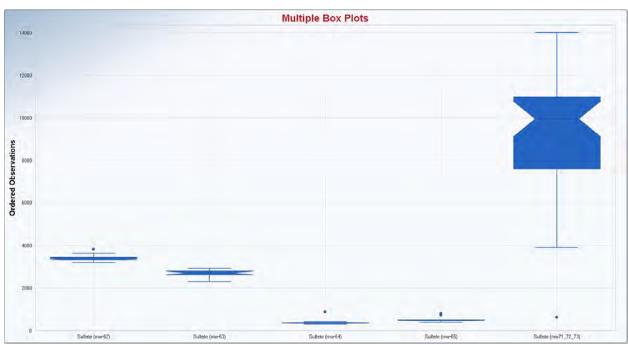


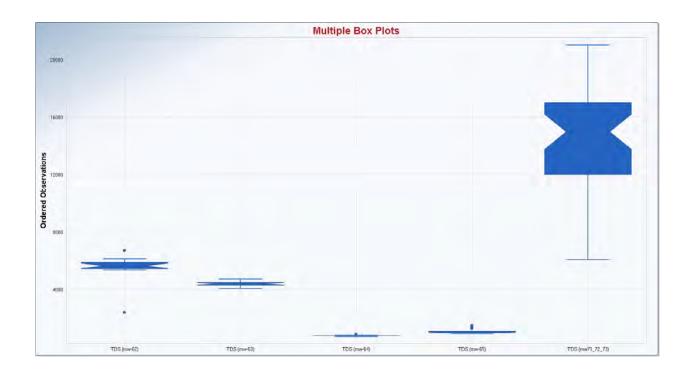








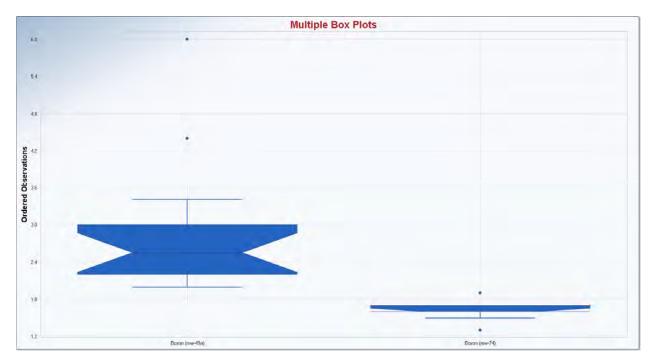


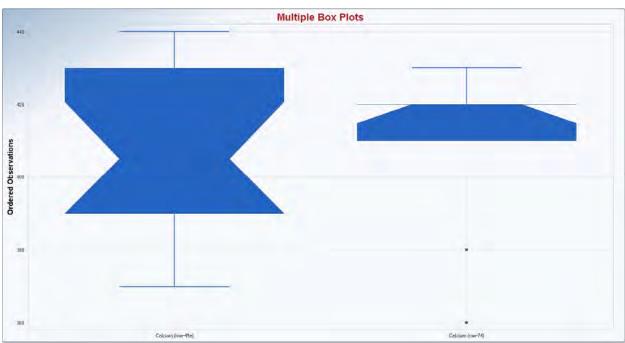


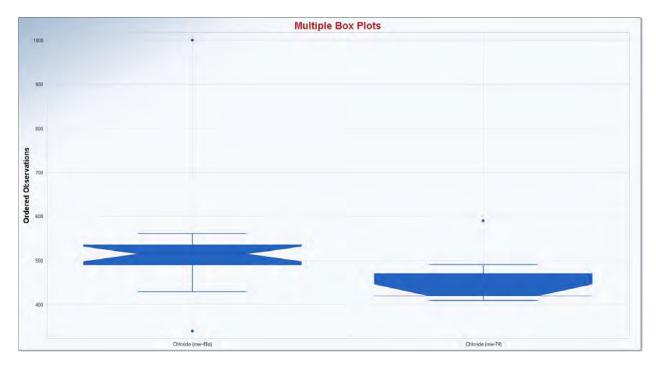


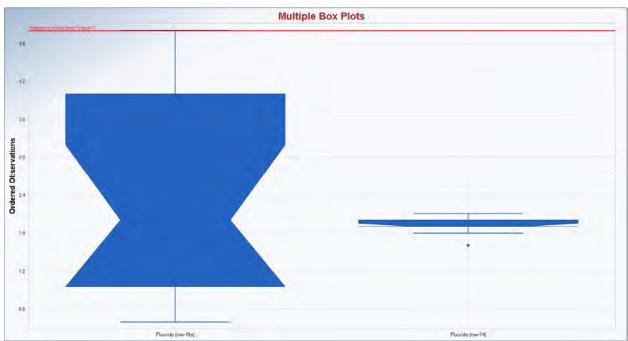
## **APPENDIX E**

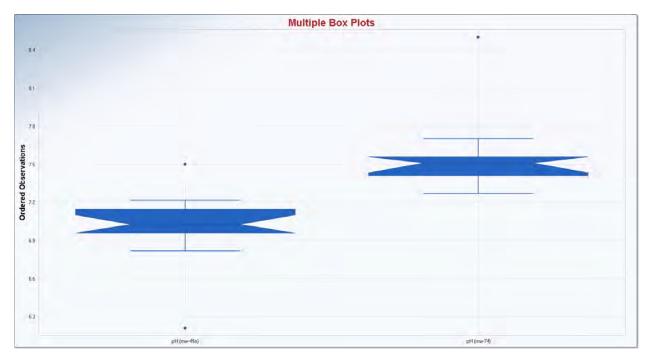
BOX AND WHISKER PLOTS FOR BACKGROUND WELLS IN LEWIS SHALE/ALLUVIUM

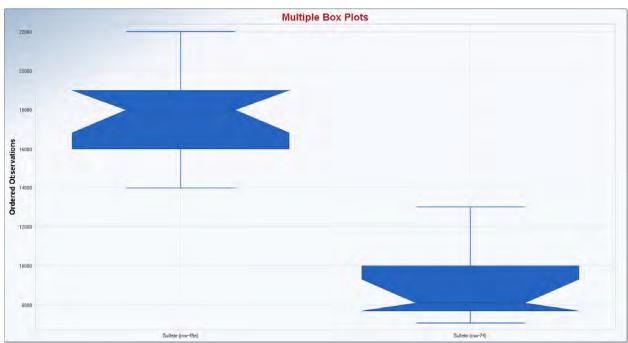


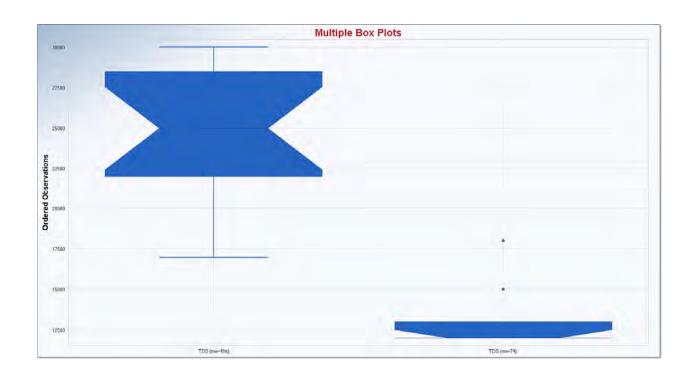








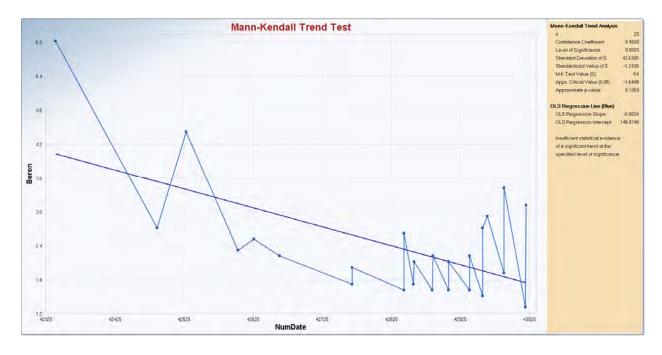


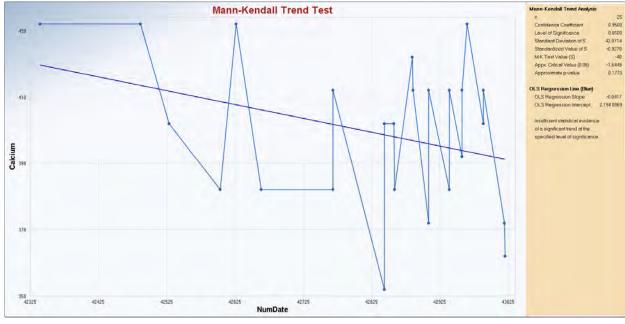


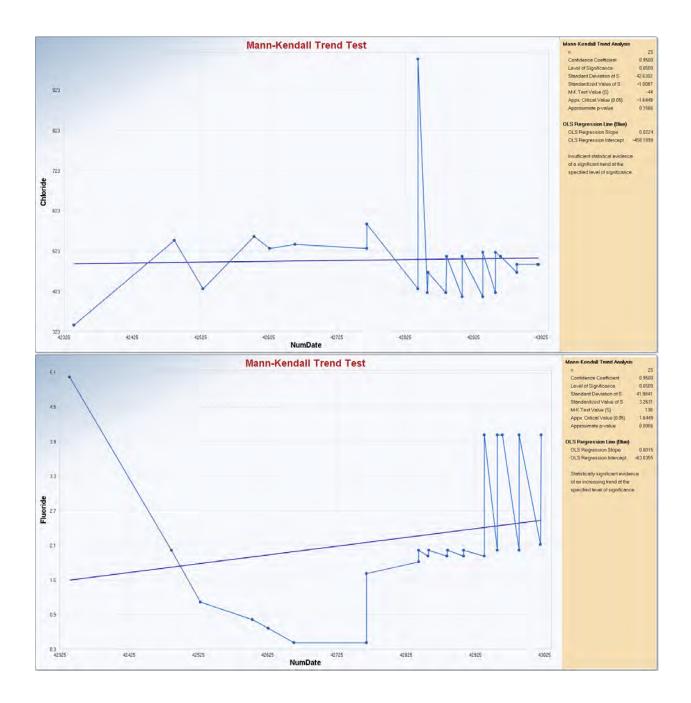


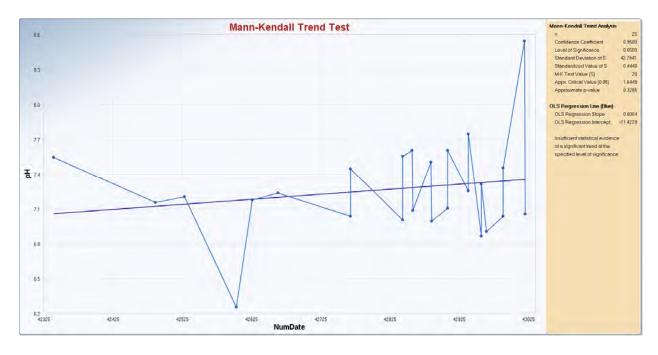
## **APPENDIX F**

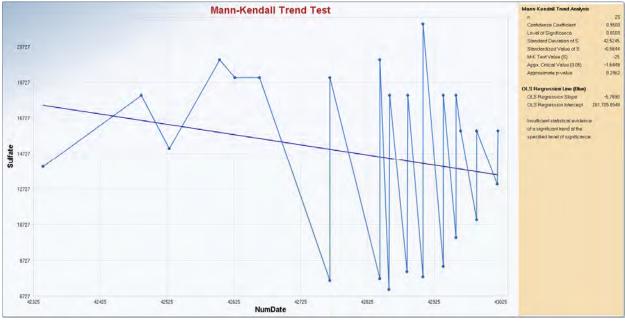
MANN-KENDALL TREND TESTS FOR BACKGROUND WELLS IN LEWIS SHALE/ALLUVIUM

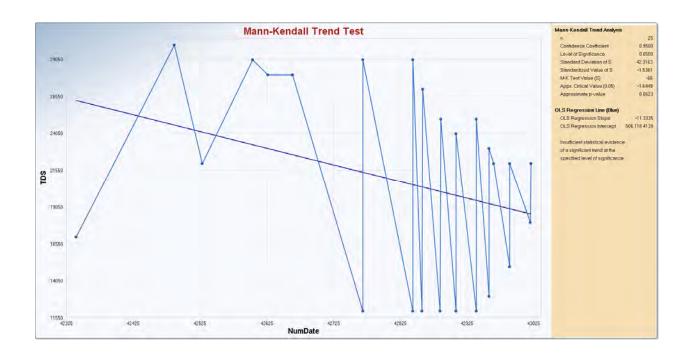








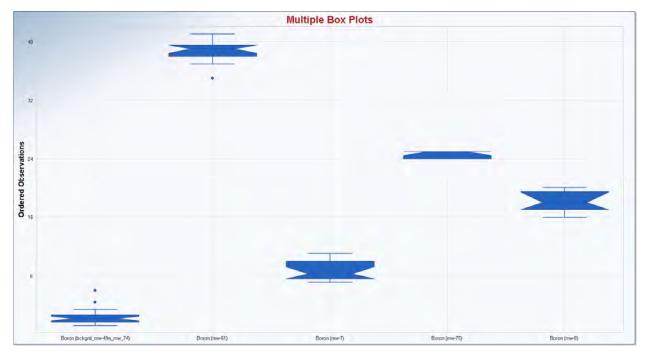


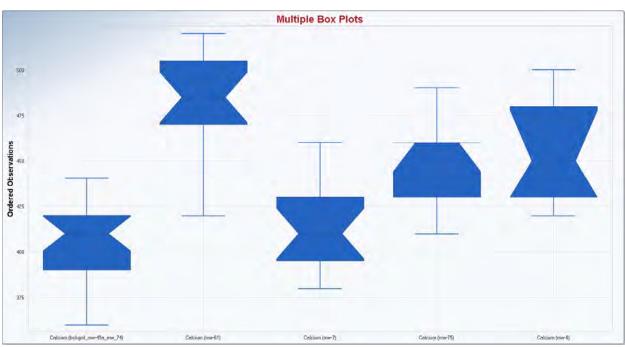


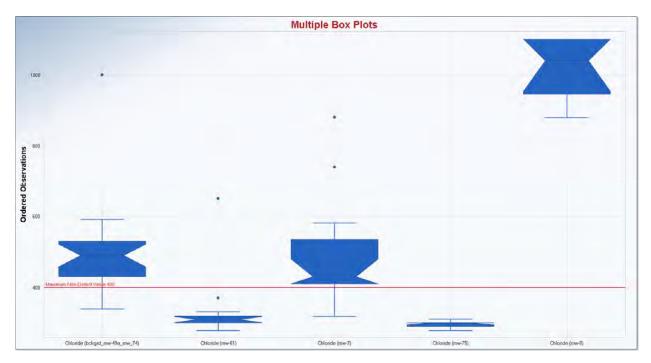


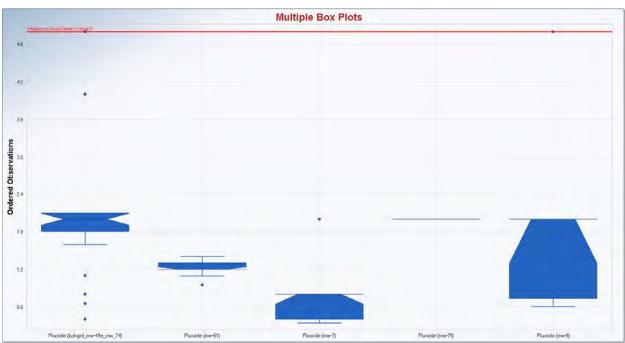
## **APPENDIX G**

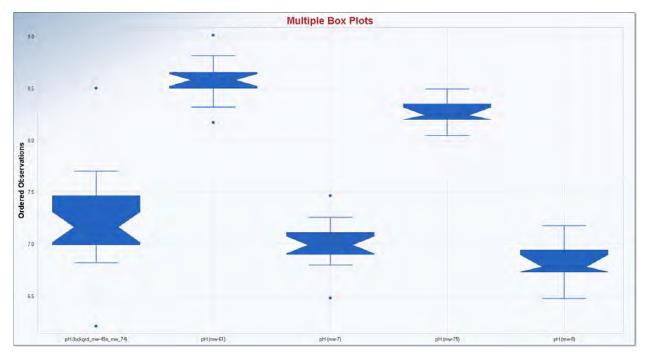
BOX AND WHISKER PLOTS FOR MULTIUNIT 1 WELLS IN LEWIS SHALE/ALLUVIUM

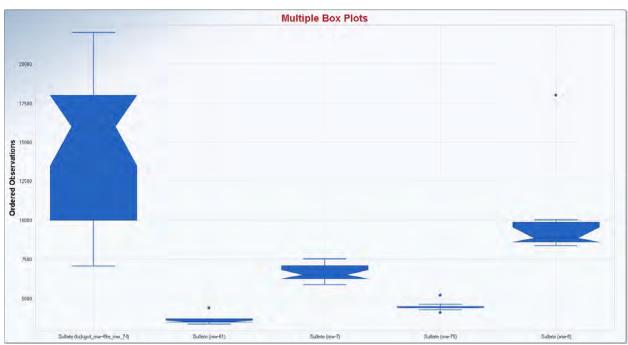


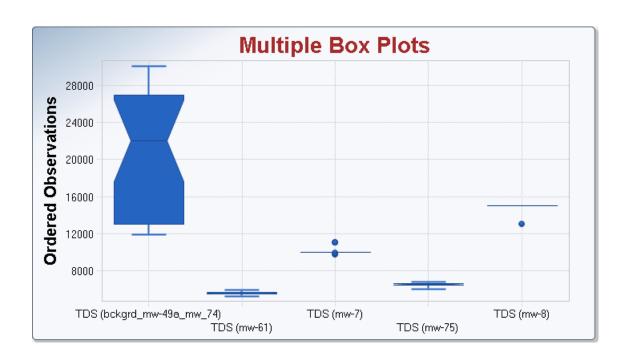














# PRACTITIONER'S NOTES (2 EXCEL SPREADSHEETS)



Practitioner's Notes

#### Prediction Limits with Retesting on Grouped Background Wells - Lewis Shale/Alluvium

INFORMAL AND INTERNAL WORK PRODUCT - DO NOT CITE OR COPY				MW49A & MV	N74	<u> </u>	
12/12/2017	Boron	Calcium	Chloride	Fluoride	рН	Sulfate	TDS
Trend testing (including NDs)							
Trend significant (p<0.05) <sup>1</sup> ?				Increasing; p<0.001			
OLS detrending successful (p<0.05) <sup>2</sup> ?				Yes; residuals not homoscedastic			
ND frequency (%)	0	0	0	56	0	0	0
Sample number	25	25	25	25	25	25	25
Goodness of fit testing (including NDs)							
Normal		x			x		x
Ln transform normal	x (transformed)						
50% <nds<100% (non-parametric)="" double="" or="" quant="" rule<br="">(NDs=100%)</nds<100%>				x			
Non-normal or no discernable distribution (non-parametric)			х			x	
ND frequency (%)	0	0	0	56	0	0	0
Sample number	25	25	25	25	25	25	25
Outlier testing (excluding NDs)							
Potential Outlier(s)	1.792 <sup>3</sup>		1000 <sup>4</sup>	Multiple values <sup>4</sup>	8.5 <sup>3</sup>		
Interpreted as outlier?	Yes		Yes	No	Yes		
Outlier removed?	Yes		Yes	No	Yes		
Proposed Statistical Method (UPL/LPL with resampling)							
Did GOF change after removing outlier(s) in background well?	No		Yes, Normal at p<0.05		No		
Suitable PL test based on GOF statistics	Parametric (In transformed data)	Parametric	Parametric	Non-Parametric	Parametric	Non-Parametric	Parametric
Background Mean	0.776	407.6	481.7		7.17		20800
Background SD	0.293	22.78	60.27		0.321		6665
k-multiplier* (Table 19-1; page D-38 Unified Guidance)	2.04	2.04	2.04		2.04		2.04
95% UPL <sup>5</sup> (backtransformed where appropriate)	3.950017463	454.0712	604.6508		7.82484		34396.6
95% LPL <sup>5</sup>					6.51516		
Non-parametric UPL <sup>6</sup>				2.1		22,000	
Non-parametric LPL <sup>6</sup>							
Notes:							

<sup>&</sup>lt;sup>1,2</sup>Too many NDs and not enough low frequency samples to conclude if trend is representative of groundwater conditions.

<sup>&</sup>lt;sup>3</sup>Normal distribution. Rosner's/Dixon's outlier test (p<0.05) identifies potential outlier(s). Box and whisker plots support this identification.

<sup>&</sup>lt;sup>4</sup>Non-normal distribution. Box and whisker plots identify potential outlier(s).

<sup>5</sup>Retesting criteria: scheme = 1 of 2 retesting, SWFPR < 0.10;

<sup>&</sup>quot;good" statistical power, per declared by the Unified Guidance

6 Nonparametric 1 of 3 retesting criteria; maximum ordered

sample value; "good" statistical power, per declared by the \* w=number of compliance wells (4 for Lewis Shale); n=size of background sample (25 in this case)

Table 10. List of Initial Exceedances for the Lewis Shale/Alluvium CCR Unit

Boron (upp	per prediction limit = 3	.95 ppm)
Well ID	Sample Date	Sample Value (ppn
MW-61	11/6/2015	35
MW-61	4/26/2016	39
MW-61	6/6/2016	38
MW-61	8/21/2016	38
MW-61	9/13/2016	40
MW-61	10/20/2016	37
MW-61	2/2/2017	37
MW-61	4/18/2017	39
MW-61	5/3/2017	39
MW-61	5/30/2017	40
MW-61	6/22/2017	38
MW-61	7/22/2017	39
MW-61	8/10/2017	40
MW-61	8/17/2017	39
MW-61	9/10/2017	41
MW-61	10/12/2017	38
MW-7	11/7/2015	9.4
MW-7	4/26/2016	10
MW-7	6/6/2016	10
MW-7	8/21/2016	11
MW-7	9/13/2016	10
MW-7	10/20/2016	10
MW-7	2/2/2017	9
MW-7	4/18/2017	8.6
MW-7	5/3/2017	8
MW-7	5/30/2017	7.3
MW-7	6/22/2017	7.6
MW-7	7/22/2017	7.6
MW-7	8/10/2017	7.8
MW-7	8/17/2017	7.5
MW-7	9/10/2017	8
MW-7	10/12/2017	7.2
MW-75	4/18/2017	24
MW-75	5/3/2017	25
MW-75	5/30/2017	24
MW-75	6/22/2017	25
MW-75	7/22/2017	25
MW-75	8/10/2017	25
MW-75	8/17/2017	25
MW-75	9/10/2017	24
MW-75	10/12/2017	24
MW-8	12/1/2015	17
MW-8	4/26/2016	20
MW-8	6/7/2016	20
MW-8	8/21/2016	19
MW-8	9/13/2016	19
MW-8	4/18/2017	17
MW-8	5/3/2017	17
MW-8	5/30/2017	16

n (upper predic	tion limit = 454.1 ppm)	Chlorid	e (upper predi	ction limit = 604.7ppm)
Sample Date	Sample Value (ppm)	Well ID	•	Sample Value (ppm)
8/17/2017	460	MW-7	4/26/2016	740
		MW-7	6/6/2016	880
5/3/2017	460			
7/22/2017	460	MW-8	12/1/2015	880
8/10/2017	460	MW-8	4/26/2016	920
8/17/2017	490	MW-8	6/7/2016	1100
9/10/2017	470	MW-8	8/21/2016	980
		MW-8	9/13/2016	970
12/1/2015	500	MW-8	4/18/2017	1100
4/26/2016	480	MW-8	5/3/2017	1100
8/21/2016	460	MW-8	5/30/2017	1100
9/13/2016	480			
	Sample Date 8/17/2017 5/3/2017 7/22/2017 8/10/2017 8/17/2017 9/10/2017 12/1/2015 4/26/2016 8/21/2016	8/17/2017 460  5/3/2017 460  7/22/2017 460 8/10/2017 460 8/17/2017 490 9/10/2017 470  12/1/2015 500 4/26/2016 480 8/21/2016 460	Sample Date 8/17/2017 460 MW-7 MW-7 MW-7 5/3/2017 460 MW-8 8/10/2017 460 MW-8 8/10/2017 460 MW-8 8/17/2017 460 MW-8 8/17/2017 490 MW-8 9/10/2017 470 MW-8 12/1/2015 500 MW-8 12/1/2016 480 MW-8 8/21/2016 460 MW-8	Sample Date 8/17/2017 460 MW-7 4/26/2016 MW-7 6/6/2016 5/3/2017 460 MW-8 12/1/2015 8/10/2017 460 MW-8 12/1/2015 8/10/2017 460 MW-8 4/26/2016 8/17/2017 490 MW-8 6/7/2016 8/17/2017 470 MW-8 8/21/2016 12/1/2015 500 MW-8 9/13/2016 12/1/2015 500 MW-8 4/18/2017 4/26/2016 480 MW-8 5/3/2017 8/21/2016 460 MW-8 5/3/2017

| PH | Upper prediction | limit = 2.1 ppm | | PH | Upper prediction | limit = 34,896.6 ppm | | PH | Upper prediction | limit = 34,896.6 ppm | | PH | Upper prediction | limit = 34,896.6 ppm | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper prediction | limit = 6.52 S.U. | | PH | Upper predic

Practitioner's Notes						Downgr	adient Well	EDA -Lewis S	hale/Alluviu	ım																		
INFORMAL AND INTERNAL WORK PRODUCT - DO NOT CITE OR COPY				MW61							MW7							MW75							MW8			
12/12/2017	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
Trend testing																												
Trend significant (p<0.05)	Increasing; p<0.05	Increasin g; p<0.05			-			Decreasin g; p<0.001		Decreasing; p<0.001	Increasing <sup>1</sup> ; p<0.05	-	Increasin g; p<0.01				Increasing; p<0.01					-		Increasing; p<0.05				
Detrending successful (p<0.05)?	Yes	Yes						Yes		Yes	Yes		Yes				Yes							Yes				
*Seasonal trends not tested due to low sample number																												
Goodness of fit testing (including NDs)																												
Normal	x (detrend)	x (detrend)			x		×	x (detrend)	x	x (detrend)		x	x (detrend)			x	x (detrend)		x	×	×	х	×			×	-	
Ln transform normal																												
Non-normal or no discernable distribution			×	×		×					×			×	×			x						x (detrend)	x		×	x
ND frequency (%)	0	0	0	0	0	0	0	0	0	6.25	87.5	0	0	0	0	0	0	100	0	0	0	0	0	0	62.5	0	0	0
Sample number	16	16	16	16	16	16	16	16	16	16	16	16	16	16	9	9	9	9	9	9	9	8	8	8	8	8	8	8
Outlier testing (excluding NDs)																												
Potential Outlier(s)		-58.93	650					-1.49		265.1		6.48								5200	6100			125.6			18000	
Interpreted as outlier?		Yes <sup>2</sup>	Yes <sup>3</sup>					Yes <sup>2</sup>		Yes <sup>2</sup>		Yes <sup>2</sup>								Yes <sup>2</sup>	Yes <sup>2</sup>			Yes <sup>3</sup>			Yes <sup>3</sup>	
Notes:																												

<sup>&</sup>lt;sup>1</sup>Too many NDs and not enough low frequency samples to conclude if trend is representative of groundwater conditions.

<sup>&</sup>lt;sup>2</sup>Normal distribution. Dixon outlier test (p<0.05) identifies potential outlier(s). Box and whisker plots support this identification.

<sup>3</sup>Non-normal distribution. Box and whisker plots identify potential outlier(s).

Non-Parametric significance level

#### Nonparametric legend:

alpha\_c = target per constituent false positive rate

c = number of monitoring constituents

alpha = target SWFPR = 0.10

w = number of compliance wells (4 for lewis shale)

ne = number of statistical evaluations per year (assumed 4)

w\* = w x ne = lookup entry for appendix table

alpha\_c 0.014938795 Equation 19.16 in Unified Guidance  $w^*$  16 quarterly sampling? 15

Non-Parametric 1 of 2 PL = Xn Significance Level Interpolation Table 19-19 w1 w2 n1 n2 15 16 20 25 25 25 kw,n: k15,25 0.0389 k20,25 0.0503 interpolated k multiplier Does 1 of 2achieved significance level 0.0446 No

Non-Parametric 1	l of 3 PL = Xn Significar	ce Level Interpolation	Table 19-20		
w1	w*	w2	n1	n*	n2
15	16	20	25	25	25
kw,n:					
k15,25	C	0.0044			
k20,25	C	0.0059			
interpolated k multiplier	0.	00515			
Does 1 of 3 achieved significance leve		Yes			

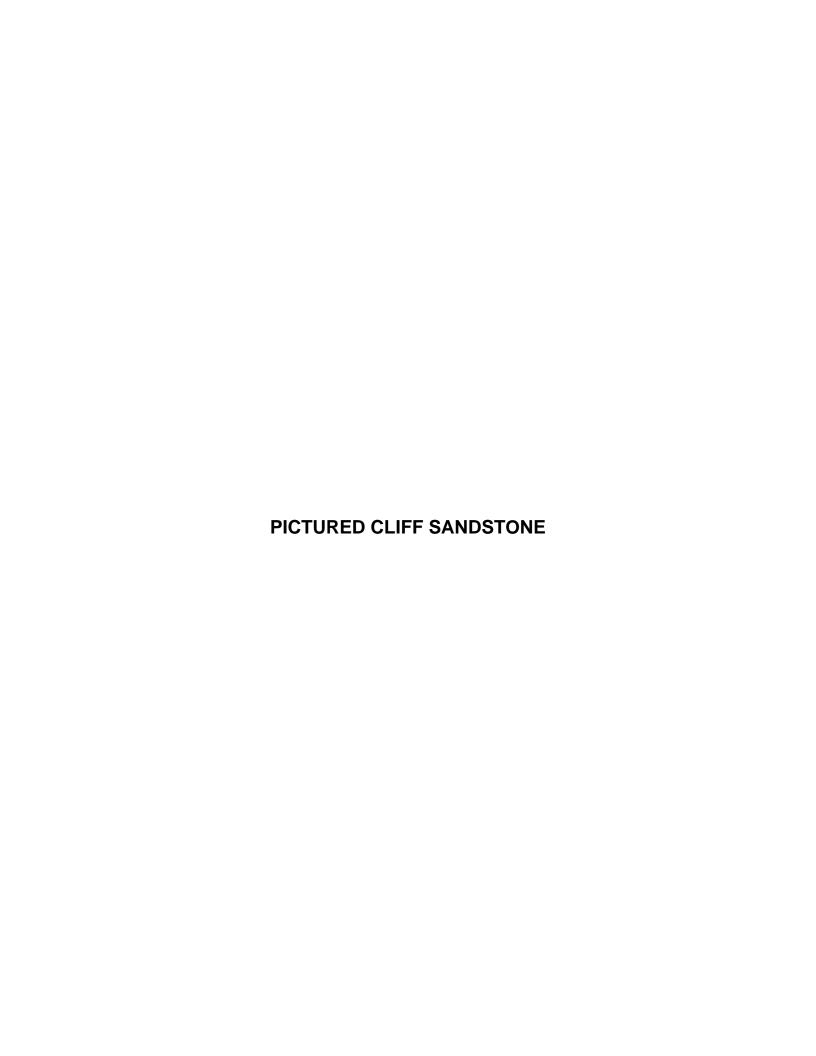
#### Parametric 1 of 2 retesting confidence

Probability of false positive for 1 of 2 resampling (equation [19.5] Unified Guidance)  $0.061285\,$ 

where:

4 wells x 7 tests = 28 = r

Corresponding confidence level 0.938715



#### Practitioner's Notes

### Prediction Limits with Retesting on Grouped Background Wells - Sandstone

INFORMAL AND INTERNAL WORK PRODUCT - DO NOT CITE OR COPY				MW 71, MW 72 AND MW7	3		
12/12/2017	Boron	Calcium	Chloride	Fluoride	рН	Sulfate	TDS
Trend testing (including NDs)							
Trend significant (p<0.05)?				Increasing <sup>1</sup> ; p < 0.001	Decreasing; p<0.05		
OLS detrending successful (p<0.05)?				NA	Yes; residuals appear homoscedastic		
ND frequency (%)	0	0	0	100	0	0	0
Sample number	42	42	42	41	42	42	42
Goodness of fit testing (including NDs)							
Normal		x	x		x (detrend)		
Ln transform normal							
50% <nds<100% (nds="100%)&lt;/td" (non-parametric)="" double="" or="" quant="" rule=""><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td></nds<100%>				x			
Non-normal or no discernable distribution (non-parametric)	x					×	х
ND frequency (%)	0	0	0	100	0	0	0
Sample number	42	42	42	41	42	42	42
Outlier testing (excluding NDs)							
Potential Outlier(s)	Multiple values <sup>4</sup>						
Interpreted as outlier?	No; more statistically independent samples needed to confirm						
Outlier removed?	No						
Proposed Statistical Method (UPL/LPL with resampling)							
Did GOF change after removing outlier(s) in background well?							
Suitable PL test based on GOF statistics	Non-Parametric	Parametric	Parametric	Non-parametric	Trend	Non-Parametric	Non-Parametric
Background Mean		465	508.6				
Background SD		35.15	94.73				
k-multiplier (interpolated)		2.123	2.123		See excel worksheet calculations		
95% UPL <sup>5</sup>		539.62345	709.71179				
95% LPL <sup>5</sup>							
Non-parametric UPL <sup>6</sup>	1.9			DQ Rule		13,000	20,000
Non-parametric LPL <sup>6</sup>							
Notes:							

<sup>&</sup>lt;sup>1</sup>Too many NDs to conclude if trend is representative of groundwater conditions.

 $<sup>^2</sup>$  Normal distribution. Rosner's outlier test (p<0.05) identifies potential outlier(s). Box and whisker plots support this identification.

 $<sup>^4\</sup>mbox{Non-normal distribution.}$  Box and whisker plots identify potential outlier(s).

SRetesting criteria: scheme = 1 of 2 retesting, SWFPR < 0.10;
"good" statistical power, per declared by the Unified
Guidance

<sup>&</sup>lt;sup>6</sup>Nonparametric 1 of 3 retesting criteria; second-maximum ordered sample value; "good" statistical power, per declared by the Unified Guidance

one-tailed t value (95% confidence, df = 40)	1.68	Table 16-1 in Unified Guidance
Standard error	0.5559	Includes k interpolated value
n	42	
Mean of sampling dates (numeric format)	42811	
SD of sampling dates	179 7	

Copied equation from Cameron's Stat SOP

```
\mathsf{UPL} = \widehat{s_0} + t_{1-\alpha,n-2} \cdot s_\varepsilon \cdot \sqrt{1 + \frac{1}{n} + \frac{(t_0 - \overline{t})^2}{(n-1)s_t^2}}
```

regression-line estimate of the mean concentration at time  $t_0$  one-tailed value at a confidence of  $1-\alpha$  and n-2 degrees of free standard error of the regression line number of samples in the background dataset date the granulowiset sample being compared to the UPL was collences of the sampling dates in the background dataset standard deviation of the sampling dates in the background dataset standard deviation of the sampling dates in the background dataset  $\widehat{x_0} = \frac{1 - a, n - 2}{s_e}$   $s_e = n = t_0 = \bar{t} = s_t = s_t = s_t = s_t$ 

nple Date	NumDate	UPL	LPL Yhat - OLS pH Estimate	pH Estimate	
3/5/2016 0:00	42434	7.955271	5.968729 6.962		
3/5/2016 0:00	42434	7.955271	5.968729 6.962		
/26/2016 0:00	42486	7.912091	5.949909 6.931		
/26/2016 0:00	42486	7.912091	5.949909 6.931		
5/6/2016 0:00	42527	7.878672	5.933328 6.906		
5/6/2016 0:00	42527	7.878672	5.933328 6.906		
/21/2016 0:00	42603	7.818927	5.899073 6.850		
21/2016 0:00	42603	7.818927	5.899073 6.850		
/12/2016 0:00	42625	7.802948	5.889052 6.846		
/13/2016 0:00	42626	7.80182	5.88818 6.845		
/20/2016 0:00	42663	7.775569	5.870431 6.823		
/20/2016 0:00	42663	7.775569	5.870431 6.823		
2/2/2017 0:00	42768	7.704609	5.813391 6.759		
2/2/2017 0:00	42768	7.704609	5.813391 6.750		
2/2/2017 0:00	42768	7.704609	5.813391 6.759	6.759	
/17/2017 0:00	42842	7.6583	5.7677 6.713		
/17/2017 0:00	42842	7.6583	5.7677 6.713		
/18/2017 0:00	42843	7.658322	5.767678 6.713		
5/2/2017 0:00	42857	7.649702	5.758298 6.704		
5/2/2017 0:00	42857	7.649702	5.758298 6.704		
5/2/2017 0:00	42857	7.649702	5.758298 6.704	6.704	
/29/2017 0:00	42884	7.63482	5.74118 6.688		
/29/2017 0:00	42884	7.63482	5.74118 6.688		
29/2017 0:00	42884	7.63482	5.74118 6.688		
/22/2017 0:00	42908	7.621239	5.724761 6.673		
/22/2017 0:00	42908	7.621239	5.724761 6.673		
/22/2017 0:00	42908	7.621239	5.724761 6.673		
21/2017 0:00	42937	7.605482	5.704518 6.655	6.655	
/21/2017 0:00	42937	7.605482	5.704518 6.655		
/22/2017 0:00	42938	7.60557	5.70443 6.655		
/10/2017 0:00	42957	7.595366	5.690634 6.643		
/10/2017 0:00	42957	7.595366	5.690634 6.643		
/10/2017 0:00	42957	7.595366	5.690634 6.643		
/17/2017 0:00	42964	7.592089	5.685911 6.639		
/17/2017 0:00	42964	7.592089	5.685911 6.639		
/17/2017 0:00	42964	7.592089	5.685911 6.639		
/10/2017 0:00	42988	7.579823	5.668177 6.624		
/10/2017 0:00	42988	7.579823	5.668177 6.624		
11/2017 0:00	42989	7.579945	5.668055 6.624	6.624	
12/2017 0:00	43020	7.56507	5.64493 6.605		
/13/2017 0:00	43021	7.564213	5.643787 6.604		
/13/2017 0:00	43021	7 564213	5.643787 6.604	6.604	

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| Regression Estimates and Informero Table
Estimates	Std. Error	T-values	p-values
32.85	9.982	3.291	0.00209
-4.101E-4	2.3315E-4	2.617	0.0125

Parameter intercept NumDate

OLS ANOVA Table

88 DOP

Iden 0.493 1

Inter 2.877 40

othel 3.37 41

R Square 0.146

Adjusted R Square 0.125

Sqr(MSZ) = Scale 0.258 0.493 0.0719 P-Velue P-Velue 6.847 0.0125

Visited: 777 | 144 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 Yhy Sec. 1952 (1952) (1

X Vester Services of Services Valid (1997) (19 207476 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 | 20071 7.190
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Table 4 and 6 combined. List of Initial Exceedances for the Pictured Cliff Sandstone CCR Units

	upper prediction lir				on limit = 540 ppm)		e (upper prediction l		(above I	pper prediction limit = qu tL) in two consecutive sam	ples (not resamples)			imit = 13,000 ppm)			imit = 20,000 ppm)		regression upper an	
ID	Sample Date	Sample Value (ppm)	Well ID	Sample Date	Sample Value (ppm)	Well ID	Sample Date	Sample Value (ppm)	Well ID	Sample Date URS CCR Unit	Sample Value (ppm)	Well ID	Sample Date	Sample Value (ppm)	Well ID	Sample Date	Sample Value (ppm)	Well ID	Sample Date	Sample Value (p
66	11/5/2015	87	MW-70	9/12/2016	550	MW-69	6/21/2017	1400	MW-66	11/5/2015	18							MW-66	8/20/2016	8.27
66	4/27/2016	86				MW-69	7/21/2017	1600	MW-66	4/27/2016	18							MW-70	8/20/2016	7.88
66 66	6/5/2016	89 100				MW-69 MW-69	8/9/2017	1600 1500	MW-66 MW-66	6/5/2016 8/20/2016	20 20							MW-68	9/13/2016	5.85
66	8/20/2016 9/12/2016	100 120				MW-69	8/16/2017 9/10/2017	1600	MW-66	8/20/2016 9/12/2016	20 12									
66	10/19/2016	130				MW-69	10/13/2017	1600	MW-66	10/19/2016	17									
66	2/1/2017	130					10/13/2017	1000	MW-66	2/1/2017	18									
66	4/16/2017	141				MW-70	11/9/2015	1200	MW-66	4/16/2017	25									
66	5/1/2017	140 130				MW-70	4/27/2016	1000	MW-66	5/1/2017	24									
66	5/29/2017	130				MW-70	6/5/2016	1200	MW-66	5/29/2017	25									
66	6/21/2017	130				MW-70	8/20/2016	1100	MW-66	6/21/2017	24									
66 66	7/21/2017	140				MW-70 MW-70	9/12/2016	1100 1100	MW-66 MW-66	7/21/2017	25 26									
66	8/9/2017 8/16/2017	140 150				MW-70	10/19/2016 2/1/2017	1100	MW-66	8/9/2017 8/16/2017	26 25									
66	9/9/2017	140				MW-70	4/16/2017	1100	MW-66	9/9/2017	26									
56	10/13/2017	150				MW-70	5/1/2017	1400	MW-66	10/13/2017	26									
	., ., .					MW-70	5/29/2017	1100												
67	11/4/2015	75				MW-70	6/21/2017	1000	MW-67	11/4/2015	18									
67	4/27/2016	86				MW-70	7/21/2017	1100	MW-67	4/27/2016	19									
7	6/6/2016	90				MW-70	8/9/2017	1100	MW-67	6/6/2016	24									
i7 i7	8/20/2016	100 110				MW-70 MW-70	8/16/2017	1100 1100	MW-67 MW-67	8/20/2016	23 23									
7	9/13/2016	110 120				MW-70 MW-70	9/9/2017 10/13/2017	1100	MW-67	9/13/2016										
i7 i7	10/20/2016 2/1/2017	120				MW-70	10/13/201/	1200	MW-67	10/20/2016 2/1/2017	16 16									
7	4/17/2017	130							MW-67	4/17/2017	22									
7	5/2/2017	130							MW-67	5/2/2017	22									
57	5/29/2017	120							MW-67	5/29/2017	21									
 i7 i7	6/21/2017	130							MW-67	6/21/2017	21									
	7/21/2017	150							MW-67	7/21/2017	22									
7	8/9/2017	160							MW-67	8/9/2017	22									
,	8/16/2017	160							MW-67	8/16/2017	22									
7	9/10/2017	150							MW-67	9/10/2017	24									
	10/13/2017	160							MW-67	10/13/2017	25									
3	11/6/2015	93							MW-68	11/6/2015	7									
	11/6/2015 4/26/2016	93 110							MW-68	11/6/2015 4/26/2016	8									
3	6/5/2016	100							MW-68	6/5/2016	10									
	8/20/2016	120							MW-68	8/20/2016	8.6									
В .	9/13/2016	120							MW-68	9/13/2016	9.7									
8	10/20/2016	120							MW-68	10/20/2016	6.8									
8	2/1/2017	120							MW-68	2/1/2017	6.4									
8	4/17/2017	130							MW-68	4/17/2017	10									
8	5/2/2017	130							MW-68	5/2/2017	10									
В	5/29/2017	120							MW-68	5/29/2017	8.3									
8	6/21/2017	120							MW-68	6/21/2017	8.7									
58	7/21/2017	130 120							MW-68	7/21/2017	9.6									
68	8/9/2017 8/16/2017	130							MW-68 MW-68	8/9/2017 8/16/2017	11 11									
68 68	9/10/2017	130 130							MW-68	9/10/2017	11 11									
68 68	10/13/2017	130 140							MW-68	10/13/2017	10									
68	10/13/2017	140							MW-69	11/4/2015	9.8									
69	11/4/2015	80								11/4/2013	3.5									
69	4/26/2016	95							MW-69	4/26/2016	13									
69	6/6/2016	94							MW-69	6/6/2016	13									
69	8/20/2016	110							MW-69	8/20/2016	16									
69	9/13/2016	120							MW-69	9/13/2016	16									
69	10/20/2016	120							MW-69	10/20/2016	9									
59	2/1/2017	130							MW-69	2/1/2017	11									
i9 i9	4/17/2017	130							MW-69	4/17/2017	17									
9	5/2/2017 5/29/2017	130 120							MW-69 MW-69	5/2/2017 5/29/2017	18 16									
9	6/21/2017	120							MW-69	6/21/2017	14									
9	7/21/2017	150							MW-69	7/21/2017	18									
9	8/9/2017	140							MW-69	8/9/2017	17									
9	8/16/2017	130							MW-69	8/16/2017	17									
•	9/10/2017	150							MW-69	9/10/2017	20									
	10/13/2017	150							MW-69	10/13/2017	20									
•																				
)	11/9/2015	95							MW-70	11/9/2015	2.6									
)	4/27/2016	91							MW-70	4/27/2016	2.3									
0	6/5/2016	89							MW-70	6/5/2016	2.1									
	8/20/2016	91							MW-70	4/16/2017	0.94									
)	9/12/2016 10/19/2016	96							MW-70 MW-70	5/1/2017 5/29/2017	1.6									
)	10/19/2016 2/1/2017	91 90							MW-70 MW-70	5/29/2017 6/21/2017	2.6 2.9									
	2/1/2017 4/16/2017	94							MW-70	6/21/2017 7/21/2017	2.9									
,	5/1/2017	95							MW-70	8/9/2017	3									
	5/29/2017	95 93							MW-70	8/16/2017	3.2									
,	6/21/2017	92							MW-70	9/9/2017	2.5									
	7/21/2017	100							MW-70	10/13/2017	1									
	8/9/2017	98 94																		
	8/16/2017	94																		
	9/9/2017	99																		
	10/13/2017	97																		
	11/9/2015	2.1	MW-62	9/12/2016	590					CWTP CCR Unit								MW-65	8/20/2016	8.27
	11/9/2015 4/27/2016	2.1	MW-62	9/12/2016 5/29/2017	590 570										-			MW-65 MW-64	8/20/2016 7/21/2017	7.61
	6/5/2016	2	MW-62	8/16/2017	590													mv-04	,/21/201/	7.61
	8/20/2016	2.3	MW-62	9/9/2017	570															
	9/12/2016	2.5	IVIVV-02	2/2/201/	3.0															
	10/19/2016	2.2	MW-63	9/12/2016	560															
	2/1/2017	2.1	MW-63	5/28/2017	560 550															
	7/21/2017	2.1	MW-63	8/16/2017	580															
	8/9/2017	2.2	33	-,, 202,																
	8/16/2017	2.1																		
	9/9/2017	2.3																		
	10/13/2017	2.2																		
	9/12/2016	2																		
	9/9/2017	2																		

#### Parametric PL k multiplier interpolation

#### Legend

 $k\!=\!PL$  multiplier w=number of compliance wells: 5 [URS] and 4 [CWTP] = 9 n=size of background sample (46 in this case) fw=fractional term fn=fractional term

#### See table 19-1 in Unified Guidance - page D-38 (5 COCs, quarterly)

	Paramet	ric 1 of 2 resamplin	g interwell k interpo	lation*		
	w1	w*	w2	n1	n*	n2
	8	9	12	45	46	50
kw,n:						
k8,45			2.1			
k12,45			2.2			
k8,50			2.09			
k12,50			2.19			
fw			0.25			
fn			0.2			
interpolated k n	nultiplier	2	.123			

Probability of false positive for 1 of 2 resampling ([19.5] Unified Guidance) 0.040877763

9 wells x 7 tests = 63 = r

Corresponding confidence level

0.959122237

Non-Parametric significance level

#### Nonparametric legend:

alpha\_c = target per constituent false positive rate c = number of monitoring constituents alpha = target SWFPR = 0.10 w = number of compliance wells ne = number of statistical evaluations per year w\* = w x ne = lookup entry for appendix table

alpha\_c 0.014939 Equation 19.16 in Unified Guidance w\* 36 quarterly sampling n 46

Non-Parametric 1 of 2 PL = Xn	Significance Level Interpo	lation Table 19	-19		
w1	w*	w2	n1	n*	n2
35	36	40	40	46	50
kw,n:					
k35,40	0.0368				
k40,40	0.0416				
k35,50	0.0247				
k40,50	0.0278				
fw	0.2				
fn	0.6				
interpolated k multiplier	0.030296				
Does 1 of 2achieved significance level < alpha_c?	No				

Non-Parametric 1 of 3 PL = Xn-	1 Significance Level Interp	olation Table 1	9-20		
w1	w*	w2	n1	n*	n2
35	36	40	40	46	50
kw,n:					
k35,40	0.0109				
k40,40	0.01243				
k35,50	0.00585				
k40,50	0.00667				
fw	0.2				
fn	0.6				
interpolated k multiplier	0.008091				
Does 1 of 3 achieved significance level < alpha_c?	Yes				

<sup>\*</sup>Assuming background wells are adequately representing groundwater spatial and temporal variability within the Pictured Cliff Sandstone; otherwise calculate for each CCR Unit separately

Practitioner's Notes																			Downgradient	Well Comparison 8	k Exceedanc	e Assessment Wo	rksheet - SANDS	TONE BACKGRO	UND																				
INFORMAL AND INTERNAL WORK PRODUCT - DO NOT CITE OR COPY	MW66						MW67					MW68					MW69					MW70					MW62				MW63					MW64					MW6S				
12/12/2017	Boron	Calcium Chlor	ide Fluoride	pH Sulfat	te TDS	Boron C	alcium Chlo	ride Fluor	ide pH	Sulfate TDS	Boron	Calcium	Chloride Flu	uoride pH	Sulfate	TDS Box	ron Calcium	Chloride	Fluoride pl	H Sulfate	TDS B	loron Calcium	Chloride Fluo	ride pH	Sulfate TI	TDS Boron	n Calcium	Chloride Fluori	ie pH	Sulfate TDS	Boron Calciu	m Chloride	Fluoride p	H Sulfate	TDS	Boron Calc	um Chloride	Fluoride p	H Sulfate	TDS I	Boron Calci	um Chloride	Fluoride	pH Sulfa	e TDS
Trend testing																																													4
Trend significant (p<0.05) <sup>1</sup>	Increasing; p<0.0001	; p<0.0	increasing p<0.001	; p<0.00	Increasing p<0.0001	; Increasing; p<0.0001	Incres p<0.0	sing; 0001	Decreasir p=0.05	g; Increasing Increasing p<0.0001	; Increasing; p<0.001	1	ncreasing; Incr p<0.002 ; p	reasing Decreas <0.01 g; p<0.0	in Increasing; Inc 05 p<0.001 p<	reasing Incre ; 0.0001 p<0.	asing ; 0001	Increasing; p<0.0001	Increasing Decre ; p<0.001 g; p=	easin Increasing; In 0.05 p<0.0001	reasing Incr :0.0003	reasing Increasing		Decreasir g; p<0.05		-   -	[	ecreasin ;; p<0.05	Decreasin g; p<0.01	Decreasi g; p<0.0	Increasing Increasing p<0.05 ; p<0.	ing 05	Decr	reasin <0.05				Decr	easin Increasing 0.05 ; p<0.05			-	D	ecreasin ; p<0.01	
Detrending successful (p<0.05)?  "Seasonal trends not tested due to high frequency sampling and relatively low sample count Goodness of fit testing (including NDs)	Yes	Ye:	Yes	Yes	Yes	Yes	Ye	· ·	Yes	Yes Yes	Yes		Yes	Yes Yes	Yes	Yes Ye	es	Yes	Yes Ye	es Yes	Yes	Yes Yes		Yes					Yes		Yes														
dodulless of the testing (including NDs)																																													
Normal	x (detrend)	x x (detre	nd)	x (detrer	nd) × (detrend	) x (detrend)	x (det	rend) x (approx	imate)	(approxim x (detrend ate, detrend)	) x (detrend)	x x	(detrend) (de	x etrend)	(d	x r etrend) (detr	x rend) x	x (detrend)	x (detrend)	x (detrend) (d	x letrend) (de	x x etrend) (detrend)	x (F	OS)		×	×	х	×		×		×	x x	×	x >			х		×	-			
Ln transform normal																															×														
Non-normal or no discernable distribution			x (detrend)	х			х		x (detren	d)				x (detren	x (detrend)				(detr	end)			х -	_ x (detrend	, × ,	х		х		х х		×					. х	х -	- ×	×	х	×	×	х х	×
ND frequency (%)	0	0 0	0	0 0	0		0 0	0	0	0 0		0	0	0 0	0	0	0	0	0 0	0	0	0	0 1	2.5 0	0 (	0 0	0	0 0	0	0 0	0 0	0	0	0 0	0	0 0	0	0	0 0	0	0 0	0	0	0 0	0
Sample number Outlier testing (excluding NDs)	16	16 16	16	16 16	16		16 1	6 16	16	16 16		16	16	16 16	16	16	16	16	16 1	6 16	16	16	16 1	6 16	16 1	16 16	16	16 16	16	16 16	15 15	15	15 1	16 15	15	16 1	16	16 1	6 16	16	16 16	16	16	16 16	16
Potential Outlier(s)			-7.507	8.27			330		Yes <sup>3</sup>					Yes <sup>3</sup>	Yes <sup>3</sup>		530		Ye	s <sup>1</sup>		57.11		- Yes <sup>3</sup>	-7.507				7.4		6.04	Multiple								0.9	98; 0.92 Multi	ple		8.3	
Interpreted as outlier?  Notes:  *Interpreted as "gross outlier" in hox and whisker plots	***		Yes <sup>1</sup>	Yes <sup>1</sup>			Yes <sup>1</sup>		Yes <sup>1</sup>					No	No		Yes²	***	N	0		Yes²		Yes	Yes <sup>1</sup>				Yes <sup>2</sup>		Yes	No <sup>3</sup>									Yes <sup>2</sup> No	ı		Yes <sup>3</sup>	

<sup>&</sup>lt;sup>3</sup>Interpreted as "gross outlier" in box and whisker plots

<sup>2</sup>Normal distribution. Dixon's outlier test (p-0.05) identifies potential outlier(s). Box and whisker plots support this identification.

<sup>3</sup>Non-normal distribution. Box and whisker plots identify potential outlier(s).

<sup>&</sup>lt;sup>1b</sup>Too many NDs to conclude if trend is representative of groundwater conditions.



## **APPENDIX H**

WOOD TECHNICAL MEMORANDA DOCUMENTING ADDITIONAL EVALUATION OF APPENDIX III CONSTITUENT DATA COLLECTED FROM THE CWTP IN APRIL AND JUNE 2018



# **Technical Memorandum**

To: Michele Robertson, RG File No: 1420162024

Pamela Norris

From: Natalie Chrisman Lazarr, PE cc: File

Carla Landrum, PhD

Tel:602-733-6087Fax:602-733-6100Date:April 25, 2018

Subject: CWTP DETECTION MONITORING - EVALUATION OF APRIL 2018 RESAMPLING DATA

Arizona Public Service Four Corners Power Plant - Fruitland, New Mexico

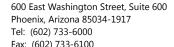
## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents an evaluation of Combined Waste Treatment Pond (CWTP) resampling data collected in April 2018 pursuant to the findings of a statistical analysis of initial Detection Monitoring constituent data supporting Coal Combustion Residuals (CCR) Rule compliance at the Arizona Public Service (APS) Four Corners Power Plant (FCPP). The referenced statistical analysis included calculation of background threshold values (BTVs) using upper prediction limits for Appendix III constituents and was documented in a Tech Memo prepared by Amec Foster Wheeler dated January 8, 2018.

Based on the results of initial exceedances of BTVs calculated for boron, calcium, and pH in groundwater collected downgradient of the CWTP during the initial eight rounds of monitoring, Amec Foster Wheeler advocated resampling strategies for these constituents. Resampling a monitoring well where an exceedance occurs can either verify the initial evidence of a release from a CCR unit or not, while avoiding unnecessary declarations based on false positives. Two resampling strategies are in place for the CWTP. Specifically, a 1 of 2 resampling strategy is in place for pH and calcium and a 1 of 3 resampling strategy is in place for boron. For a 1 of n resampling strategy, where n represents the number of resamples, the initial exceedance and all corresponding statistically independent resamples must exceed the BTV to declare a statistically significant increase (SSI) over background; if the resample(s) fail to exceed the BTV, there is not enough evidence to declare an SSI and detection monitoring continues.

## 2.0 EVALUATION

Table 1 presents the results of the April 2018 CWTP resampling event for boron, calcium and pH and summarizes both the calculated BTVs and the most recent exceedance identified during the initial eight rounds of detection monitoring. As indicated in Table 1, there is insufficient evidence to declare an SSI for calcium or pH at this time since resample concentrations were less than corresponding BTVs. For boron, there is insufficient evidence to declare an SSI over background in monitoring well MW-63 because the April 2018 resample concentration was less than the corresponding BTV; however, the 1 of 3 resampling strategy remains in effect for monitoring well MW-62 because the April 2018 resample concentration exceeded the BTV.



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## 3.0 RECOMMENDATIONS

The third and final resample for boron in MW-62 should occur no sooner than within approximately 3 months from the April 2018 resampling event to help ensure that the third and final resample event is statistically independent from the second. This resampling event could occur concurrent with a full round of detection monitoring of the CWTP as part of the semiannual detection monitoring program.

## 4.0 REFERENCES

Amec Foster Wheeler Environment and Infrastructure, Inc. (now known as Wood Environment and Infrastructure Solutions, Inc.), 2018. Statistical Analysis of Initial Detection Monitoring Appendix III Constituent Data. Arizona Public Service Four Corners Power Plant – Fruitland, New Mexico. Technical Memorandum dated January 12, 2018.

TABLE 1
CWTP DETECTION MONITORING RESAMPLING ANALYSIS - APRIL 2018

		Param	eter Value by Dowi	ngradient Monitori	ng Well	
	MW	<b>1-62</b>	MW	V-63	MW-64	MW-65
	Boron	Calcium	Boron	Calcium	рН	pН
Parameter	(ppm)	(ppm)	(ppm)	(ppm)	(SU)	(SU)
Not to Exceed BTV	1.9	540	1.9	540	5.7 - 7.6	5.7 - 7.6
Resampling Strategy in Effect	1 of 3	1 of 2	1 of 3	1 of 2	1 of 2	1 of 2
Most Recent Initial Exceedance Concentration During Initial Detection Monitoring (Date of Exceedance)	2.2 (10/13/17)	570 (9/9/17)	2.0 (9/9/17)	580 (8/16/17)	7.61 (7/21/17)	8.27 (8/20/16)
Resample Concentration (Sample Date)	2.1 (4/6/18)	520 (4/6/18)	1.3 (4/6/18)	530 (4/6/18)	7.5 (4/6/18)	7.2 (4/6/18)
SSI Over Background Status as of April 2018	To Be Determined <sup>1</sup>	Insufficient Evidence to Declare <sup>2</sup>	Insufficient Evidence to Declare <sup>2</sup>	Insufficient Evidence to Declare <sup>2</sup>	Insufficient Evidence to Declare <sup>2</sup>	Insufficient Evidence to Declare <sup>2</sup>
Path Forward	Continue 1 of 3 Resampling Strategy	Continue Detection Monitoring	Continue Detection Monitoring	Continue Detection Monitoring	Continue Detection Monitoring	Continue Detection Monitoring

## Notes:

BTV = Background Threshold Value

ppm = parts per million

SSI = statistically significant increase

SU = standard units

 $<sup>^{1}</sup>$  A 1 of 3 resampling strategy is in effect and one more statistically independent samples is necessary make a declaration.

<sup>&</sup>lt;sup>2</sup> There is insufficient evidence to declare a statistically significant increase over background because the resample concentration is less than the respective BTV.



# **Technical Memorandum**

To: Michele Robertson, RG File No: 1420162024.4.4

Pamela Norris

From: Natalie Chrisman Lazarr, PE cc: File

Carla Landrum, PhD

**Date:** October 15, 2018

Subject: CCR GROUNDWATER DETECTION MONITORING

**EVALUATION OF JUNE 2018 DATA COLLECTED FROM THE CWTP** 

Arizona Public Service Four Corners Power Plant – Fruitland, New Mexico

## 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents an evaluation of detection monitoring data collected in June 2018 from the Combined Waste Treatment Pond (CWTP) located at the Arizona Public Service (APS) Four Corners Power Plant (FCPP) in Fruitland, New Mexico. The evaluation consists of comparing CWTP compliance (i.e., downgradient) sample data to Appendix III background threshold values (BTVs) using the prediction limit statistical method declared in the *Statistical Analysis of Initial Detection Monitoring Appendix III Constituent Data* Technical Memorandum (2018 Tech Memo) (Amec Foster Wheeler Environment and Infrastructure, Inc. [Amec Foster Wheeler], 2018). This Tech Memo as well as the 2018 Tech Memo were prepared pursuant to the Coal Combustion Residuals (CCR) Rule and the *Statistical Data Analysis Work Plan* (Wood, 2018a) developed for the site.

## 2.0 EVALUATION

Table 1 presents the concentrations of Appendix III constituents in samples collected from CWTP compliance monitoring wells MW-62, MW-63, MW-64 and MW-65 on June 3, 2018. APS recognizes this sampling event as the first detection monitoring event of 2018 at the CWTP as well as the final resampling event for a 1 of 3 resampling strategy for boron at MW-62 based on an initial exceedance identified in the 2018 Tech Memo. Applicable BTVs are presented in Table 1 for comparison.

## 2.1 Updates to Background Threshold Values

With the exception of fluoride and pH, the BTVs presented in Table 1 reflect those previously declared in the 2018 Tech Memo for the CWTP. A discussion of updates to BTVs by constituent follows.

**Fluoride.** The Double Quantification Rule (DQR) is the applicable method for evaluating if there is a statistically significant increase (SSI) above background in CWTP compliance well (i.e. downgradient) fluoride concentrations since fluoride was not detected in background wells throughout the initial detection monitoring period (November 2015 to October 2017). The DQR states that two consecutive detectable sample concentrations in a downgradient well provides sufficient evidence to declare an SSI above a background that exhibits 100% non-detectable concentrations. However, as noted in the 2018 Tech Memo, the reporting limit values were inconsistent between background and compliance wells during the initial detection monitoring period. For a majority of sampling events, the maximum reporting limit for background well fluoride analyses (i.e., 2 milligrams per liter [mg/L]) exceeded the reportable concentrations



in downgradient CWTP wells. In these instances, achieving a lower reporting limit in compliance wells relative to background (i.e. 2 mg/L) subjectively increased the detection frequency in compliance wells and, therefore, introduced uncertainty in declaring an SSI above background using the DQR. To manage this uncertainty, recommendations were made in the 2018 Tech Memo to maintain a fluoride reporting limit for samples collected in both background and CWTP compliance wells of no more than 0.8 mg/L, effective in 2018 and thereafter. On this basis, the fluoride BTV in Table 1 reflects the 0.8 mg/L threshold, not the maximum background reporting limit equal to 2 mg/L, and the DQR remains in effect.

*pH.* For the initial detection monitoring period, there was a statistically significant (p<0.05) temporal trend in grouped background pH sample data associated with the CWTP (i.e., data collected from monitoring wells MW-71, MW-72 and MW-73). The temporal trend means the pH values change as a function of time and warrant an iterative calculation of pH prediction limits around this trend for each sampling event. The p value for Mann-Kendal trend was 0.03 for the 42 background samples collected during the initial detection monitoring period (Figure 1). Integrating the June 2018 pH data into the BTV Mann-Kendal trend analysis results in a statistically insignificant (p<0.05) temporal trend. In this case, the p value increases to 0.09 with a sample number equal to 45 (Figure 2). In the absence of a temporal trend, the BTV resorts to a prediction limit calculation for a stationary data set (i.e., the data contain no temporal trends). On this basis, the upper and lower pH BTVs in Table 1 were updated to a simple parametric prediction limit calculation for a stationary and normally distributed sample dataset. The updated pH parametric prediction limits maintain a 1 of 2 resampling strategy.

## 2.2 Exceedance Assessment

As indicated in Table 1, there is insufficient evidence at this time to declare an initial exceedance for boron, calcium, chloride, sulfate, or total dissolved solids based on June 2018 data because sample concentrations are less than their respective BTVs.

For boron, a 1 of 3 resampling strategy was implemented for MW-62 based on review of an initial exceedance declared in the 2018 Tech Memo. Table 1 presents the results of associated resampling data for this constituent as well as previous resampling data for comparison (Wood, 2018b). Since the June 2018 resampling concentration was 1.8 mg/L (which is less than the BTV), the initial exceedance was not confirmed. For an exceedance to be confirmed using a 1 of 3 resampling strategy, all three samples must exceed the BTV.

For fluoride, this constituent was detected in all downgradient wells at a concentration that exceeded the reporting limit used to establish that the constituent was not present in background wells (i.e., 0.8 mg/L). On this basis, there is sufficient evidence to declare initial exceedances at all downgradient wells for fluoride. Since the DQR is in effect for this constituent, a second consecutive sample from one or more of the downgradient wells must indicate a reportable concentration above 0.8 mg/L to declare an SSI over background.

For pH, there is sufficient evidence to declare an initial exceedance over background in monitoring wells MW-64 and MW-65 because the June 2018 pH values are higher than the corresponding upper BTV. The initial exceedance in pH triggers a 1 of 2 resampling strategy for this constituent. Resampling a monitoring well where an exceedance occurs can either verify the initial evidence of a release from a CCR unit or not, while avoiding unnecessary declarations based on false positives. In this case, a second statistically independent sample from monitoring wells MW-64 and MW-65 must exceed the pH upper BTV to declare

a statistically significant increase (SSI) over background; if the resample(s) fail to exceed the BTV, there is not enough evidence to declare an SSI and detection monitoring continues.

## 3.0 RECOMMENDATIONS

The second resample for pH in MW-64 and MW-65 should occur no sooner than within approximately 3 months from the June 2018 sampling event but before the next scheduled statistical evaluation for the Detection Monitoring Program at the APS FCPP. The next detection monitoring event is scheduled for December 2018 and evaluation of resampling results will be conducted thereafter with the associated detection monitoring data assessment.

To ensure that a false positive SSI for fluoride is not declared in accordance with the DQR, Wood recommends that the reporting limit for this constituent in compliance and background monitoring well data be enforced at a maximum value of 0.8 mg/L for the duration of groundwater monitoring at the CWTP.

The p values for the Mann-Kendal pH trend test prior to incorporating the June 2018 data and after are very close to 0.05, which is the stated significance level for the test. It is possible for the trend to revert to significant with future sample data. Therefore, trend testing should occur iteratively after every sampling event to determine if there is change in trend significance for pH; if the trend reverts to significant the prediction limit calculation should honor the trend. Trend detection is, in part, sensitive to the sampling frequency. The sampling frequency was highly irregular during the initial detection monitoring period. A more consistent sampling frequency (i.e. semiannual) will likely improve the consistency in trend detection.

## 4.0 REFERENCES

Amec Foster Wheeler Environment and Infrastructure, Inc. (Amec Foster Wheeler; now known as Wood Environment and Infrastructure Solutions, Inc. [Wood]), 2018a. Statistical Analysis of Initial Detection Monitoring Appendix III Constituent Data. Arizona Public Service Four Corners Power Plant – Fruitland, New Mexico. Technical Memorandum dated January 12, 2018 and revised August 20, 2018.

Wood, 2018a. *Statistical Data Analysis Work Plan*. Coal Combustion Residual Rule Groundwater Monitoring System Compliance. Four Corners Power Plant, Fruitland, New Mexico. Report prepared for Arizona Public Service. Updated October 15, 2018.

Wood, 2018b. CWTP Detection Monitoring – Evaluation of April 2018 Resampling Data. Arizona Public Service Four Corners Power Plant – Fruitland, New Mexico. Technical Memorandum dated April 25, 2018.



**TABLES** 

Table 1
Detection Monitoring Data Collected from the CWTP in June 2018

Well	Sample Date	Boron <sup>1</sup> (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride <sup>2</sup> (mg/L)	Sulfate (mg/L)	TDS (mg/L)	рН <sup>3</sup> (S.U.)
MW-62	10/13/2017	2.2						
	4/6/2018	2.1						
	6/3/2018	1.8	490	120	1.6	3500	5900	6.59
MW-63	6/3/2018	1.4	510	90	1.7	2600	4500	6.76
MW-64	6/3/2018	0.48	85	50	1.4	390	800	7.54
MW-65	6/3/2018	0.62	98	52	1.9	480	1000	7.22
Not to	Not to Exceed Upper BTV		540	710	0.8	13,000	20,000	7.04
Not to	Exceed Lower BTV							6.33

#### Notes:

BTV = Background Threshold Value

2.2

Concentration exceeds applicable BTV

mg/L = milligrams per liter

S.U. = standard units

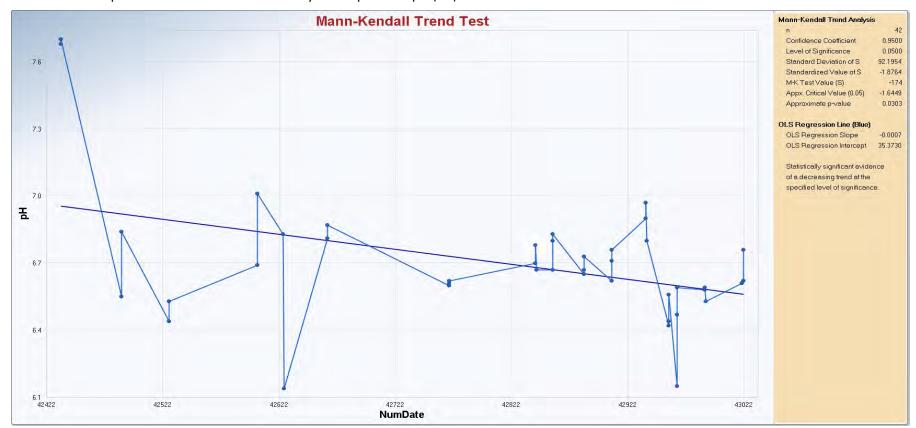
TDS = total dissolved solids

- A 1 of 3 resampling strategy was implemented after intial review of Appendix III constituent data (Amec Foster Wheeler, 2018). The October 2107 and April 2018 concentrations exceeded the BTV (Wood, 2018) but the June 2018 concentration was less than the BTV. On this basis, there is insufficient evidence to declare a statistically significant increase over background as all three sample results must exceed the BTV to declare an exceedance.
- <sup>2</sup> Fluoride was not detected (with a reporting limit of 0.8 mg/L) in background well samples (i.e., MW-71, MW-72, and MW-73) collected in June 2018. Since the Double Quantification Rule (DQR) is in effect and the reporting limits for both the background and downgradient wells were consistent, the detected concentrations in downgradient wells represent an initial exceedance for fluoride that must be confirmed by a consecutive exceedance during the next monitoring round to declare a statistically significant increase over background.
- <sup>3</sup> Grouped background sample data (MW-71, MW-72 and MW-73) supported a statistically significant (p<0.05) decreasing temporal trend in pH prior to June 2018, meaning pH values change over time. Trend testing subsequent to incorporating the June 2018 sampling data indicate the trend is no longer statistically significant (p<0.05). Therefore, the upper and lower BTVs reflect a traditional parametric prediction limit calculation with a 1 of 2 resampling strategy. Elevated pH values at MW-64 and MW-65 represent an intial exceedance.

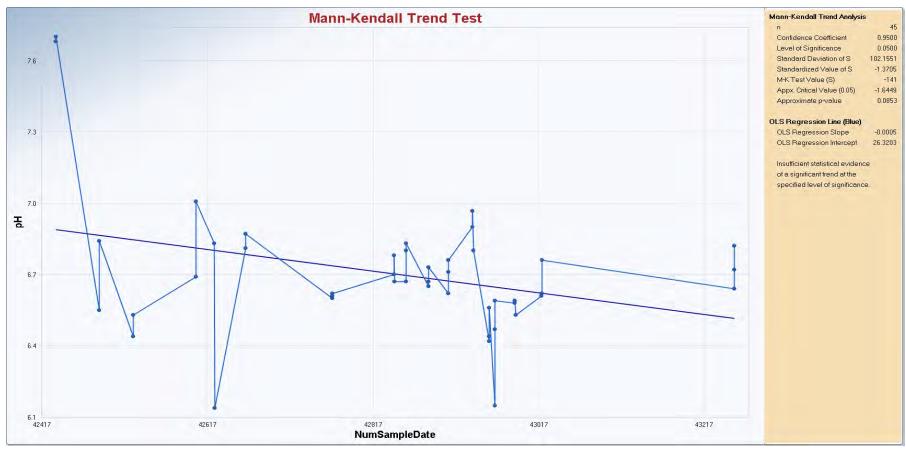
# wood.

**FIGURES** 

**Figure 1.** Mann-Kendal trend test results for the initial detection monitoring sample period for grouped wells MW-71, MW-72 and MW-73. The x-axis reflects the sample date in numeric format. The y-axis represents pH (SU).



**Figure 2.** Mann-Kendal trend test results including the June 2018 sample event and the initial detection monitoring sample period for grouped wells MW-71, MW-72 and MW-73. The x-axis reflects the sample date in numeric format. The y-axis represents pH (SU).





## **APPENDIX I**

WOOD TECHNICAL MEMORANDUM DOCUMENTING THE STATISTICAL ANALYSIS
OF INITIAL ASSESSMENT MONITORING APPENDIX IV CONSTITUENT DATA
COLLECTED FROM MULTIUNIT 1



# **Technical Memorandum**

To: Michele Robertson, RG File No: 142016202444

Pamela Norris

From: Natalie Chrisman Lazarr, PE File cc:

Carla Landrum, PhD

Date: October 15, 2018

**Subject: CCR GROUNDWATER ASSESSMENT MONITORING** 

STATISTICAL ANALYSIS AND RESULTS FOR MULTIUNIT 1

Arizona Public Service Four Corners Power Plant - Fruitland, New Mexico

#### 1.0 **INTRODUCTION**

This Technical Memorandum (Tech Memo) documents the initial statistical evaluation of assessment monitoring (i.e., Appendix IV constituent) groundwater data at Multiunit 1 located at the Arizona Public Service (APS) Four Corners Power Plant (FCPP) in Fruitland, New Mexico. The statistical methods and analysis include the determination of groundwater protection standards (GWPSs) for Appendix IV constituents using statistically-driven background threshold values (BTVs), the applicable U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) promulgated under the Safe Drinking Water Act, or alternative riskbased GWPSs established in the statute, whichever is higher (40 Code of Federal Regulations [CFR] Section [§] 257.95(h)). The statistical method selection process for evaluating assessment monitoring data was selected pursuant to the Coal Combustion Residuals (CCR) Rule (40 CFR § 257.93(f)(3)) and the analysis approach documented in the FCPP Statistical Data Analysis Work Plan (Wood, 2018).

The following sections detail data inputs, statistical evaluations, results and recommendations for the subject analysis.

#### 2.0 **DATA INPUTS**

#### 2.1 **Appendix IV Constituent Data**

The Multiunit 1 CCR groundwater monitoring well network consists of two background monitoring wells (MW-49A and MW-74) and four compliance (i.e., downgradient), monitoring wells (MW-7, MW-8, MW-61, and MW-75) with usable data for the subject statistical analysis<sup>1</sup>. Collected data from the two background monitoring wells were pooled for evaluation purposes.

The period of evaluation for Multiunit 1 Appendix IV constituent statistical analysis ranges from November 2015 through June 2018 and includes site data collected during a minimum of eight initial rounds of detection monitoring (for both Appendix III and IV constituents) and two rounds of assessment monitoring (for

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<sup>&</sup>lt;sup>1</sup> Monitoring wells MW-12R (now abandoned), MW-12R1 (a replacement well for MW-12R), MW-43, MW-50A and MW-51 are background monitoring wells associated with Multiunit 1 that are either routinely dry or have limited saturated thickness for sampling. Monitoring wells MW-40R and MW-76 are Multiunit 1 downgradient monitoring wells that are also either routinely dry or have limited saturated thickness for sampling.

Appendix IV constituents). The duration of collected data is shorter (i.e. February 2017 through June 2018) for MW-74, which was installed in January 2017.

Due principally to the addition of wells to the monitoring program in 2016 and 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). Assessment monitoring was performed on a quarterly basis and the first round of assessment monitoring at Multiunit 1 was conducted in March 2018; all Appendix IV constituents were evaluated in collected samples during this monitoring event. During the second round of assessment monitoring conducted in June 2018, only detected Appendix IV constituents from the first round of assessment monitoring were evaluated in collected samples as prescribed by the CCR Rule. Based on these frequencies of sample collection for Appendix IV constituents and the inconsistent presence of water at monitoring program wells, the minimum sample numbers used in the statistical evaluation of available data were 8 and 26 for compliance monitoring wells and pooled background monitoring wells, respectively

Appendix A contains the contents of the ProUCL data upload tables for the subject analysis. 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 the analyte's reporting limit value for the corresponding sample date. Duplicates were retracted using a random selection process. Combined radium and fluoride data exhibit unique sampling dates and/or duplicate records; therefore, these analytes were segregated into separate worksheets for duplicate retraction and software upload.

## 2.2 MCLs and Alternative Risk-Based GWPSs

As presented in the Introduction of this Tech Memo, the CCR Rule stipulates that GWPSs used in evaluation of assessment monitoring data are established by comparing the applicable U.S. EPA MCL or an alternative risk-based GWPS to a statistically-driven BTV calculated from background well data. The highest value is selected as the GWPS for each constituent. Table 1 lists the MCLs and alternative risk-based GWPSs used in this analysis.

## 3.0 STATISTICAL METHODS

Assessment monitoring data evaluation implements a single-sample population testing approach, where downgradient samples are compared to a pre-defined standard, in this case the GWPS. Detection monitoring data evaluation differs in that it is a two-sample population (or more) testing approach, where there is no GWPS to compare to for compliance assessment. As such, the statistical methods and testing approaches differ between detection monitoring and assessment monitoring.

To establish BTVs for each Appendix IV constituent, background well data underwent exploratory data analysis (EDA) to select an appropriate statistical test for calculating the BTVs (see Section 3.1). In accordance with the Unified Guidance (U.S. EPA, 2009) and CCR Rule (40 C.F.R. § 257.93(f)(3)), the Statistical Data Analysis Work Plan (Wood, 2018) identifies the upper tolerance limit (UTL) method as the prescribed approach for establishing BTVs. This method encompasses a variety of statistical tests to establish BTVs in instances where a promulgated U.S. EPA MCL or alternative risk-based GWPS exists. The purpose of selecting the UTL method is its ability to serve as a single-sample statistical comparison. The statistical hypothesis structure for a single-sample comparison is reversible, such that the same fixed background level can be used for assessment

monitoring and later for corrective action comparison testing, if necessary. The UTL tests are applicable for analytes that exhibit non-detectable frequencies of less than 100%. The U.S. EPA's Unified Guidance (2009) and the Statistical Data Analysis Work Plan (Wood, 2018) promote the use of the Double Quantification Rule (DQR) to calculate the UTL in cases where the background non-detection frequency is equal to 100%. Where applicable, the DQR uses the maximum reporting limit (RL) as the BTV.

To compare compliance data for each Appendix IV constituent to the corresponding established GWPS, derivation of compliance threshold limits are appropriate for assessment monitoring. On this basis, a threshold limit was established for each Appendix IV constituent in each compliance well using the confidence interval statistical method. This method encompasses a variety of statistical tests (U.S. EPA, 2009). For assessment monitoring, the lower confidence limit (LCL) for each analyte is compared to its respective GWPS to assess if the lower limit exceeds the GWPS and, if so, declares a statistically significant increase (SSI) in constituent concentrations above the GWPS. Much like the UTL, the confidence interval method's use is reversible. For assessment monitoring, the lower confidence limit is compared to the GWPS to determine if there is a potential release from the CCR unit whereas the upper confidence limit is compared to the GWPS for corrective action analysis to assess if corrective action is successful. Each compliance well analyte underwent EDA (see Section 3.2) to ensure that the compliance well had no sample outliers and to assess for statistically-significant (p<0.05) increasing or decreasing temporal trends in the sample data. The EDA process also identified which statistical distribution the sample data best fit to select an appropriate statistical comparison (e.g. parametric versus non-parametric) to the GWPS (Wood, 2018).

The following section describe these statistical methods in more detail.

## 3.1 EDA Workflow Procedures

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 SSI over the GWPS. Figure 1 generalizes the EDA workflow, including assessment of spatial heterogeneity, trend detection, data distribution assessment, and outlier detection. Sample number, monitoring well network configuration, sampling frequency and non-detect frequency determine which EDA methods are most useful. The final EDA step is selecting an adequate and appropriate statistical method.

There are a number of different types of tolerance limit and confidence interval quantification methods to select from, depending on the statistical distribution, the presence of a temporal trend, the type of statistical

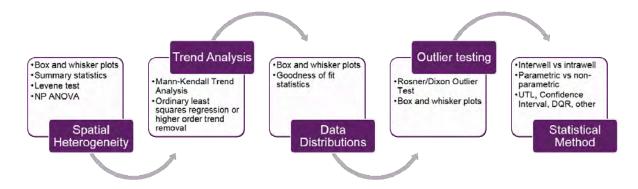


Figure 1. Assessment monitoring EDA and statistical method workflow procedures. Each box represent as separate step in the EDA workflow process. The items listed in each box identifies the statistical method(s) applied for each step. Both quantitative and qualitative methods are listed.

comparison (e.g. interwell or intrawell) and the quantity of non-detect values in the background sample data. The following subsections describe these methods and criteria for their selection.

Appendix B summarizes the results of the EDA of Multiunit 1 Appendix IV groundwater data.

## 3.2 Establishing Background Threshold Values

The EDA results for the subject analysis suggest that three UTL statistical tests are appropriate for collected Multiunit 1 background groundwater data: the parametric interwell upper tolerance limit, non-parametric interwell upper tolerance limit and the Double Quantification Rule. Each statistical test is described below. This work assumes that background well locations are adequate and thereby declare interwell comparisons appropriate.

## 3.2.1 Parametric Interwell Upper Tolerance Limit (P-UTL)

An interwell UTL represents an upper boundary, or threshold concentration value, that contains a prespecified proportion, or coverage, of the underlying statistical population. For example, this coverage can range from 95% to 99% of all possible sample measurements in the underlying background statistical population, depending on the data characteristics. To be meaningful, testing with the UTL assumes that this coverage is similar for any statistically similar population (e.g. downgradient compliance wells), thereby underscoring the importance of a representative background well. Declaring a tolerance coefficient is necessary to establish confidence that the background sample dataset contains the pre-specified coverage (U.S. EPA, 2009). Oftentimes a tolerance coefficient of at least 95% is used, which corresponds to a significance level ( $\alpha$ ) equal to 5% (U.S. EPA, 2009). Table 17-3 within the Unified Guidance (U.S. EPA, 2009) combines the coverage and confidence to calculate the UTL.

A parametric interwell upper tolerance limit (P-UTL) was calculated if the background sample data generally met the following criteria, which are tested using procedures declared in the Statistical Data Analysis Work Plan (Wood, 2018):

- 1. Temporal stationarity (no trend in concentration through time)
- 2. Normal or transformed normal data distribution
- 3. Spatial heterogeneity is minimal
- 4. Sample outliers have been removed
- 5. Sample data are statistically independent and identically distributed

The P-UTLs were calculated using a 99% coverage with a 95% confidence. Although the Unified Guidance (U.S. EPA, 2009) recommends at least 95% coverage, the 99% coverage is justifiable for the following reasons:

- 1) The sampling frequency for the November 2015 to June 2018 sampling period is higher than quarterly in some cases, suggesting the background sample data might not be derived from independent samples and might underrepresent long-term temporal variations in groundwater constituent concentrations. A larger coverage can help compensate for underrepresented temporal variation. A more conservative coverage (i.e. only 95%) is suggested once a longer history of samples exists and the background sampling frequency becomes more consistent (e.g., semiannual).
- 2) Spatial heterogeneity is suspected at Multiunit 1. Spatial heterogeneity introduces uncertainty in the sample data in that one sample location might have naturally occurring elevated concentrations of a

constituent relative to other sample locations. This uncertainty can increase the chance of a declaring a false positive SSI. By increasing the UTL coverage it is possible to reduce the chance of declaring a false positive SSI due to spatial heterogeneity. This analysis assumes that the background well designations are adequate such that the other extreme does not occur (i.e., that the spatial heterogeneity causes background analyte concentrations to be elevated and result in a false negative SSI downgradient of the site).

The UTL coverage assumes the background sample data set is adequate and representative of intrinsic spatial and temporal variability in groundwater constituent concentrations beneath Multiunit 1. Factors that can violate this assumption include: 1) background wells completed in a different water-bearing unit than compliance wells (i.e., spatial heterogeneity), 2) background wells that have not been sampled during times of extreme potentiometric level (drought and snow-melt), and 3) structurally-compromised wells that do not produce representative groundwater samples. Reference to the conceptual site model and professional judgement/interpretation are necessary to confirm the adequacy of background well designations.

Table 1 lists background analytes and wells that qualify for the P-UTL method.

## 3.2.2 Non-Parametric Interwell Upper Tolerance Limit (NP-UTL)

A non-parametric interwell tolerance limit (NP-UTL) was calculated if the upgradient sample data generally met the following diagnostic criteria:

- 1. Temporal stationarity
- 2. No discernable data distribution
- 3. Spatial heterogeneity is minimal
- 4. Sample outliers have been removed
- 5. Statistical independence

Criterion Number 2, where a parametric distribution is not discernable from the sample data, primarily drives the NP-UTL selection. A NP-UTL uses the first or second highest-ranked background concentration value to establish the UTL, depending on the number of data points. "Ranked" means the grouped background concentration values are ordered in decreasing order and assigned a rank based on this order, where a rank equal to one represents the maximum concentration value. Table 17-4 in the Unified Guidance (U.S. EPA, 2009) provides minimum coverage levels for the first and second ordered sample values with 95% confidence for different background sample numbers. Table 17-4 illustrates that the sample number controls the coverage for the NP-UTL and higher sample numbers are necessary to achieve a higher coverage. Overall, the non-parametric tolerance limit is less powerful in comparison to its parametric counterparts (but more appropriate when parametric assumptions are not met).

The NP-UTL uses the maximum ranked value in the background well, which can constitute a reporting limit value if the reporting limit is higher than detectable concentrations. It is preferable that the maximum reporting limit in compliance wells not exceed the maximum reporting limit in the background well.

Table 1 lists background analytes and wells that qualify for the NP-UTL method.

## 3.2.3 Double Quantification Rule

The DQR is appropriate when the analyte exhibits 100% non-detectable concentrations in the background data set. The DQR states that, for any given compliance well analyte, two consecutive detectable concentrations that are above the maximum reporting limit are sufficient evidence to declare an SSI.

It should be noted that implications exist when there are inconsistencies in reporting limit values over time and between monitoring wells. For example, when the downgradient wells reflect a higher maximum reporting limit in comparison to the background well, applying the DQR leads to uncertainty in identifying a real SSI (i.e., the statistical test results in a false negative SSI). In other cases, it is possible to have lower reporting limit values in downgradient wells, resulting in a higher detection frequencies, which can trigger a false positive SSI. For these reasons, it is recommended that the laboratory establish achievable and consistent analytical reporting limit values among all wells throughout the duration of the monitoring program.

Table 1 lists background analytes and wells that qualify for the DQR.

## 3.3 Establishing Compliance Well Comparison Limits

Confidence intervals are a recommended approach for comparing compliance well (i.e., downgradient) data to a GWPS during assessment monitoring or corrective action (U.S. EPA, 2009). The confidence interval method estimates the range of concentration values (e.g. the upper and lower limits) in which the true central tendency (e.g. mean, median for this work) is expected to occur with a certain probability. The confidence interval accounts for both the level of statistical variation in the data and the desired confidence level. For this statistical analysis, the lower confidence limit is of interest and reflects the lowest concentration beyond which we do not expect the true mean of the downgradient sample data to reside.

Below is the formal null hypothesis statement for the confidence limit:

Ho: The true central tendency of the sample concentrations at the compliance point (e.g. downgradient well) is no greater than the predetermined GWPS.

This is the assumed condition unless, through a statistical test, the actual data demonstrates otherwise. The null hypothesis is rejected when the lower confidence limit (LCL) of the compliance sample dataset resides above the GWPS, resulting in sufficient evidence to declare an SSI.

Statistical power is the ability for the statistical test to detect a true increase above the GWPS. The statistical power can be negligible when the sample size is small, the sample variability is high and/or the confidence level is set too high (U.S. EPA, 2009). Statistical confidence should not be confused with the statistical power. The *statistical confidence* (1- $\alpha$ ) indicates how often the confidence limit will contain the statistical parameter of interest (i.e., mean or median). The *statistical power* indicates how often a test will correctly identify an exceedance, using the statistical parameter of interest, above the GWPS. Because the statistical power typically decreases with higher confidence levels, the Unified Guidance (U.S. EPA, 2009) recommends first establishing an acceptable level of statistical power and then computing the associated confidence level. The Unified Guidance (U.S. EPA, 2009) suggests that the compliance test have at least 80% statistical power to detect a compliance well central tendency that is two times above the GWPS. This recommendation primarily accommodates parametric statistical tests, meaning when parametric method assumptions are not met, the parametric methods' power and confidence are not meaningful. In these cases, non-parametric methods are appropriate and their confidence limits generally exhibit somewhat less statistical power than their parametric counterparts.

Page 6

The EDA results for the subject analysis suggest that three LCL statistical tests are appropriate for groundwater data collected downgradient of Multiunit 1: the parametric lower confidence limit, non-parametric lower confidence limit and the parametric lower confidence limit with a temporal trend. Each statistical test is described below.

## 3.3.1 Parametric Lower Confidence Limits (P-LCL)

For parametric data distributions, the mean (i.e., central tendency), standard deviation, and one-tailed Student's t value are necessary to calculate the parametric lower confidence limit (P-LCL) according to Equation 21.1 in the Unified Guidance (U.S. EPA, 2009). The confidence level (1- $\alpha$ ) is necessary to establish the Student's t value. The objective is to select the  $\alpha$  that achieves high statistical power with an acceptable level of confidence. Table 22-2 in Appendix D of the Unified Guidance (U.S. EPA, 2009) allows for the selection of  $\alpha$  based on the compliance well's sample number and the above statistical power criterion (i.e., at least 80%). The selected  $\alpha$  for the P-LCL test is the maximum value that achieves at least 80% statistical power for the set sample number (n) and the minimum RCRA standard requirement of  $\alpha$  = 0.01 (U.S. EPA, 2009).

Table 2 summarizes compliance well analytes that quality for the P-LCL test.

## 3.3.2 Non-Parametric Lower Confidence Limits (NP-LCL)

For the non-parametric cases, the median represents the central tendency. The Unified Guidance (U.S. EPA, 2009) does not provide formal guidance for calculating the statistical power for a non-parametric statistical test using environmental data. As such, the non-parametric confidence limit calculations will achieve a minimum confidence level of 95%.

The non-parametric LCL (NP-LCL) test uses the sample number and the 95% confidence level  $(1-\alpha)$  to establish the LCL. The compliance well with a sample count (n) is first ordered from smallest to largest sample concentration then assigned a numeric rank, where 1 is the lowest concentration and (n) is the highest concentration. Table 21-11 in Appendix D of the Unified Guidance (U.S. EPA, 2009) provides achievable confidence levels for ranked values for small sample sizes (n<20). The rank value that achieves the 95% confidence level or higher serves as the lower non-parametric confidence limit.

Table 2 summarizes compliance well analytes that quality for the NP-LCL test.

## 3.3.3 Calculating the Trend-Dependent Lower Confidence Limit (P-LCLT)

The confidence interval tests are sensitive to temporal trends, which inflate the standard deviation. If the temporal Mann-Kendall trend was significant (p<0.05), and the data exhibit a parametric distribution, the 95% lower confidence interval was calculated around the temporal trend (P-LCLT). If a trend was significant (p<0.05) but the data distribution was non-parametric, then a NP-LCL was calculated. The P-LCLT was calculated in ProUCL 5.1 using equation 10-12 in the ProUCL 5.1.1 Technical Guidance (U.S. EPA, 2015). By proxy, the coefficient of variation was calculated to assess the statistical power of this parametric test. The Unified Guidance (Section 7.4.1) suggests that if the coefficient of variation is less than or equal to 0.5, the lower limit confidence exhibits adequate statistical power.

Table 2 summarizes compliance well analytes that quality for the P-LCLT test if the statistically significant (p<0.05) temporal trend is increasing or decreasing.

## 4.0 RESULTS

Table 1 summarizes the GWPS selection for each Appendix IV constituent. The GWPS constitutes either the statistically calculated BTV, the U.S. EPA's promulgated MCL, or the risk-based alternative GWPS identified for constituents without MCLs, whichever value is higher.

Table 2 summarizes: 1) which compliance wells exhibit SSIs above 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 sufficient evidence to declare an SSI for cobalt in monitoring wells MW-61 and MW-75, which show LCLs equal to 0.016 mg/L and 0.043 mg/L, respectively. The GWPS for cobalt is equal to 0.01 mg/L, which corresponds to the NP-UTL BTV (Table 1). Monitoring wells MW-61 and MW-75 also exhibit statistically significant (p<0.05) increasing temporal trends for cobalt.

This statistical analysis also indicates there is sufficient evidence to declare an SSI for molybdenum in monitoring well MW-75, which shows an LCL equal to 0.15 mg/L. The GWPS for molybdenum is 0.1 mg/L which corresponds to the risk-based alternative GWPS identified for this constituent (Table 1).

This statistical analysis indicates there is insufficient evidence to declare SSIs above their respective GWPSs for the remaining Appendix IV analytes (i.e., excluding cobalt and molybdenum). Statistically significant (p<0.05) increasing trends are present for MW-7 (arsenic and selenium), MW-61 (fluoride) and MW-75 (selenium). Statistically significant (p<0.05) decreasing trends are present for monitoring wells MW-7 and MW-8 for barium and molybdenum.

This analysis suggests spatial heterogeneity is present within the grouped background wells (MW-49a and MW-74) for arsenic, combined radium, lithium and selenium. Specifically, MW-74 exhibits elevated concentrations for selenium relative to all Multiunit 1 monitoring wells. The elevated background selenium concentrations present a possibility for declaring a false negative SSI in downgradient wells using the interwell statistical comparison method. Reference to the conceptual site model and professional judgement/interpretation are necessary to confirm adequacy and representativeness of background well designations for Multiunit 1.

Statistically significant (p<0.05) trends were detected in the background dataset for barium (decreasing), molybdenum (decreasing) and combined radium (decreasing).

## 5.0 RECOMMENDATIONS

This statistical analysis results in the following recommendations for the Multiunit 1 assessment monitoring statistical analysis:

• There is sufficient evidence to declare an SSI above the GWPS for cobalt in wells MW-61 and MW-75 and molybdenum in well MW-75. Therefore, proper notification in the facility's operation record should be made and, within 90 days of the date of this Tech Memo, APS should either begin corrective action assessment or demonstrate that the SSI is due to an alternative source.

- A lower sampling frequency is necessary to avoid temporal autocorrelation in the groundwater monitoring data; a quarterly or semiannual frequency should be used until future data evaluations can establish a more objective, data-driven sampling frequency.
- The laboratory should achieve reporting limits below the U.S. EPA's promulgated MCLs and maintain a constant reporting limit for each analyte over time for all monitoring wells background and compliance. This recommendation will improve the certainty of detection of temporal trends in the groundwater sample data while also decreasing the probability for declaring false negative/false positive SSIs when applying statistical tests, especially the DQR.
- Intrawell statistical comparisons should be considered for analytes that exhibit spatial heterogeneity. Reference to the conceptual site model and professional judgement/interpretation are necessary to confirm adequacy and representativeness of background well designations for Multiunit 1.

## 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., 2018. *Statistical Data Analysis Work Plan*. Coal Combustion Residual Rule Groundwater Monitoring System Compliance, Four Corners Power Plant, Fruitland, New Mexico. Prepared for Arizona Public Service. October, 2018.



**TABLES** 



Table 1
GWPS Selection for the FCPP Multiunit 1
Appendix IV Statistical Comparison

			Alternative	Background Threshold Value		
Grouped Background		US EPA	Risk-Based	(Calculation		
Wells	Constituent	MCL	GWPS	Method <sup>1,2</sup> )	Units	GWPS Selection <sup>3</sup>
MW-49A & MW-74	Antimony	0.006		0.01 (NP-UTL)	mg/L	BTV
MW-49A & MW-74	Arsenic	0.01		0.0086 (P-UTL)	mg/L	US EPA MCL
MW-49A & MW-74	Barium	2		0.042 (NP-UTL)	mg/L	US EPA MCL
MW-49A & MW-74	Beryllium	0.004		0.001 (NP-UTL)	mg/L	US EPA MCL
MW-49A & MW-74	Cadmium	0.005		0.002 (NP-UTL)	mg/L	US EPA MCL
MW-49A & MW-74	Chromium	0.1		0.02 (NP-UTL)	mg/L	US EPA MCL
MW-49A & MW-74	Cobalt		0.006	0.01 (NP-UTL)	mg/L	BTV
MW-49A & MW-74	Fluoride	4		5 (NP-UTL)	mg/L	BTV
MW-49A & MW-74	Lead		0.015	0.01 (DQR)	mg/L	Alternative Risk-Based GWPS
MW-49A & MW-74	Lithium		0.04	1.8 (NP-UTL)	mg/L	BTV
MW-49A & MW-74	Mercury	0.002		0.0002 (NP-UTL)	mg/L	BTV/US EPA MCL
MW-49A & MW-74	Molybdenum		0.1	0.12 (P-UTL)*	mg/L	Alternative Risk-Based GWPS
MW-49A & MW-74	Selenium	0.05		0.092 (NP-UTL)	mg/L	BTV
MW-49A & MW-74	Thallium	0.002		0.017 (NP-UTL)	mg/L	BTV
MW-49A & MW-74	Combined Radium	5		4.43 (P-UTL)*	pCi/L	US EPA MCL

## Notes:

BTV = Background Threshold Value

GWPS = Groundwater Protection Standard

US EPA MCL = United States Environmental Protection Agency Maximum Contaminant Level under the Safe Drinking Water Act

10/15/2018 Page 1

<sup>&</sup>lt;sup>1</sup> Double Quantification Rule (DQR), Parametric Upper Tolerance Limit (P-UTL), Non-Parametric Upper Tolerance Limit (NP-UTL)

<sup>&</sup>lt;sup>2</sup> The DQR BTV represents the maximum reporting limit value

<sup>&</sup>lt;sup>3</sup> The GWPS selection represents the highest value between the US EPA MCL, the Alternative Risk-Based GWPS and the BTV

<sup>\*</sup> Inadequate temporal detrending in the background data defaults to using US EPA MCL or Alternative Risk-Based GWPS, as applicable

Table 2
Statistical Results Summary - FCPP MultiUnit 1 CCR Unit
Appendix IV Statistical Comparison

Appendix IV Constituent	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
GWPS	0.01	0.01	2	0.004	0.005	0.1	0.01	5	0.015	1.8	0.002	0.1	0.092	0.017	5
MW-7	_	P-LCLT (0.0012)	P-LCLT (0.013)	_	NP-LCL (0.0004)	_	NP-LCL (0.002)		NP-LCL (0.002)	IP-I (I (N 72)	NP-LCL (0.0002)	INP-ICL (0.01)		P-LCL (0.000063)	P-LCL (0.50)
MW-8	NP-LCL (0.0025)	NP-LCL (0.001)	NP-LCL (0.017)		P-LCL (0.000056)		P-LCL (0.000035)	_	NP-LCL (0.0014)		NP-LCL (0.0002)	IP-I CLT (0 0049)		NP-LCL (0.0005)	P-LCL (0.41)
MW-61		NP-LCL (0.002)	NP-LCL (0.014)		P-LCL (0.00082)		<u>P-LCLT</u> (0.016)	P-LCLT (2.0)	P-LCL (0.00076)	P-LCL (0.34)	NP-LCL (0.0002)	IP-I CL (0.069)	_	P-LCL (0.0015)	P-LCL (0.00)
MW-75		NP-LCL (0.004)	NP-LCL (0.02)	_	P-LCL (0.0017)		<u>P-LCLT</u> (0.043)	NP-LCL	NP-I CI	P-I CI (0 39)	NP-LCL (0.0002)	P-LCL (0.15)		NP-LCL (0.001)	P-LCL (0.24)

## Legend

Method (LCL)	There is insufficient evidence to declare an SSI over the GWPS	NP-LCL	Non-Parametric Lower Confidence Limit
Method (LCL)	Statistically significant increasing trend (p<0.05)	P-LCLT	Parametric Lower Confidence Limit with a Trend
Method (LCL)	Statistically significant decreasing trend (p<0.05)	P-LCL	Parametric Lower Confidence Limit
Method (LCL)	There is sufficient evidence to declare an SSI over the GWPS	LCL	Lower Confidence Limit

10/15/2018 Page 2



# **APPENDIX A**

**PROUCL INPUT FILES** 

Table A-1 Fluoride - All Wells

Fluoride - All Wells											
Well	Sample Date	Fluoride	D_Fluoride								
Background	12/1/2015	5	0								
Background	6/7/2016	0.86	1								
Background	8/21/2016	0.08	0								
Background	9/13/2016	0.4	0								
Background	10/20/2016	0.4	0								
Background	2/2/2017	0.4	0								
Background	2/2/2017	1.7	1								
Background	4/18/2017	2	0								
Background	4/18/2017	1.6	1								
Background	5/2/2017	1.9	1								
Background	5/3/2017	0.79	1								
Background	5/29/2017	1.9	1								
Background	5/30/2017	2	0								
Background	6/22/2017	1.9	1								
Background	6/22/2017	2	0								
Background	7/22/2017	4	0								
Background	7/22/2017	1.9	1								
Background	8/10/2017	4	0								
Background	8/10/2017	2	1								
Background	8/17/2017	4	0								
Background	9/10/2017	4	0								
Background	9/10/2017	2	1								
Background	10/11/2017	2.1	1								
Background	10/12/2017	4	0								
Background	3/17/2018	3.2	1								
Background	3/17/2018	4	0								
Background	6/1/2018	0.8	0								
Background	6/1/2018	2.1	1								
MW-61	11/6/2015	1.2	1								
MW-61	4/26/2016	1.3	1								
MW-61	6/6/2016	1.3	1								
MW-61	8/21/2016	0.91	1								
MW-61	9/13/2016	1.1	1								
MW-61	10/20/2016	1.1	1								
MW-61	2/2/2017	1.1	1								
MW-61	4/18/2017	1.1	1								
MW-61	5/3/2017	1.2	1								
MW-61	5/30/2017	1.2	1								
MW-61	6/22/2017	1.3	1								
MW-61	7/22/2017	1.3	1								
MW-61	8/10/2017	1.2	1								
MW-61	8/17/2017	1.4	1								
MW-61	9/10/2017	1.2	1								
MW-61	10/12/2017	1.2	1								
MW-61	3/17/2018	1.6	1								
MW-61	6/1/2018	1.3	1								

Table A-1 Fluoride - All Wells

Well	Sample Date	Fluoride	D_Fluoride
MW-7	11/7/2015	0.35	1
MW-7	4/26/2016	2	0
MW-7	6/6/2016	0.4	1
MW-7	8/21/2016	0.4	0
MW-7	9/13/2016	0.4	0
MW-7	10/20/2016	0.4	0
MW-7	2/2/2017	0.4	0
MW-7	4/18/2017	0.8	0
MW-7	5/3/2017	0.35	1
MW-7	5/30/2017	0.8	0
MW-7	6/22/2017	0.8	0
MW-7	7/22/2017	0.8	0
MW-7	8/10/2017	0.8	0
MW-7	8/17/2017	0.8	0
MW-7	9/10/2017	0.8	0
MW-7	10/12/2017	0.8	0
MW-7	3/17/2018	4	0
MW-7	6/1/2018	0.8	0
MW-75	4/18/2017	2	0
MW-75	5/3/2017	1.4	1
MW-75	5/30/2017	2	0
MW-75	6/22/2017	2	0
MW-75	7/22/2017	2	0
MW-75	8/10/2017	2	0
MW-75	8/17/2017	2	0
MW-75	9/10/2017	2	0
MW-75	10/12/2017	2	0
MW-75	3/17/2018	1.7	1
MW-75	6/1/2018	1.2	1
MW-8	12/1/2015	5	0
MW-8	4/26/2016	2	0
MW-8	6/7/2016	0.68	1
MW-8	8/21/2016	0.4	0
MW-8	9/13/2016	0.4	0
MW-8	4/18/2017	0.8	0
MW-8	5/3/2017	1.1	1
MW-8	5/30/2017	2	0
MW-8	6/1/2018	0.91	1

Table A-2
Fluoride - Background Wells Only

Thuonide - background Wens Only											
Well	Sample Date	Fluoride	D_Fluoride								
MW-49A	12/1/2015	5	0								
MW-49A	6/7/2016	0.86	1								
MW-49A	8/21/2016	0.08	0								
MW-49A	9/13/2016	0.4	0								
MW-49A	10/20/2016	0.4	0								
MW-49A	2/2/2017	0.4	0								
MW-49A	4/18/2017	2	0								
MW-49A	5/3/2017	0.79	1								
MW-49A	5/30/2017	2	0								
MW-49A	6/22/2017	2	0								
MW-49A	7/22/2017	4	0								
MW-49A	8/10/2017	4	0								
MW-49A	8/17/2017	4	0								
MW-49A	9/10/2017	4	0								
MW-49A	10/12/2017	4	0								
MW-49A	3/17/2018	4	0								
MW-49A	6/1/2018	0.8	0								
MW-74	2/2/2017	1.7	1								
MW-74	4/18/2017	1.6	1								
MW-74	5/2/2017	1.9	1								
MW-74	5/29/2017	1.9	1								
MW-74	6/22/2017	1.9	1								
MW-74	7/22/2017	1.9	1								
MW-74	8/10/2017	2	1								
MW-74	9/10/2017	2	1								
MW-74	10/11/2017	2.1	1								
MW-74	3/17/2018	3.2	1								
MW-74	6/1/2018	2.1	1								

Table A-3 Radium - All Wells

Well	Sample Date	Combined_Radium	D_CombinedRadium	NumDate	
Background	12/1/2015	1.87	1	42339.00	
Background	4/26/2016	2.3	1	42486.00	
Background	6/7/2016	2.4	1	42528.00	
Background	8/21/2016	3.5	1	42603.00	
Background	9/13/2016	1.3	1	42626.00	
Background	10/20/2016	2.1	1	42663.00	
Background	2/2/2017	3.4	1	42768.00	
Background	2/2/2017	1.6	1	42768.00	
Background	4/17/2017	0.7	1	42842.00	
Background	4/18/2017	2	1	42843.00	
Background	5/2/2017	1.5	1	42857.00	
Background	5/3/2017	1.9	1	42858.00	
Background	5/29/2017	1.1	1	42884.61	
Background	5/30/2017	2.1	1	42885.00	
Background	6/22/2017	0.6	0	42908.42	
Background	6/22/2017	2.7	1	42908.60	
Background	7/22/2017	2.6	1	42938.00	
Background	7/22/2017	0.7	0	42938.00	
Background	8/10/2017	1.7	1	42957.00	
Background	8/10/2017	0.9	1	42957.00	
Background	8/17/2017	2	1	42964.00	
Background	9/10/2017	2.3	1	42988.00	
Background	9/10/2017	1.7	1	42988.00	
Background	10/11/2017	0.6	0	43019.00	
Background	10/12/2017	2.5	1	43020.00	
Background	3/17/2018	0.9	0	43176.45	
Background	3/17/2018	0.8	0	43176.58	
Background	6/1/2018	1.5	1	43252.00	
Background	6/1/2018	0.7	0	43252.00	
MW-61	11/6/2015	1.29	1	42314.00	
MW-61	4/26/2016	1.9	1	42486.00	
MW-61	6/6/2016	0.8	0	42527.00	
MW-61	8/21/2016	1.4	1	42603.00	
MW-61	9/13/2016	1.3	1	42626.00	
MW-61	10/20/2016	0.7	1	42663.00	
MW-61	2/2/2017	2.2	1	42768.00	
MW-61	4/18/2017	0.6	0	42843.00	
MW-61	5/3/2017	0.7	1	42858.00	
MW-61	5/30/2017	0.6	0	42885.00	
MW-61	6/22/2017	0.6	0	42908.50	
MW-61	7/22/2017	0.5	1	42938.00	
MW-61	8/10/2017	0.7	0	42957.00	
MW-61	8/17/2017	0.7	0	42964.00	
MW-61	9/10/2017	0.7	1	42988.00	
MW-61	10/12/2017	2	1	43020.00	
MW-61	3/17/2018	0.9	0	43176.49	

Table A-3 Radium - All Wells

Well	Sample Date	Combined_Radium	D_CombinedRadium	NumDate
MW-61	6/1/2018	0.7	0	43252.00
MW-7	11/7/2015	1.8	1	42315.00
MW-7	4/26/2016	1.9	1	42486.00
MW-7	6/6/2016	3.3	1	42527.00
MW-7	8/21/2016	0.7	1	42603.00
MW-7	9/13/2016	3.3	1	42626.00
MW-7	10/20/2016	1	1	42663.00
MW-7	2/2/2017	1.9	1	42768.00
MW-7	4/18/2017	1.5	1	42843.00
MW-7	5/3/2017	0.6	0	42858.00
MW-7	5/30/2017	0.6	0	42885.00
MW-7	6/22/2017	1.2	1	42908.00
MW-7	7/22/2017	1.9	1	42938.00
MW-7	8/10/2017	1.2	1	42957.00
MW-7	8/17/2017	1.2	1	42964.00
MW-7	9/10/2017	1.3	1	42988.00
MW-7	10/12/2017	2.6	1	43020.00
MW-7	3/17/2018	0.9	0	43176.00
MW-7	6/1/2018	1.3	1	43252.00
MW-75	4/17/2017	1.6	1	42842.00
MW-75	5/3/2017	0.4	1	42858.00
MW-75	5/30/2017	0.9	1	42885.37
MW-75	6/22/2017	0.6	0	42908.53
MW-75	7/22/2017	0.7	0	42938.00
MW-75	8/10/2017	1	1	42957.00
MW-75	8/17/2017	0.7	0	42964.00
MW-75	9/10/2017	0.8	1	42988.00
MW-75	10/12/2017	0.8	1	43020.00
MW-75	3/17/2018	0.8	0	43176.52
MW-75	6/1/2018	1.4	1	43252.00
MW-8	12/1/2015	4.66	1	42339.00
MW-8	4/26/2016	1.4	1	42486.00
MW-8	6/7/2016	1.3	1	42528.00
MW-8	8/21/2016	1.3	1	42603.00
MW-8	9/13/2016	1.2	1	42626.00
MW-8	4/18/2017	1	1	42843.00
MW-8	5/3/2017	1.9	1	42858.00
MW-8	5/30/2017	1.2	1	42885.00
MW-8	6/1/2018	0.7	0	43252.00

Table A-4
Radium - Background Wells Only

kadium - Background Wells Only											
Well	Sample Date	Combined_Radium	D_CombinedRadium								
MW-49A	12/1/2015	1.87	1								
MW-49A	4/26/2016	2.3	1								
MW-49A	6/7/2016	2.4	1								
MW-49A	8/21/2016	3.5	1								
MW-49A	9/13/2016	1.3	1								
MW-49A	10/20/2016	2.1	1								
MW-49A	2/2/2017	3.4	1								
MW-49A	4/18/2017	2	1								
MW-49A	5/3/2017	1.9	1								
MW-49A	5/30/2017	2.1	1								
MW-49A	6/22/2017	2.7	1								
MW-49A	7/22/2017	2.6	1								
MW-49A	8/10/2017	1.7	1								
MW-49A	8/17/2017	2	1								
MW-49A	9/10/2017	2.3	1								
MW-49A	10/12/2017	2.5	1								
MW-49A	3/17/2018	0.8	0								
MW-49A	6/1/2018	1.5	1								
MW-74	2/2/2017	1.6	1								
MW-74	4/17/2017	0.7	1								
MW-74	5/2/2017	1.5	1								
MW-74	5/29/2017	1.1	1								
MW-74	6/22/2017	0.6	0								
MW-74	7/22/2017	0.7	0								
MW-74	8/10/2017	0.9	1								
MW-74	9/10/2017	1.7	1								
MW-74	10/11/2017	0.6	0								
MW-74	3/17/2018	0.9	0								
MW-74	6/1/2018	0.7	0								

Table A-5
All Constituents Except Fluoride and Radium - All Wells

			T				I		riuoriue anu r	ı		Ti .		Т	T	Г		
Well	Sample Date	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium		D_Chromium		D_Cobalt	Lead	D_Lead	Lithium
Background	12/1/2015	0.00033	1	0.0016	1	0.042	1	0.00075	1	0.00018	1	0.0035	1	0.0022	1	0.01	0	0.75
Backgrounc	6/7/2016	0.00035	1	0.0013	1	0.028	1	0.001	0	0.00012	1	0.00091	1	0.0019	1	0.0005	0	0.9
Backgrounc	8/21/2016	0.00035	1	0.0011	1	0.022	1	0.001	0	0.0003	1	0.00079	1	0.003	1	0.0005	0	1.8
Backgrounc	9/13/2016	0.0025	0	0.004	0	0.029	1	0.001	0	0.002	0	0.01	0	0.004	0	0.002	0	1.2
Background	10/20/2016	0.005	0	0.002	0	0.022	1	0.001	0	0.001	0	0.005	0	0.0036	1	0.0001	0	1.2
Background	2/2/2017	0.001	0	0.00092	1	0.02	1	0.001	0	0.00031	1	0.00079	1	0.004	1	0.0005	0	1.4
Background	2/2/2017	0.002	0	0.0035	1	0.036	1	0.001	0	0.0002	0	0.0026	1	0.001	0	0.0005	0	0.39
Backgrounc	4/18/2017	0.004	0	0.002	0	0.022	1	0.001	0	0.0004	0	0.002	0	0.0045	1	0.002	0	1.3
Background	4/18/2017	0.004	0	0.0029	1	0.018	1	0.001	0	0.0004	0	0.002	0	0.002	0	0.002	0	0.4
Background	5/2/2017	0.002	0	0.0028	1	0.018	1	0.001	0	0.0002	0	0.001	0	0.001	0	0.001	0	0.38
Background	5/3/2017	0.001	0	0.00088	1	0.022	1	0.001	0	0.00023	1	0.00065	1	0.0037	1	0.0005	0	1.1
Background	5/29/2017	0.00048	1	0.0045	1	0.022	1	0.001	0	0.00028	1	0.005	0	0.00064	1	0.005	0	0.37
Background	5/30/2017	0.001	0	0.0011	1	0.022	1	0.001	0	0.00024	1	0.00069	1	0.0036	1	0.0005	0	1.1
Background	6/22/2017	0.004	0	0.0032	1	0.02	1	0.001	0	0.0004	0	0.002	0	0.002	0	0.002	0	0.38
Background	6/22/2017	0.001	0	0.0011	1	0.021	1	0.001	0	0.00024	1	0.00088	1	0.0039	1	0.0005	0	1.1
Background	7/22/2017	0.01	0	0.01	0	0.021	1	0.001	0	0.001	0	0.02	0	0.01	0	0.005	0	1.1
Background	7/22/2017	0.004	0	0.0028	1	0.018	1	0.001	0	0.0004	0	0.002	0	0.001	0	0.002	0	0.41
Background	8/10/2017	0.01	0	0.002	0	0.02	1	0.001	0	0.001	0	0.004	0	0.0029	1	0.005	0	1.1
Background	8/10/2017	0.01	0	0.0022	1	0.019	1	0.001	0	0.001	0	0.004	0	0.002	0	0.005	0	0.43
Backgrounc	8/17/2017	0.004	0	0.002	0	0.02	1	0.001	0	0.0004	0	0.004	0	0.0029	1	0.002	0	1.1
Background	9/10/2017	0.004	0	0.002	0	0.02	1	0.001	0	0.0004	0	0.004	0	0.0026	1	0.002	0	0.9
Background	9/10/2017	0.004	0	0.0043	1	0.023	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.48
	10/11/2017	0.01	0	0.005	0	0.023	1	0.001	1	0.001	0	0.01	0	0.005	0	0.005	0	0.48
	10/12/2017	0.004	0	0.005	0	0.019	1	0.001	0	0.0004	0	0.01	0	0.005	0	0.005	0	0.92
Background	3/17/2018	0.004	0	0.0034	1	0.02	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.47
Background	3/17/2018	0.004	0	0.002	0	0.021	1	0.001	0	0.0004	0	0.004	0	0.0023	1	0.002	0	1.1
Background	6/1/2018	0.001		0.01	0	0.022	1	0.001	- C	0.002	0	0.001		0.01	0	0.01	0	1.1
Background	6/1/2018			0.01	0	0.019	1			0.002	0			0.01	0	0.01	0	0.49
MW-61	11/6/2015	0.00029	1	0.00056	1	0.015	1	0.00016	1	0.001	1	0.00075	1	0.011	1	0.00082	1	0.36
MW-61	4/26/2016	0.0025	0	0.0005	0	0.014	1	0.001	0	0.00082	1	0.0005	0	0.01	1	0.00078	1	0.4
MW-61	6/6/2016	0.0023	1	0.0005	0	0.015	1	0.001	0	0.00094	1	0.0005	0	0.012	1	0.00078	1	0.39
MW-61	8/21/2016	0.00023	1	0.00058	1	0.013	1	0.001	0	0.00091	1	0.00052	1	0.012	1	0.0008	1	0.33
MW-61	9/13/2016	0.0025	0	0.00038	0	0.014	1	0.001	0	0.00091	1	0.00032	0	0.013	1	0.0001	1	0.44
MW-61	10/20/2016	0.0025	0	0.00042	1	0.014	1	0.001	0	0.00094	1	0.0025	0	0.013	1	0.00092	1	0.39
MW-61	2/2/2017	0.0003	0	0.00042	1	0.014	1	0.001	0	0.00034	1	0.0005	0	0.012	1	0.00032	1	0.39
MW-61	4/18/2017	0.001	0	0.0003	0	0.013	1	0.001	0	0.00011	1	0.0003	0	0.013	1	0.00073	0	0.30
MW-61	5/3/2017	0.004	0	0.0005	0	0.014	1	0.001	0	0.00093	1	0.0002	1	0.014	1	0.0002	1	0.37
MW-61	5/30/2017	0.001	0	0.0005	0	0.014	1	0.001	0	0.00094	1	0.0005	0	0.014	1	0.00082	1	0.36
MW-61	6/22/2017	0.001	0	0.0003	1	0.014	1	0.001	0	0.00092	1	0.0005	1	0.015	1	0.00089	1	0.30
MW-61	7/22/2017	0.001	0	0.0003	0	0.014	1	0.001	0	0.00098	1	0.00032	0	0.013	1	0.00080	0	0.37
H		0.004	0	0.002										0.013		0.002		+
MW-61	8/10/2017				0	0.014	1	0.001	0	0.00092	1	0.001	0		1		1	0.4
MW-61	8/17/2017	0.004	0	0.002	0	0.014	1	0.001	0	0.00092	1	0.004	0	0.015	1	0.002	0	0.41
MW-61	9/10/2017	0.004	0	0.002	0	0.013	1	0.001	0	0.00087	1	0.004	0	0.014	1	0.002	0	0.37
MW-61	10/12/2017	0.004	0	0.005	0	0.013	1	0.001	0	0.00097	1	0.01	0	0.016	1	0.005	0	0.35
MW-61	3/17/2018	0.004	0	0.002	0	0.014	1	0.001	0	0.0011	1	0.004	0	0.016	1	0.002	0	0.38
MW-61	6/1/2018			0.01	0	0.014	1			0.002	0			0.017	1	0.01	0	0.36

Fruitland, New Mexico OCTOBER 2018 Page 1 of 4

Table A-5
All Constituents Except Fluoride and Radium - All Wells

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Well	Sample Date	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium			Chromium D_0	Chromium	Cobalt	D_Cobalt	Lead	D_Lead	Lithium
MW-7	11/7/2015	0.00027	1	0.0006	1	0.017	1	0.00015	1	0.00014	1	0.00041	1	0.0028	1	0.00045	1	0.75
MW-7	4/26/2016	0.0025	0	0.00065	1	0.014	1	0.001	0	0.0001	0	0.0005	0	0.0015	1	0.0005	0	1
MW-7	6/6/2016	0.00031	1	0.00075	1	0.017	1	0.001	0	0.0001	0	0.0005	0	0.002	1	0.00082	1	0.94
MW-7	8/21/2016	0.00016	1	0.00055	1	0.017	1	0.001	0	0.0001	0	0.0005	0	0.0015	1	0.0005	0	1.2
MW-7	9/13/2016	0.0025	0	0.001	0	0.017	1	0.001	0	0.0014	1	0.0025	0	0.002	1	0.0005	0	0.9
MW-7	10/20/2016	0.0005	0	0.00033	1	0.015	1	0.001	0	0.0001	1	0.0005	0	0.00083	1	0.0001	0	0.93
MW-7	2/2/2017	0.001	1	0.0005	0	0.016	1	0.001	0	0.0001	0	0.00093	1	0.00065	1	0.0005	0	0.92
MW-7	4/18/2017	0.001	0	0.00072	1	0.016	1	0.001	0	0.0001	0	0.0023	1	0.0005	0	0.0005	0	0.85
MW-7	5/3/2017	0.001	0	0.0005	0	0.015	1	0.001	0	0.0001	0	0.0024	1	0.0005	0	0.0005	0	0.9
MW-7	5/30/2017	0.001	0	0.0005	1	0.015	1	0.001	0	0.0001	0	0.0025	1	0.0005	0	0.0005	0	0.79
MW-7	6/22/2017	0.001	0	0.00067	1	0.015	1	0.001	0	0.0001	0	0.0018	1	0.0005	0	0.0005	0	0.86
MW-7	7/22/2017	0.004	0	0.002	0	0.014	1	0.001	0	0.0004	0	0.002	0	0.002	0	0.002	0	0.89
MW-7	8/10/2017	0.01	0	0.00066	1	0.016	1	0.001	0	0.001	0	0.0017	1	0.0005	0	0.005	0	0.9
MW-7	8/17/2017	0.004	0	0.002	0	0.015	1	0.001	0	0.0004	0	0.0047	1	0.002	0	0.002	0	0.96
MW-7	9/10/2017	0.004	0	0.0021	1	0.014	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.83
MW-7	10/12/2017	0.001	0	0.00079	1	0.013	1	0.001	0	0.0001	0	0.001	0	0.0005	0	0.0005	0	0.81
MW-7	3/17/2018	0.004	0	0.002	0	0.014	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.92
MW-7	6/1/2018			0.01	0	0.017	1			0.002	0			0.01	0	0.01	0	0.83
MW-75	4/18/2017	0.004	1	0.004	0	0.02	1	0.001	0	0.0022	1	0.002	0	0.043	1	0.0031	1	0.43
MW-75	5/3/2017	0.001	0	0.001	0	0.018	1	0.001	0	0.0019	1	0.001	0	0.042	1	0.0031	1	0.43
MW-75	5/30/2017	0.001	0	0.0005	0	0.017	1	0.001	0	0.0019	1	0.0005	0	0.039	1	0.0028	1	0.43
MW-75	6/22/2017	0.004	0	0.002	0	0.02	1	0.001	0	0.0024	1	0.002	0	0.048	1	0.0041	1	0.43
MW-75	7/22/2017	0.004	0	0.002	0	0.018	1	0.001	0	0.002	1	0.002	0	0.043	1	0.003	1	0.44
MW-75	8/10/2017	0.01	0	0.002	0	0.019	1	0.001	0	0.0023	1	0.004	0	0.046	1	0.005	0	0.45
MW-75	8/17/2017	0.004	0	0.002	0	0.018	1	0.001	0	0.002	1	0.004	0	0.045	1	0.0032	1	0.48
MW-75	9/10/2017	0.004	0	0.002	0	0.018	1	0.001	0	0.002	1	0.004	0	0.044	1	0.0032	1	0.42
MW-75	10/12/2017	0.01	0	0.005	0	0.02	1	0.001	0	0.0023	1	0.01	0	0.049	1	0.005	0	0.41
MW-75	3/17/2018	0.004	0	0.002	0	0.018	1	0.001	0	0.002	1	0.004	0	0.044	1	0.003	1	0.43
MW-75	6/1/2018			0.01	0	0.02	1			0.0024	1			0.048	1	0.01	0	0.4
MW-8	12/1/2015	0.0014	1	0.0091	1	0.15	1	0.002	1	0.00096	1	0.02	1	0.019	1	0.033	1	1.1
MW-8	4/26/2016	0.005	0	0.001	0	0.014	1	0.001	0	0.00025	1	0.001	0	0.0018	1	0.001	0	1.2
MW-8	6/7/2016	0.00054	1	0.00058	1	0.038	1	0.001	0	0.0002	1	0.0016	1	0.0023	1	0.0014	1	1.1
MW-8	8/21/2016	0.00048	1	0.0005	0	0.014	1	0.001	0	0.00022	1	0.00082	1	0.00093	1	0.0005	0	1.5
MW-8	9/13/2016	0.0025	0	0.001	0	0.013	1	0.001	0	0.00074	1	0.0025	0	0.0013	1	0.0005	0	1.1
MW-8	4/18/2017	0.001	0	0.00053	1	0.017	1	0.001	0	0.00018	1	0.00075	1	0.00053	1	0.0005	1	1.1
MW-8	5/3/2017	0.001	0	0.0005	0	0.012	1	0.001	0	0.00011	1	0.0006	1	0.0005	0	0.0005	0	1.2
MW-8	5/30/2017	0.001	0	0.0007	1	0.013	1	0.001	0	0.00013	1	0.00077	1	0.0005	0	0.0005	0	1.1
MW-8	6/1/2018	<del>_</del>	-	0.01	0	0.011	1			0.002	0			0.01	0	0.01	0	1.2
	0, 1, 1010			0.01	, ,	0.011	-			0.002				0.01		0.01		

OCTOBER 2018 Page 2 of 4

Table A-5
All Constituents Except Fluoride and Radium - All Wells

Well	Cample Date	D. Lithium	I	T	•	nd Radium - All V	Selenium	D. Colonium	Thallium	D. Thallium
Background	Sample Date 12/1/2015	D_Lithium 1	Mercury 0.0001	ט_wercury 1	0.096	D_Molybdenum 1	0.0021	D_Selenium 1	0.0014	D_Thallium 1
Background	6/7/2016	1	0.0001	0	0.090	1	0.0021	1	0.0014	1
Background	8/21/2016	1	0.0002	0	0.003	1	0.0018	1	0.0012	1
Background	9/13/2016	1	0.0002	0	0.028	1	0.0018	0	0.0013	
Background	10/20/2016	1	0.0002	0	0.036	1	0.006	0	0.002	1
Background	2/2/2017	1	0.0002	0	0.042	1	0.0018	1	0.0015	1
Background	2/2/2017	1	0.0002	0	0.075	1	0.089	1	0.0001	0
Background	4/18/2017	1	0.0002	0	0.028	1	0.002	0	0.017	1
Background	4/18/2017	1	0.0002	0	0.013	1	0.069	1	0.0004	0
Background	5/2/2017	1	0.0002	0	0.019	1	0.067	1	0.0002	0
Background	5/3/2017	1	0.0002	0	0.025	1	0.0018	1	0.0014	1
Background	5/29/2017	1	0.0002	0	0.028	1	0.062	1	0.00035	1
Background	5/30/2017	1	0.0002	0	0.028	1	0.0017	1	0.0015	1
Background	6/22/2017	1	0.0002	0	0.02	1	0.06	1	0.0004	0
Background	6/22/2017	1	0.0002	0	0.025	1	0.0017	1	0.0014	1
Background	7/22/2017	1	0.0002	0	0.025	1	0.01	0	0.0013	1
Background	7/22/2017	1	0.0002	0	0.016	1	0.071	1	0.0004	0
Background	8/10/2017	1	0.0002	0	0.029	1	0.002	0	0.0014	1
Background	8/10/2017	1	0.0002	0	0.018	1	0.06	1	0.001	0
Background	8/17/2017	1	0.0002	0	0.037	1	0.002	0	0.0014	1
Background	9/10/2017	1	0.0002	0	0.034	1	0.002	0	0.0013	1
Background	9/10/2017	1	0.0002	0	0.024	1	0.092	1	0.0004	0
Background	10/11/2017	1	0.0002	0	0.023	1	0.081	1	0.001	0
Background	10/12/2017	1	0.0002	0	0.032	1	0.002	0	0.0013	1
Background	3/17/2018	1	0.0002	0	0.016	1	0.085	1	0.0004	0
Background	3/17/2018	1	0.0002	0	0.021	1	0.002	0	0.0015	1
Background	6/1/2018	1			0.018	1	0.01	0	0.002	0
Background	6/1/2018	1			0.015	1	0.089	1	0.002	0
MW-61	11/6/2015	1	0.0002	0	0.076	1	0.0016	1	0.00018	1
MW-61	4/26/2016	1	0.0002	0	0.076	1	0.00088	1	0.00013	1
MW-61	6/6/2016	1	0.0002	0	0.077	1	0.00096	1	0.00014	1
MW-61	8/21/2016	1	0.0002	0	0.083	1	0.00091	1	0.00016	1
MW-61	9/13/2016	1	0.0002	0	0.069	1	0.003	0	0.0005	0
MW-61	10/20/2016	1	0.0002	0	0.08	1	0.00076	1	0.00014	1
MW-61	2/2/2017	1	0.0002	0	0.072	1	0.0007	1	0.00015	1
MW-61	4/18/2017	1	0.0002	0	0.078	1	0.002	0	0.0004	0
MW-61	5/3/2017	1	0.0002	0	0.075	1	0.00067	1	0.00015	1
MW-61	5/30/2017	1	0.0002	0	0.079	1	0.0005	0	0.00016	1
MW-61	6/22/2017	1	0.0002	0	0.079	1	0.00076	1	0.00016	1
MW-61	7/22/2017	1	0.0002	0	0.07	1	0.002	0	0.0004	0
MW-61	8/10/2017	1	0.0002	0	0.079	1	0.00066	1	0.00011	1
MW-61	8/17/2017	1	0.0002	0	0.078	1	0.002	0	0.0004	0
MW-61	9/10/2017	1	0.0002	0	0.073	1	0.002	0	0.0004	0
MW-61	10/12/2017	1	0.0002	0	0.07	1	0.002	0	0.001	0
MW-61	3/17/2018	1	0.0002	0	0.079	1	0.002	0	0.0004	0
MW-61	6/1/2018	1			0.085	1	0.01	0	0.002	0

OCTOBER 2018

Table A-5
All Constituents Except Fluoride and Radium - All Wells

Well	Sample Date	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum	Selenium	D_Selenium	Thallium	D_Thallium
MW-7	11/7/2015	1	0.0002	0	0.0055	1	0.0038	1	0.000093	1
MW-7	4/26/2016	1	0.0002	0	0.0039	1	0.0028	1	0.0001	0
MW-7	6/6/2016	1	0.0002	0	0.0046	1	0.0026	1	0.00022	1
MW-7	8/21/2016	1	0.0002	0	0.033	1	0.011	1	0.00016	1
MW-7	9/13/2016	1	0.0002	0	0.041	1	0.0064	1	0.00053	1
MW-7	10/20/2016	1	0.0002	0	0.016	1	0.0049	1	0.00015	1
MW-7	2/2/2017	1	0.0002	0	0.0048	1	0.0063	1	0.00017	1
MW-7	4/18/2017	1	0.0002	0	0.0039	1	0.008	1	0.00011	1
MW-7	5/3/2017	1	0.0002	0	0.0035	1	0.011	1	0.0001	1
MW-7	5/30/2017	1	0.0002	0	0.0041	1	0.0098	1	0.00015	1
MW-7	6/22/2017	1	0.0002	0	0.0037	1	0.014	1	0.00015	1
MW-7	7/22/2017	1	0.0002	0	0.0031	1	0.011	1	0.0004	0
MW-7	8/10/2017	1	0.0002	0	0.005	0	0.015	1	0.001	0
MW-7	8/17/2017	1	0.0002	0	0.0022	1	0.013	1	0.0004	0
MW-7	9/10/2017	1	0.0002	0	0.0035	1	0.013	1	0.0004	0
MW-7	10/12/2017	1	0.0002	0	0.0031	1	0.015	1	0.0001	1
MW-7	3/17/2018	1	0.0002	0	0.0043	1	0.0047	1	0.0004	0
MW-7	6/1/2018	1			0.01	0	0.01	0	0.002	0
MW-75	4/18/2017	1	0.0002	0	0.17	1	0.0021	1	0.0004	0
MW-75	5/3/2017	1	0.00028	1	0.17	1	0.0022	1	0.00018	1
MW-75	5/30/2017	1	0.0002	0	0.16	1	0.0025	1	0.00017	1
MW-75	6/22/2017	1	0.0002	0	0.18	1	0.0022	1	0.0004	0
MW-75	7/22/2017	1	0.0002	0	0.16	1	0.0026	1	0.0004	0
MW-75	8/10/2017	1	0.0002	0	0.18	1	0.0025	1	0.001	0
MW-75	8/17/2017	1	0.0002	0	0.17	1	0.0021	1	0.0004	0
MW-75	9/10/2017	1	0.0002	0	0.16	1	0.0023	1	0.0004	0
MW-75	10/12/2017	1	0.0002	0	0.18	1	0.005	0	0.001	0
MW-75	3/17/2018	1	0.0002	0	0.16	1	0.0023	1	0.0004	0
MW-75	6/1/2018	1			0.17	1	0.01	0	0.002	0
MW-8	12/1/2015	1	0.0002	0	0.033	1	0.013	1	0.01	0
MW-8	4/26/2016	1	0.0002	0	0.018	1	0.0015	1	0.0002	0
MW-8	6/7/2016	1	0.0002	0	0.018	1	0.0013	1	0.00014	1
MW-8	8/21/2016	1	0.0002	0	0.049	1	0.0016	1	0.0001	0
MW-8	9/13/2016	1	0.0002	0	0.044	1	0.003	0	0.0005	0
MW-8	4/18/2017	1	0.0002	0	0.014	1	0.00084	1	0.0001	0
MW-8	5/3/2017	1	0.0002	0	0.014	1	0.0015	1	0.0001	0
MW-8	5/30/2017	1	0.0002	0	0.016	1	0.0016	1	0.0001	0
MW-8	6/1/2018	1			0.011	1	0.01	0	0.002	0

OCTOBER 2018 Page 4 of 4

Table A-6
All Constituents Except Fluoride and Radium - Background Wells Only

				,		7111 C	onstituents E	жеереттаотт	ac ana naaran	Buckgrou	na wens only							
Well	Cample Date	Antimony	D. Antimony	Arconic	D. Arconic	Barium	D Barium	Domillium	D. Domillium	Cadmium	D Cadmium	Chromium	D Chromium	Cobalt	D Cobalt	Load	Diload	Lithium
MW-49A	Sample Date 12/1/2015	0.00033	D_Antimony 1	Arsenic 0.0016	D_Arsenic	0.042	_	0.00075	D_Beryllium	Cadmium 0.00018	_	0.0035	1	0.0022	D_Cobait	Lead 0.01	D_Lead 0	0.75
-					1		1		1		1				1	0.0005	0	0.75
MW-49A	6/7/2016	0.00035	1	0.0013	1	0.028	1	0.001	0	0.00012 0.0003	1	0.00091	1	0.0019	1			
MW-49A	8/21/2016	0.00035	1	0.0011	1	0.022	1	0.001	0		1	0.00079	1	0.003	1	0.0005	0	1.8
MW-49A	9/13/2016	0.0025	0	0.004	0	0.029	1	0.001	0	0.002	0	0.01	0	0.004	0	0.002	0	1.2
MW-49A	10/20/2016	0.005	0	0.002	0	0.022	1	0.001	0	0.001	0	0.005	0	0.0036	1	0.0001	0	1.2
MW-49A	2/2/2017	0.001	0	0.00092	1	0.02	1	0.001	0	0.00031	1	0.00079	1	0.004	1	0.0005	0	1.4
MW-49A	4/18/2017	0.004	0	0.002	0	0.022	1	0.001	0	0.0004	0	0.002	0	0.0045	1	0.002	0	1.3
MW-49A	5/3/2017	0.001	0	0.00088	1	0.022	1	0.001	0	0.00023	1	0.00065	1	0.0037	1	0.0005	0	1.1
MW-49A	5/30/2017	0.001	0	0.0011	1	0.022	1	0.001	0	0.00024	1	0.00069	1	0.0036	1	0.0005	0	1.1
MW-49A	6/22/2017	0.001	0	0.0011	1	0.021	1	0.001	0	0.00024	1	0.00088	1	0.0039	1	0.0005	0	1.1
MW-49A	7/22/2017	0.01	0	0.01	0	0.021	1	0.001	0	0.001	0	0.02	0	0.01	0	0.005	0	1.1
MW-49A	8/10/2017	0.01	0	0.002	0	0.02	1	0.001	0	0.001	0	0.004	0	0.0029	1	0.005	0	1.1
MW-49A	8/17/2017	0.004	0	0.002	0	0.02	1	0.001	0	0.0004	0	0.004	0	0.0029	1	0.002	0	1.1
MW-49A	9/10/2017	0.004	0	0.002	0	0.02	1	0.001	0	0.0004	0	0.004	0	0.0026	1	0.002	0	0.9
MW-49A	10/12/2017	0.004	0	0.005	0	0.019	1	0.001	0	0.0004	0	0.01	0	0.005	0	0.005	0	0.92
MW-49A	3/17/2018	0.004	0	0.002	0	0.021	1	0.001	0	0.0004	0	0.004	0	0.0023	1	0.002	0	1.1
MW-49A	6/1/2018			0.01	0	0.022	1			0.002	0			0.01	0	0.01	0	1.1
MW-74	2/2/2017	0.002	0	0.0035	1	0.036	1	0.001	0	0.0002	0	0.0026	1	0.001	0	0.0005	0	0.39
MW-74	4/18/2017	0.004	0	0.0029	1	0.018	1	0.001	0	0.0004	0	0.002	0	0.002	0	0.002	0	0.4
MW-74	5/2/2017	0.002	0	0.0028	1	0.018	1	0.001	0	0.0002	0	0.001	0	0.001	0	0.001	0	0.38
MW-74	5/29/2017	0.00048	1	0.0045	1	0.022	1	0.001	0	0.00028	1	0.005	0	0.00064	1	0.005	0	0.37
MW-74	6/22/2017	0.004	0	0.0032	1	0.02	1	0.001	0	0.0004	0	0.002	0	0.002	0	0.002	0	0.38
MW-74	7/22/2017	0.004	0	0.0028	1	0.018	1	0.001	0	0.0004	0	0.002	0	0.001	0	0.002	0	0.41
MW-74	8/10/2017	0.01	0	0.0022	1	0.019	1	0.001	0	0.001	0	0.004	0	0.002	0	0.005	0	0.43
MW-74	9/10/2017	0.004	0	0.0043	1	0.023	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.48
MW-74	10/11/2017	0.01	0	0.005	0	0.023	1	0.001	1	0.001	0	0.01	0	0.005	0	0.005	0	0.48
MW-74	3/17/2018	0.004	0	0.0034	1	0.02	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.47
MW-74	6/1/2018			0.01	0	0.019	1			0.002	0			0.01	0	0.01	0	0.49

OCTOBER 2018 Page 1 of 2

Table A-6
All Constituents Except Fluoride and Radium - Background Wells Only

							,			
Well	Sample Date	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum	Selenium	D_Selenium	Thallium	D_Thallium
MW-49A	12/1/2015	1	0.0001	1	0.096	1	0.0021	1	0.0014	1
MW-49A	6/7/2016	1	0.0002	0	0.069	1	0.0018	1	0.0012	1
MW-49A	8/21/2016	1	0.0002	0	0.028	1	0.0018	1	0.0015	1
MW-49A	9/13/2016	1	0.0002	0	0.027	1	0.012	0		
MW-49A	10/20/2016	1	0.0002	0	0.036	1	0.006	0	0.002	1
MW-49A	2/2/2017	1	0.0002	0	0.042	1	0.0018	1	0.0015	1
MW-49A	4/18/2017	1	0.0002	0	0.028	1	0.002	0	0.017	1
MW-49A	5/3/2017	1	0.0002	0	0.025	1	0.0018	1	0.0014	1
MW-49A	5/30/2017	1	0.0002	0	0.028	1	0.0017	1	0.0015	1
MW-49A	6/22/2017	1	0.0002	0	0.025	1	0.0017	1	0.0014	1
MW-49A	7/22/2017	1	0.0002	0	0.025	1	0.01	0	0.0013	1
MW-49A	8/10/2017	1	0.0002	0	0.029	1	0.002	0	0.0014	1
MW-49A	8/17/2017	1	0.0002	0	0.037	1	0.002	0	0.0014	1
MW-49A	9/10/2017	1	0.0002	0	0.034	1	0.002	0	0.0013	1
MW-49A	10/12/2017	1	0.0002	0	0.032	1	0.002	0	0.0013	1
MW-49A	3/17/2018	1	0.0002	0	0.021	1	0.002	0	0.0015	1
MW-49A	6/1/2018	1			0.018	1	0.01	0	0.002	0
MW-74	2/2/2017	1	0.0002	0	0.075	1	0.089	1	0.0001	0
MW-74	4/18/2017	1	0.0002	0	0.013	1	0.069	1	0.0004	0
MW-74	5/2/2017	1	0.0002	0	0.019	1	0.067	1	0.0002	0
MW-74	5/29/2017	1	0.0002	0	0.028	1	0.062	1	0.00035	1
MW-74	6/22/2017	1	0.0002	0	0.02	1	0.06	1	0.0004	0
MW-74	7/22/2017	1	0.0002	0	0.016	1	0.071	1	0.0004	0
MW-74	8/10/2017	1	0.0002	0	0.018	1	0.06	1	0.001	0
MW-74	9/10/2017	1	0.0002	0	0.024	1	0.092	1	0.0004	0
MW-74	10/11/2017	1	0.0002	0	0.023	1	0.081	1	0.001	0
MW-74	3/17/2018	1	0.0002	0	0.016	1	0.085	1	0.0004	0
MW-74	6/1/2018	1			0.015	1	0.089	1	0.002	0



#### **APPENDIX B**

**PROUCL OUTPUT FILES** 

#### TABLE B-1 MULTIUNIT ProUCL GENERAL STATISTICS

	General Statistics on Uncensored Data
ate/Time of Computation	ProUCL 5.110/9/2018 4:54:52 PM
ser Selected Options	
om File	Table1_AppendixA_Multiunit_AppendixIV_ProUCLUpload_Sept2018.xls
ıll Precision	OFF
	iunit_AppendixIV_ProUCLUpload_Sept2018.xls a 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 (background)	26	2	4	22	84.62%	0.001	0.01	3.7750E-4	3.5688E-9	5.9739E-5	0.158
Antimony (mw-61)	17	1	3	14	82.35%	5.0000E-4	0.004	2.5000E-4	8.000E-10	2.8284E-5	0.113
Antimony (mw-7)	17	1	4	13	76.47%	5.0000E-4	0.01	3.2200E-4	5.4696E-8	2.3387E-4	0.726
Antimony (mw-75)	10	1	1	9	90.00%	0.001	0.01	0.00138	9.8438E-7	9.9216E-4	0.722
Antimony (mw-8)	8	1	3	5	62.50%	0.001	0.005	6.5833E-4	1.1076E-7	3.3281E-4	0.506
Arsenic (background)	28	0	16	12	42.86%	0.002	0.01	0.00201	1.3232E-6	0.00115	0.572
Arsenic (mw-61)	18	0	5	13	72.22%	5.0000E-4	0.01	4.7900E-4	6.0890E-9	7.8032E-5	0.163
Arsenic (mw-7)	18	0	11	7	38.89%	5.0000E-4	0.01	6.6314E-4	1.5309E-7	3.9126E-4	0.59
Arsenic (mw-75)	11	0	0	11	100.00%	5.0000E-4	0.01	N/A	N/A	N/A	N/A
Arsenic (mw-8)	9	0	4	5	55.56%	5.0000E-4	0.01	0.00163	7.9781E-6	0.00282	1.734
Barium (background)	28	0	28	0	0.00%	N/A	N/A	0.0225	2.8851E-5	0.00537	0.239
Barium (mw-61)	17	1	17	0	0.00%	N/A	N/A	0.0139	5.5882E-7	7.4755E-4	0.0536
Barium (mw-7)	18	0	18	0	0.00%	N/A	N/A	0.0154	1.6634E-6	0.00129	0.0838
Barium (mw-75)	11	0	11	0	0.00%	N/A	N/A	0.0187	1.2182E-6	0.0011	0.0589
Barium (mw-8)	9	0	9	0	0.00%	N/A	N/A	0.0313	0.00205	0.0453	1.445
Beryllium (background)	26	2	2	24	92.31%	0.001	0.001	7.5962E-4	2.3114E-9	4.8077E-5	0.0633
Beryllium (mw-61)	17	1	1	16	94.12%	0.001	0.001	1.6000E-4	0	0	N/A
Beryllium (mw-7)	17	1	1	16	94.12%	0.001	0.001	1.5000E-4	0	0	N/A
Beryllium (mw-75)	10	1	0	10	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
Beryllium (mw-8)	8	1	1	7	87.50%	0.001	0.001	0.00113	1.0938E-7	3.3072E-4	0.294
Cadmium (background)	28	0	8	20	71.43%	2.0000E-4	0.002	2.2000E-4	4.2200E-9	6.4962E-5	0.295
Cadmium (mw-61)	18	0	17	1	5.56%	0.002	0.002	9.4235E-4	5.4768E-9	7.4006E-5	0.0785
Cadmium (mw-7)	18	0	3	15	83.33%	1.0000E-4	0.002	1.7989E-4	9.3166E-8	3.0523E-4	1.697
Cadmium (mw-75)	11	0	11	0	0.00%	N/A	N/A	0.00213	3.8182E-8	1.9540E-4	0.0919
Cadmium (mw-8)	9	0	8	1	11.11%	0.002	0.002	3.4875E-4	8.8561E-8	2.9759E-4	0.853
Chromium (background)	26	2	8	18	69.23%	0.001	0.02	0.00113	7.0632E-7	8.4043E-4	0.741
Chromium (mw-61)	17	1	4	13	76.47%	5.0000E-4	0.01	5.4556E-4	6.5580E-9	8.0982E-5	0.148
Chromium (mw-7)	17	1	8	9	52.94%	5.0000E-4	0.004	0.00135	1.3551E-6	0.00116	0.861
Chromium (mw-75)	10	1	0	10	100.00%	5.0000E-4	0.01	N/A	N/A	N/A	N/A

TABLE B-1
MULTIUNIT ProUCL GENERAL STATISTICS\*

Chromium (mw-8)	8	1	6	2	25.00%	0.001	0.0025	0.00327	4.0084E-5	0.00633	1.937
Cobalt (background)	28	0	14	14	50.00%	0.001	0.01	0.00218	1.7627E-6	0.00133	0.61
Cobalt (mw-61)	18	0	18	0	0.00%	N/A	N/A	0.0138	3.3595E-6	0.00183	0.133
General Statistics for Censored	Data Set (with N	Ds) using Kapl	an Meier Meth	nod						·	
Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Cobalt (mw-7)	18	0	7	11	61.11%	5.0000E-4	0.01	0.00102	4.8515E-7	6.9653E-4	0.686
Cobalt (mw-75)	11	0	11	0	0.00%	N/A	N/A	0.0446	8.8545E-6	0.00298	0.0667
Cobalt (mw-8)	9	0	6	3	33.33%	5.0000E-4	0.01	0.00311	3.1951E-5	0.00565	1.818
Lead (background)	28	0	0	28	100.00%	1.0000E-4	0.01	N/A	N/A	N/A	N/A
Lead (mw-61)	18	0	11	7	38.89%	0.002	0.01	8.5455E-4	3.9702E-9	6.3010E-5	0.0737
Lead (mw-7)	18	0	2	16	88.89%	1.0000E-4	0.01	3.2042E-4	5.0762E-8	2.2530E-4	0.703
Lead (mw-75)	11	0	8	3	27.27%	0.005	0.01	0.00319	1.3359E-7	3.6550E-4	0.115
Lead (mw-8)	9	0	3	6	66.67%	5.0000E-4	0.01	0.00423	1.0359E-4	0.0102	2.409
Lithium (background)	28	0	28	0	0.00%	N/A	N/A	0.852	0.155	0.393	0.462
Lithium (mw-61)	18	0	18	0	0.00%	N/A	N/A	0.38	4.9412E-4	0.0222	0.0585
Lithium (mw-7)	18	0	18	0	0.00%	N/A	N/A	0.899	0.00962	0.0981	0.109
Lithium (mw-75)	11	0	11	0	0.00%	N/A	N/A	0.432	4.3636E-4	0.0209	0.0484
Lithium (mw-8)	9	0	9	0	0.00%	N/A	N/A	1.178	0.0169	0.13	0.111
Mercury (background)	26	2	1	25	96.15%	2.0000E-4	2.0000E-4	1.0000E-4	0	0	N/A
Mercury (mw-61)	17	1	0	17	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (mw-7)	17	1	0	17	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (mw-75)	10	1	1	9	90.00%	2.0000E-4	2.0000E-4	2.0800E-4	5.760E-10	2.4000E-5	0.115
Mercury (mw-8)	8	1	0	8	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Molybdenum (background)	28	0	28	0	0.00%	N/A	N/A	0.031	3.6322E-4	0.0191	0.615
Molybdenum (mw-61)	18	0	18	0	0.00%	N/A	N/A	0.0766	1.9556E-5	0.00442	0.0578
Molybdenum (mw-7)	18	0	16	2	11.11%	0.005	0.01	0.00821	1.1361E-4	0.0107	1.298
Molybdenum (mw-75)	11	0	11	0	0.00%	N/A	N/A	0.169	6.9091E-5	0.00831	0.0492
Molybdenum (mw-8)	9	0	9	0	0.00%	N/A	N/A	0.0241	2.0136E-4	0.0142	0.589
Selenium (background)	28	0	18	10	35.71%	0.002	0.012	0.0306	0.00133	0.0365	1.195
Selenium (mw-61)	18	0	9	9	50.00%	5.0000E-4	0.01	8.4000E-4	8.0780E-8	2.8422E-4	0.338
Selenium (mw-7)	18	0	17	1	5.56%	0.01	0.01	0.00877	1.7496E-5	0.00418	0.477
Selenium (mw-75)	11	0	9	2	18.18%	0.005	0.01	0.00231	2.9877E-8	1.7285E-4	0.0748
Selenium (mw-8)	9	0	7	2	22.22%	0.003	0.01	0.00268	1.3375E-5	0.00366	1.365
Thallium (background)	27	1	16	11	40.74%	1.0000E-4	0.002	0.00151	9.6213E-6	0.0031	2.059
Thallium (mw-61)	18	0	10	8	44.44%	4.0000E-4	0.002	1.4800E-4	3.360E-10	1.8330E-5	0.124
Thallium (mw-7)	18	0	11	7	38.89%	1.0000E-4	0.002	1.6063E-4	1.0489E-8	1.0241E-4	0.638
Thallium (mw-75)	11	0	2	9	81.82%	4.0000E-4	0.002	1.7500E-4	2.500E-11	5.0000E-6	0.0286
Thallium (mw-8)	9	0	1	8	88.89%	1.0000E-4	0.01	1.0800E-4	2.560E-10	1.6000E-5	0.148
Fluoride (background)	28	0	13	15	53.57%	0.08	5	1.31	0.827	0.909	0.694

1.113

0.684

TABLE B-1
MULTIUNIT ProUCL GENERAL STATISTICS\*

			MU	LIIUNII Proud	CL GENERAL	STATISTICS	•				
Fluoride (mw-61)	18	0	18	0	0.00%	N/A	N/A	1.223	0.0215	0.146	0.12
Fluoride (mw-7)	18	0	3	15	83.33%	0.4	4	0.357	3.0612E-4	0.0175	0.049
Fluoride (mw-75)	11	0	3	8	72.73%	2	2	1.433	0.0422	0.205	0.143
Fluoride (mw-8)	9	0	3	6	66.67%	0.4	5	0.664	0.0728	0.27	0.406
Combined_Radium (background)	29	0	23	6	20.69%	0.6	0.9	1.7	0.682	0.826	0.486
Combined_Radium (mw-61)	18	0	10	8	44.44%	0.6	0.9	0.934	0.329	0.574	0.615
General Statistics for Censored Date	ta Set (with N	Ds) using Kapla	n Meier Meth	od				·			
Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Combined_Radium (mw-7)	18	0	15	3	16.67%	0.6	0.9	1.552	0.657	0.811	0.522
Combined_Radium (mw-75)	11	0	7	4	36.36%	0.6	0.8	0.773	0.167	0.409	0.53

11.11%

0.7

0.7

1.629

1.24

#### General Statistics for Raw Data Sets using Detected Data Only

9

Combined\_Radium (mw-8)

Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Antimony (background)	4	2	3.3000E-4	4.8000E-4	3.7750E-4	3.5000E-4	4.7583E-9	6.8981E-5	1.4826E-5	1.885	0.183
Antimony (mw-61)	3	1	2.3000E-4	2.9000E-4	2.5000E-4	2.3000E-4	1.2000E-9	3.4641E-5	0	1.732	0.139
Antimony (mw-7)	4	1	1.6000E-4	0.001	4.3500E-4	2.9000E-4	1.4590E-7	3.8197E-4	1.1119E-4	1.832	0.878
Antimony (mw-75)	1	1	0.004	0.004	0.004	0.004	N/A	N/A	0	N/A	N/A
Antimony (mw-8)	3	1	4.8000E-4	0.0014	8.0667E-4	5.4000E-4	2.6493E-7	5.1472E-4	8.8955E-5	1.706	0.638
Arsenic (background)	16	0	8.8000E-4	0.0045	0.00235	0.0025	1.5241E-6	0.00123	0.00163	0.302	0.525
Arsenic (mw-61)	5	0	4.2000E-4	6.3000E-4	5.3800E-4	5.6000E-4	6.5200E-9	8.0747E-5	8.8955E-5	-0.66	0.15
Arsenic (mw-7)	11	0	3.3000E-4	0.0021	7.5636E-4	6.6000E-4	2.1505E-7	4.6373E-4	1.3343E-4	2.839	0.613
Arsenic (mw-75)	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic (mw-8)	4	0	5.3000E-4	0.0091	0.00273	6.4000E-4	1.8053E-5	0.00425	1.2602E-4	1.998	1.558
Barium (background)	28	0	0.018	0.042	0.0225	0.021	2.8851E-5	0.00537	0.00148	2.546	0.239
Barium (mw-61)	17	1	0.013	0.016	0.0139	0.014	5.5882E-7	7.4755E-4	0	1.116	0.0536
Barium (mw-7)	18	0	0.013	0.017	0.0154	0.015	1.6634E-6	0.00129	0.00148	-0.0941	0.0838
Barium (mw-75)	11	0	0.017	0.02	0.0187	0.018	1.2182E-6	0.0011	0.00148	0.108	0.0589
Barium (mw-8)	9	0	0.011	0.15	0.0313	0.014	0.00205	0.0453	0.00297	2.824	1.445
Beryllium (background)	2	2	7.5000E-4	0.001	8.7500E-4	8.7500E-4	3.1250E-8	1.7678E-4	1.8532E-4	N/A	0.202
Beryllium (mw-61)	1	1	1.6000E-4	1.6000E-4	1.6000E-4	1.6000E-4	N/A	N/A	0	N/A	N/A
Beryllium (mw-7)	1	1	1.5000E-4	1.5000E-4	1.5000E-4	1.5000E-4	N/A	N/A	0	N/A	N/A
Beryllium (mw-75)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium (mw-8)	1	1	0.002	0.002	0.002	0.002	N/A	N/A	0	N/A	N/A
Cadmium (background)	8	0	1.2000E-4	3.1000E-4	2.3750E-4	2.4000E-4	4.0214E-9	6.3415E-5	7.4129E-5	-0.83	0.267
Cadmium (mw-61)	17	0	8.2000E-4	0.0011	9.4235E-4	9.4000E-4	5.8191E-9	7.6283E-5	4.4477E-5	0.637	0.0809
Cadmium (mw-7)	3	0	1.0000E-4	0.0014	5.4667E-4	1.4000E-4	5.4653E-7	7.3928E-4	5.9303E-5	1.726	1.352
Cadmium (mw-75)	11	0	0.0019	0.0024	0.00213	0.002	3.8182E-8	1.9540E-4	1.4826E-4	0.32	0.0919

TABLE B-1
MULTIUNIT ProUCL GENERAL STATISTICS\*

Cadmium (mw-8)	8	0	1.1000E-4	9.6000E-4	3.4875E-4	2.1000E-4	1.0121E-7	3.1814E-4	8.8955E-5	1.497	0.912
Chromium (background)	8	2	6.5000E-4	0.0035	0.00135	8.3500E-4	1.1646E-6	0.00108	1.6308E-4	1.62	0.799
Chromium (mw-61)	4	1	5.2000E-4	7.5000E-4	6.0250E-4	5.7000E-4	1.1892E-8	1.0905E-4	7.4129E-5	1.075	0.181
Chromium (mw-7)	8	1	4.1000E-4	0.0047	0.00209	0.00205	1.6464E-6	0.00128	5.9303E-4	1.029	0.613
Chromium (mw-75)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium (mw-8)	6	1	6.0000E-4	0.02	0.00409	7.9500E-4	6.0876E-5	0.0078	1.7791E-4	2.438	1.908
Cobalt (background)	14	0	6.4000E-4	0.0045	0.00298	0.00295	1.0273E-6	0.00101	0.00104	-0.756	0.34
Cobalt (mw-61)	18	0	0.01	0.017	0.0138	0.014	3.3595E-6	0.00183	0.00148	-0.277	0.133
Cobalt (mw-7)	7	0	6.5000E-4	0.0028	0.00161	0.0015	5.4575E-7	7.3875E-4	7.4129E-4	0.248	0.458
General Statistics for Raw Data	Sets using Detec	ted Data Only	<b>'</b>	"		1		<b>"</b>	<b>'</b>		
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Cobalt (mw-75)	11	π iviissirig	0.039	0.049	0.0446	0.044	8.8545E-6	0.00298	0.00297	-0.208	0.0667
Cobalt (mw-8)	6	0	5.3000E-4	0.049	0.00431	0.00155	5.2182E-5	0.00238	0.00297	2.408	1.676
Lead (background)	0	0	N/A	0.019 N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead (mw-61)	11	0	7.8000E-4	0.001	8.5455E-4	8.3000E-4	4.3673E-9	6.6085E-5	5.9303E-5	1.061	0.0773
Lead (mw-7)	2	0	4.5000E-4	8.2000E-4	6.3500E-4	6.3500E-4	4.3073E-9 6.8450E-8	2.6163E-4	2.7428E-4	N/A	0.0773
Lead (mw-75)	8	0	0.0028	0.0041	0.00319	0.0031	1.5268E-7	3.9074E-4	1.4826E-4	2.194	0.412
Lead (mw-8)	3	0	5.000E-4	0.033	0.0116	0.0031	3.4260E-4	0.0185	0.00133	1.727	1.591
Lithium (background)	28	0	0.37	1.8	0.852	0.0014	0.155	0.393	0.504	0.285	0.462
Lithium (mw-61)	18	0	0.35	0.44	0.38	0.375	4.9412E-4	0.0222	0.0222	1.193	0.402
Lithium (mw-7)	18	0	0.75	1.2	0.899	0.9	0.00962	0.0222	0.0222	1.582	0.109
Lithium (mw-75)	11	0	0.73	0.48	0.432	0.43	4.3636E-4	0.0209	0.0007	0.994	0.103
Lithium (mw-8)	9	0	1.1	1.5	1.178	1.1	0.0169	0.0203	0.0140	2.269	0.111
Mercury (background)	1	2	1.0000E-4	1.0000E-4	1.0000E-4	1.0000E-4	N/A	N/A	0	N/A	N/A
Mercury (mw-61)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (mw-7)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (mw-75)	1	1	2.8000E-4	2.8000E-4	2.8000E-4	2.8000E-4	N/A	N/A	0	N/A	N/A
Mercury (mw-8)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum (background)	28	0	0.013	0.096	0.031	0.026	3.6322E-4	0.0191	0.00964	2.251	0.615
Molybdenum (mw-61)	18	0	0.069	0.085	0.0766	0.0775	1.9556E-5	0.00442	0.00297	-0.125	0.0578
Molybdenum (mw-7)	16	0	0.0022	0.041	0.00876	0.004	1.3333E-4	0.0115	0.00104	2.3	1.318
Molybdenum (mw-75)	11	0	0.16	0.18	0.169	0.17	6.9091E-5	0.00831	0.0148	0.19	0.0492
Molybdenum (mw-8)	9	0	0.011	0.049	0.0241	0.018	2.0136E-4	0.0142	0.00593	1.05	0.589
Selenium (background)	18	0	0.0017	0.092	0.0465	0.061	0.00144	0.0379	0.0415	-0.289	0.815
Selenium (mw-61)	9	0	6.6000E-4	0.0016	8.7778E-4	7.6000E-4	8.4919E-8	2.9141E-4	1.4826E-4	2.267	0.332
Selenium (mw-7)	17	0	0.0026	0.015	0.00896	0.0098	1.8650E-5	0.00432	0.00519	-0.0716	0.482
Selenium (mw-75)	9	0	0.0021	0.0026	0.00231	0.0023	3.3611E-8	1.8333E-4	2.9652E-4	0.418	0.0793
Selenium (mw-8)	7	0	8.4000E-4	0.013	0.00305	0.0015	1.9327E-5	0.0044	1.4826E-4	2.625	1.442
Thallium (background)	16	1	3.5000E-4	0.017	0.00234	0.0014	1.5385E-5	0.00392	1.4826E-4	3.953	1.676

TABLE B-1
MULTIUNIT ProUCL GENERAL STATISTICS\*

Combined_Radium (mw-8)	8	0	1	4.66	1.745	1.3	1.455	1.206	0.148	2.585	0.691
Combined Radium (mw-75)	7	0	0.4	1.6	0.986	0.9	0.161	0.402	0.148	0.318	0.408
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
General Statistics for Raw Data Se	ts using Detec	cted Data Only									
Combined_Radium (mw-7)	15	0	0.7	3.3	1.74	1.5	0.617	0.785	0.593	1.03	0.451
Combined_Radium (mw-61)	10	0	0.5	2.2	1.269	1.295	0.376	0.613	0.882	0.268	0.483
Combined_Radium (background)	23	0	0.7	3.5	1.986	2	0.488	0.698	0.593	0.353	0.352
Fluoride (mw-8)	3	0	0.68	1.1	0.897	0.91	0.0442	0.21	0.282	-0.284	0.235
Fluoride (mw-75)	3	0	1.2	1.7	1.433	1.4	0.0633	0.252	0.297	0.586	0.176
Fluoride (mw-7)	3	0	0.35	0.4	0.367	0.35	8.3333E-4	0.0289	0	1.732	0.0787
Fluoride (mw-61)	18	0	0.91	1.6	1.223	1.2	0.0215	0.146	0.148	0.494	0.12
Fluoride (background)	13	0	0.79	3.2	1.842	1.9	0.349	0.591	0.297	0.198	0.321
Thallium (mw-8)	1	0	1.4000E-4	1.4000E-4	1.4000E-4	1.4000E-4	N/A	N/A	0	N/A	N/A
Thallium (mw-75)	2	0	1.7000E-4	1.8000E-4	1.7500E-4	1.7500E-4	5.000E-11	7.0711E-6	7.4129E-6	N/A	0.0404
Thallium (mw-7)	11	0	9.3000E-5	5.3000E-4	1.7573E-4	1.5000E-4	1.5237E-8	1.2344E-4	5.9303E-5	2.78	0.702
Γhallium (mw-61)	10	0	1.1000E-4	1.8000E-4	1.4800E-4	1.5000E-4	3.733E-10	1.9322E-5	1.4826E-5	-0.457	0.131

User Selected Options	Mann-Ker	ndall Trend	Test Analy	/sis					
Date/Time of Computation	ProUCL 5	.19/19/2018	3 9:22:16 <i>A</i>	AM.					
From File		NOFLUOR			smentMon	t Sept201	8.xls		
Full Precision	OFF								
Confidence Coefficient	0.95								
Level of Significance	0.05								
Level of eignmeanes	0.00								
Arsenic-backg	round								
General Statis									
Number or Reported Event		0							
Number of Genera		28							
Number Values R		28							
	Minimum	8.8000E-4							
	Maximum	0.01							
	Mean	0.00334							
Geom	netric Mean	0.00262							
	Median	0.0025							
Standar	d Deviation	0.00264							
Coefficient	of Variation	0.79							
Mann-Kendall	Test								
M-K Tes	t Value (S)	129							
Critical V	'alue (0.05)	1.645							
Standard De	viation of S	50.24							
Standardized	Value of S	2.548							
Approxim	ate p-value	0.00542							
	<u> </u>								
Statistically significant evidenc	e of an incr	easing							
trend at the specified level of s	ignificance.								
Arsenic-mw-	-61								
General Statis									
Number or Reported Event		0							
Number of Genera		18							
Number Values R		18							
	Minimum	4.2000E-4							
				1			1	1	1
	Maximum	0.01							
	Mean	0.00173							
Geom	Mean netric Mean	0.00173 0.00104							
	Mean netric Mean Median	0.00173 0.00104 6.0500E-4							
Standar	Mean netric Mean Median d Deviation	0.00173 0.00104 6.0500E-4 0.00236							
	Mean netric Mean Median d Deviation	0.00173 0.00104 6.0500E-4							
Standar Coefficient	Mean netric Mean Median d Deviation of Variation	0.00173 0.00104 6.0500E-4 0.00236							
Standar Coefficient ( Mann-Kendall	Mean netric Mean Median d Deviation of Variation  Test	0.00173 0.00104 6.0500E-4 0.00236 1.362							
Standar Coefficient Mann-Kendall M-K Tes	Mean netric Mean Median d Deviation of Variation  Test st Value (S)	0.00173 0.00104 6.0500E-4 0.00236 1.362							
Standar Coefficient Mann-Kendall M-K Tes Tabula	Mean netric Mean Median d Deviation of Variation  Test st Value (S) ted p-value	0.00173 0.00104 6.0500E-4 0.00236 1.362 74 0.002							
Standar Coefficient of Mann-Kendall M-K Tes Tabula Standard De	Mean Median d Deviation of Variation  Test st Value (S) ted p-value viation of S	0.00173 0.00104 6.0500E-4 0.00236 1.362 74 0.002 25.53							
Standar Coefficient Mann-Kendall M-K Tes Tabula	Mean Median d Deviation of Variation  Test st Value (S) ted p-value viation of S	0.00173 0.00104 6.0500E-4 0.00236 1.362 74 0.002 25.53 2.859							
Standar Coefficient Mann-Kendall M-K Tes Tabula Standard De Standardized	Mean Median d Deviation of Variation  Test st Value (S) ted p-value viation of S	0.00173 0.00104 6.0500E-4 0.00236 1.362 74 0.002 25.53							
Standar Coefficient of Mann-Kendall M-K Tes Tabula Standard De Standardized	Mean Median Median d Deviation of Variation  Test st Value (S) ted p-value viation of S Value of S ate p-value	0.00173 0.00104 6.0500E-4 0.00236 1.362 74 0.002 25.53 2.859 0.00213							

around at the amonified level of simulfiers					
trend at the specified level of significance.					
Arsenic-mw-7					
General Statistics					
Number or Reported Events Not Used					
Number of Generated Events	18				
Number Values Reported (n)	18				
Minimum	3.3000E-4				
Maximum	0.01				
Mean	0.00146				
Geometric Mean	9.3180E-4				
Median	6.9500E-4				
Standard Deviation	0.00222				
Coefficient of Variation					
Mann-Kendall Test					
M-K Test Value (S)	67				
Tabulated p-value					
Standard Deviation of S					
Standard Deviation of S					
Approximate p-value	0.00596				
Statistically significant evidence of an incr					
trend at the specified level of significance.					
Arsenic-mw-75					
General Statistics					
Number or Reported Events Not Used					
Number of Generated Events					
Number Values Reported (n)					
Minimum	5.0000E-4				
Maximum	0.01				
Mean	0.00295				
Geometric Mean	0.00222				
Median	0.002				
Standard Deviation	0.00265				
	0.897				
Coefficient of Variation	0.897				
	0.897				
Coefficient of Variation  Mann-Kendall Test					
Coefficient of Variation  Mann-Kendall Test  M-K Test Value (S)	20				
Coefficient of Variation  Mann-Kendall Test  M-K Test Value (S)  Tabulated p-value	20 0.06				
Coefficient of Variation  Mann-Kendall Test  M-K Test Value (S)  Tabulated p-value  Standard Deviation of S	20 0.06 11.69				
Mann-Kendall Test  M-K Test Value (S)  Tabulated p-value  Standard Deviation of S  Standardized Value of S	20 0.06 11.69 1.625				
Coefficient of Variation  Mann-Kendall Test  M-K Test Value (S)  Tabulated p-value  Standard Deviation of S	20 0.06 11.69 1.625				
Mann-Kendall Test  M-K Test Value (S)  Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value	20 0.06 11.69 1.625 0.0521				
Mann-Kendall Test  M-K Test Value (S) Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value Insufficient evidence to identify a significant	20 0.06 11.69 1.625 0.0521				
Mann-Kendall Test  M-K Test Value (S) Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value Insufficient evidence to identify a significant trend at the specified level of significance	20 0.06 11.69 1.625 0.0521				
Mann-Kendall Test  M-K Test Value (S) Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value Insufficient evidence to identify a significant	20 0.06 11.69 1.625 0.0521				
Mann-Kendall Test  M-K Test Value (S) Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value Insufficient evidence to identify a significant trend at the specified level of significance Arsenic-mw-8	20 0.06 11.69 1.625 0.0521				
Mann-Kendall Test  M-K Test Value (S)  Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value  Insufficient evidence to identify a significant trend at the specified level of significance Arsenic-mw-8  General Statistics	20 0.06 11.69 1.625 0.0521				
Mann-Kendall Test  M-K Test Value (S) Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value Insufficient evidence to identify a significant trend at the specified level of significance Arsenic-mw-8  General Statistics Number or Reported Events Not Used	20 0.06 11.69 1.625 0.0521				
Mann-Kendall Test  M-K Test Value (S)  Tabulated p-value Standard Deviation of S Standardized Value of S Approximate p-value  Insufficient evidence to identify a significant trend at the specified level of significance Arsenic-mw-8  General Statistics	20 0.06 11.69 1.625 0.0521				

	M: :  5 0000				1	1	1		
	Minimum	5.0000E-4							
	Maximum	0.01							
	Mean	0.00266							
Geome	etric Mean	0.00119							
	Median	7.0000E-4							
Standard	Standard Deviation 0.0039								
		1.475							
Coefficient of Variation 1.475									
14 17 1.11									
Mann-Kendall									
	Value (S)	-4							
	ed p-value	0.381							
Standard Dev	riation of S	9.487							
Standardized '	Value of S	-0.316							
Approxima	te p-value	0.376							
Insufficient evidence to identify	Insufficient evidence to identify a significant								
trend at the specified level of significance.									
Поли от от от от от от от от от									
Mann-Kendall Trend			Toet Analy	reie					
	IVIAI II I-INGI	uali Heliu	i est Aliaiy	7313					
User Selected Options	D 1101 F	10/10/001	0.0.00.47	\ <b>\ \ \</b>					
<u>'</u>	ProUCL 5.								
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	OFF								
Confidence Coefficient	0.95								
Level of Significance	0.05								
Barium-backgro	ound								
General Statis	tice								
Number or Reported Events		0							
Number of Generat		28							
Number Values Re		28							
	Minimum	0.018							
	Maximum	0.042							
	Mean	0.0225							
Geome	etric Mean	0.022							
	Median	0.021							
Standard	Deviation	0.00537	7						
Coefficient o	f Variation	0.239							
								1	
Mann-Kendall	Test								
	Value (S)	-110							
	alue (0.05)	-1.645						1	
Standard Dev		49.77							
Standardized '		-2.19							
Approxima	te p-value	0.0143							
Statistically significant evidence	atistically significant evidence of a decreasing								
trend at the specified level of sig	nd at the specified level of significance.								
	Barium-mw-61								
22									
General Statis	tice							1	
		0							
Number or Reported Events Not Used 0									

Number of Generated Events	17				
Number Values Reported (n)	18				
Number Values Missing	1				
Number Values Used	17				
Minimum	0.013				
Maximum	0.016				
Mean	0.0139				
Geometric Mean	0.0139				
Median	0.014				
Standard Deviation					
Coefficient of Variation	0.0536				
	0.0000				
Mann-Kendall Test					
M-K Test Value (S)	-41				
Tabulated p-value	0.054				
Standard Deviation of S	20.39				
Standard Deviation of S Standardized Value of S	-1.962				
	0.0249				
Approximate p-value	0.0249				
Insufficient evidence to identify a significan					
trend at the specified level of significance.					
Barium-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	18				
Number Values Reported (n)	18				
Minimum	0.013				
Maximum	0.017				
Mean	0.0154				
Geometric Mean	0.0153				
Median	0.015				
Standard Deviation	0.00129	)			
Coefficient of Variation	0.0838				
Mann-Kendall Test					
M-K Test Value (S)	-58				
Tabulated p-value	0.013				
Standard Deviation of S	25.52				
Standardized Value of S	-2.233				
Approximate p-value	0.0128				
, tp. ominate p value	3.0120				
Statistically significant evidence of a decre	asing				
trend at the specified level of significance.	~~y				
Barium-mw-75					
Banam-mw-70					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	0.017				
Maximum	0.02				
Mean	0.0187				

		JE 1017 (1414 11					
Geometric Me		1					
Med	ian 0.018						
Standard Devia	ion 0.0011						
Coefficient of Varia	tion 0.0589	)					
Mann-Kendall Test							
M-K Test Value	(S) 5						
Tabulated p-va	. ,						
Standard Deviation of							
Standardized Value							
Approximate p-va							
Арргохіпате р-ча	ue 0.308						
Inc. officions and down as to indepent to a cinquit							
Insufficient evidence to identify a signif							
trend at the specified level of significa	nce.						
Barium-mw-8							
General Statistics							
Number or Reported Events Not U							
Number of Generated Eve							
Number Values Reported							
Minim	um 0.011						
Maxim	um 0.15						
Me	ean 0.0313	3					
Geometric Me	ean 0.0196	5					
Med	ian 0.014						
Standard Devia	Standard Deviation 0.0453						
Coefficient of Varia							
Mann-Kendall Test							
M-K Test Value	(S) -24						
Tabulated p-va							
Standard Deviation of							
Standardized Value							
Approximate p-va		7					
т фризимало р							
Statistically significant evidence of a de	ecreasing						
trend at the specified level of significan							
	1						
Mann-	Kendall Trend	l Test Δnalv	reie				
User Selected Options			<del>.</del>				
-	L 5.19/19/201	8 0.36.13 /	M				
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Full Precision OFF	LINOI LUUF	UPLUINAD	10 IVIA39ES	JOHNSHILL HIVION	Ochreni	U.AI3	
Confidence Coefficient 0.95							
Level of Significance 0.05							
Level of Significance   0.05							
Cadmium-background				1	1	1	I
Caumum-background							
Consuel Statistics	One and Obstiction						
	General Statistics  Number or Reported Events Not Used 0						
Number or Reported Events Not U							
	Number of Generated Events 28						
Number Values Reported							
Minim	um 1.2000E-4	4					

Maximum						
	6.1786E-4					
Geometric Mean	4.5402E-4					
Median	4.0000E-4					
Standard Deviation	5.6011E-4					
Coefficient of Variation						
	0.007					
Mann-Kendall Test						
M-K Test Value (S)	144					
( )						
Critical Value (0.05)						
Standard Deviation of S						
Standardized Value of S						
Approximate p-value	0.00181					
Statistically significant evidence of an incre	easing					
trend at the specified level of significance.						
Cadmium-mw-61						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events						
Number Values Reported (n)						
	8.2000E-4					
Maximum		,				
Mean						
Geometric Mean						
	9.4000E-4					
Standard Deviation		•				
Coefficient of Variation	0.26					
Mann-Kendall Test						
M-K Test Value (S)	16					
Tabulated p-value	0.275					
Standard Deviation of S	26.13					
Standardized Value of S	0.574					
Approximate p-value						
PP 1 2 P 1						
Insufficient evidence to identify a significan	nt					
trend at the specified level of significance						
Cadmium-mw-7	-					
Odumum-/						
General Statistics						
Number or Reported Events Not Used	_					
•						
Number of Generated Events						
Number Values Reported (n)						
	1.0000E-4					
Maximum			 			
Mean	3.9667E-4	·				
Geometric Mean	2.1549E-4					
Median	1.0000E-4	,				
Standard Deviation	5.3618E-4					
Coefficient of Variation						
					<u> </u>	

N 1/ 1 1 T 1		I	I	1		1
Mann-Kendall Test						
M-K Test Value (S)						
Tabulated p-value						
Standard Deviation of S						
Standardized Value of S	1.812					
Approximate p-value	0.035					
Statistically significant evidence of an incre	easing					
trend at the specified level of significance.						
Cadmium-mw-75						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events						
Number Values Reported (n)						
Minimum						
Maximum						
Mean						
Geometric Mean		<u> </u>				
Median						
Standard Deviation						
Coefficient of Variation	0.0919					
Mann-Kendall Test						
M-K Test Value (S)	14					
Tabulated p-value						
Standard Deviation of S	12.38					
Standardized Value of S	1.05					
Approximate p-value	0.147					
Insufficient evidence to identify a significal	nt					
trend at the specified level of significance	•					
Cadmium-mw-8						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	9					
Number Values Reported (n)						
	1.1000E-4	<u> </u>  -				
Maximum						
	5.3222E-4	<u> </u> 			1	
Geometric Mean						
	2.2000E-4				1	
Standard Deviation		·				
Coefficient of Variation	1.176					
• • • • • • • • • • • • • • • • • • •					1	
Mann-Kendall Test						
M-K Test Value (S)						
Tabulated p-value						
Standard Deviation of S						
Standardized Value of S						
Approximate p-value	0.174		 			
Ţ						

Insufficient evidence to identify a	a significar	nt						
trend at the specified level of sig								
	,	<u> </u>						
	Mann-Ken	dall Trend	Test Analy	/sis				
User Selected Options								
	ProLICL 5	19/24/201	8 2:43:01 F	PM				
-			IDEorRAD		smentMon	t Sent201	8 yls	
	OFF	1101 2001		1011111110000	omontavion	i_oopizo1	0.500	
	0.95							
	0.05							
Level of eightheaties	0.00							
Chromium-backgr	round							
General Statist	ics							
Number or Reported Events		0						
Number of Generate		26						
Number Values Re		28						
Number Values Re		20						
Number Value	_	26						
		6.5000E-4						
	Maximum	0.000=4	•					
<u> </u>		0.02						
Coome	Mean etric Mean	0.00415						
Geome		0.00275						
Standard	Median							
		0.00426	)					
Coefficient of	variation	1.029						
Mann-Kendall T								
		00						
M-K Test		89						
Critical Va		1.645						
Standard Devi		44.72						
Standardized \		1.968						
Approximat	te p-value	0.0245						
Statistically significant evidence		easing						
trend at the specified level of sig								
Chromium-mw-	-67							
A	•							
General Statist								
Number or Reported Events		0						
Number of Generate		17						
Number Values Re		18						
Number Value	_	1						
Number Val		17						
		5.0000E-4						
	Maximum	0.01						
	Mean	0.00202						
Geome	tric Mean	0.00121						
		7.5000E-4						
Standard		0.00245	5					
Coefficient of	Variation	1.212						
Mann-Kendall T	est							

M-K Test Value (S)					
Tabulated p-value					
Standard Deviation of S	23.81				
Standardized Value of S	2.772				
Approximate p-value	0.00279				
Statistically significant evidence of an incre	easing				
trend at the specified level of significance.					
Chromium-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	17				
Number Values Reported (n)	18				
Number Values Missing	1				
Number Values Used	17				
Minimum	4.1000E-4				
Maximum	0.0047				
Mean	0.0019				
Geometric Mean	0.00142	<u> </u>			
Median	0.0018				
Standard Deviation		<b>)</b>			
Coefficient of Variation					
Mann-Kendall Test					
M-K Test Value (S)	70				
Tabulated p-value					
Standard Deviation of S					
Standardized Value of S					
Approximate p-value	0.00206	;			
PP					
Statistically significant evidence of an incre	easing				
trend at the specified level of significance.					
Chromium-mw-75					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	10				
Number Values Reported (n)	11				
Number Values Missing					
Number Values Used	10				
	5.0000E-4				
Maximum	0.01				
Mean	0.00335	j			
Geometric Mean	0.00353				
Median	0.00232	•			
Standard Deviation	0.003	)			
Coefficient of Variation		*			
Coefficient of variation	0.002				
Mann-Kendall Test					
Mann-Kendali Test M-K Test Value (S)	28				
Tabulated p-value					
Standard Deviation of S	10.61				

Standardized									
Approxima	ate p-value	0.00548							
Statistically significant evidence	atistically significant evidence of an increasing								
trend at the specified level of si	gnificance.								
Chromium-m	w-8								
General Statis	stics								
Number or Reported Events	Not Used	0							
Number of Genera	ted Events	8							
Number Values Re	Number Values Reported (n) 9								
Number Values Missing 1									
Number Values Used 8									
Minimum 6.0000E-4									
	Maximum 0.02								
	Mean	0.00351							
Geom	etric Mean	0.00148							
2.00		9.1000E-4							
		0.00669							
		1.91							
Coemolonic of Variation 1.01		1.51							
Mann-Kendall	Toet								
	t Value (S)	-16							
	ed p-value	0.031							
Standard Dev		8.083							
Standardized	te p-value	-1.856 0.0317							
Statistically significant evidence trend at the specified level of si		asing							
	Mann-Ken	dall Trend	Test Analy	/sis					
User Selected Options	Wallin Itoli	adii 11011d	10007 11101	, 0.0					
Date/Time of Computation	ProLICL 5	19/23/2018	8 5.26.18 [	ЭМ					
From File		NOFLUOR			ementMon	t Sent201	Q vle		
Full Precision	OFF	1101 20011	IDEON V.E	710111710000	SITIOTILIVIOI		0.213		
Confidence Coefficient	0.95								
Level of Significance	0.05								
	2.00								
Cobalt-backgro	ound								
2 3 Daile Davingin									
General Statis	tics								
Number or Reported Events		0							
Number of Genera		28							
		28					1	1	
Trainiber values I'll	Number Values Reported (n) 28  Minimum 6.4000E-4						1	1	
Maximum 0.4000E									
			<u> </u>						
Mean 0.00353 Geometric Mean 0.00283									
Geom	Median	0.00283	•						
Oto			,						
	d Deviation	0.00257							
Coefficient of	variation	0.729							
1	\				1	1			

Mann-Kendall Test	1	1			
Mann-Kendali Test M-K Test Value (S)	62				
Critical Value (0.05)					
Standard Deviation of S					
Standardized Value of S					
Approximate p-value	0.113				
Insufficient evidence to identify a significant					
trend at the specified level of significance	•				
Cobalt-mw-61					
General Statistics					
Number or Reported Events Not Used					
Number of Generated Events	18				
Number Values Reported (n)	18				
Minimum	0.01				
Maximum	0.017				
Mean	0.0138				
Geometric Mean	0.0137				
Median	0.014				
Standard Deviation	0.00183	3			
Coefficient of Variation					
Mann-Kendall Test					
M-K Test Value (S)	114				
Tabulated p-value					
Standard Deviation of S					
Standardized Value of S					
Approximate p-value					
, ipproximate p value	0.72072				
Statistically significant evidence of an incre	easing				
trend at the specified level of significance.					
Cobalt-mw-7					
Gobalt IIIW 7					
General Statistics					
Number or Reported Events Not Used	0				
·					
Number of Generated Events	18 18				
Number Values Reported (n)	5.0000E-4				
Maximum		•			
Mean	0.00179				
Geometric Mean	0.00122	[			
Median					
Standard Deviation	0.00218	5			
Coefficient of Variation	1.218				
Mann-Kendall Test					
M-K Test Value (S)					
Tabulated p-value			 		
Standard Deviation of S					
Standardized Value of S					
Approximate p-value	0.361				
Approximate p-value		l I			

	_			1	1	1	
Insufficient evidence to identify a significar							
trend at the specified level of significance.							
Cobalt-mw-75							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	11						
Number Values Reported (n)	11						
Minimum	0.039						
Maximum	0.049						
Mean	0.0446						
Geometric Mean	0.0445						
Median	0.044						
Standard Deviation	0.00298						
Coefficient of Variation	0.0667						
<del></del>							
Mann-Kendall Test							
M-K Test Value (S)	22		1				
Tabulated p-value	0.043		1				
Standard Deviation of S	12.73						
Standard Deviation of S	1.65						
Approximate p-value	0.0495						
Арргохіппасе р-чаше	0.0493						
Statistically significant avidence of an incre	ooina						
Statistically significant evidence of an incre	asing						
trend at the specified level of significance.  Cobalt-mw-8							
Cobait-mw-8							
O an anal Otation							
General Statistics	0						
Number or Reported Events Not Used	0						
Number of Generated Events	9						
Number Values Reported (n)	9						
	5.0000E-4						
Maximum	0.019						
Mean	0.0041						
Geometric Mean	0.00171						
Median	0.0013						
Standard Deviation	0.00634						
Coefficient of Variation	1.549						
Mann-Kendall Test							
M-K Test Value (S)	-17						
Tabulated p-value	0.06						
Standard Deviation of S	9.539						
Standardized Value of S	-1.677						
Approximate p-value	0.0467						
Insufficient evidence to identify a significar	ıt						
trend at the specified level of significance.							
			1				
Mann-Ken	dall Trend	Test Analysis	_1	1	1	1	<u> </u>
User Selected Options		•					
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Full Precision	OFF							 
Confidence Coefficient	0.95							 
Level of Significance	0.05							
Lead-backgro	und							
General Statis	stics							
Number or Reported Events	s Not Used	0						
Number of Genera	ted Events	28						
Number Values Re	eported (n)	28						
		1.0000E-4						
	Maximum	0.01						
	Mean	0.00302	)					
Geom	etric Mean	0.00179	)					
	Median	0.002						
Standard	d Deviation	0.00296	;					
Coefficient		0.981						
3333011								
Mann-Kendall	Test							
	t Value (S)	144						
	alue (0.05)							
Standard Dev	, ,							
Standardized								
	Approximate p-value 0.00162		)					
Аррголіні	ate p-value	0.00102	•					
Statistically significant evidence	of an incr	ageing						
trend at the specified level of si		sasing						
Lead-mw-6								
Leau-IIIW-0	' !							
General Statis	rtico							
Number or Reported Events		0						
Number of Genera		18						
Number of General Number Values Re								
Number values in	. ,	7.8000E-4						
	Maximum	0.01						
	Mean	0.001						
Coom								
Geom	etric Mean	0.00137 9.0500E-4					-	
Ota							-	
Standard Coefficient of	d Deviation							
Coemicient o	variation	1.186						
Mp 17 1.0	Toot							
Mann-Kendall		00						
	t Value (S)							
	ted p-value							
Standard Dev								
0:	Standardized Value of S 3.148							
		Approximate p-value 8.2079E-4			1		1	
	ate p-value	8.2079E-4						
Approxima								
Approxima Statistically significant evidence	e of an incr	easing						
Approxima Statistically significant evidence trend at the specified level of si	e of an incre	easing						
Approxima Statistically significant evidence	e of an incre	easing						
Approxima  Statistically significant evidence trend at the specified level of si  Lead-mw-7	e of an incre gnificance.	easing						
Approxima Statistically significant evidence trend at the specified level of si	e of an incre gnificance.	easing						

Number or Reported Events Not Used	0				
Number of Generated Events	18				
Number Values Reported (n)	18				
	1.0000E-4				
Maximum					
Mean					
Geometric Mean					
	5.0000E-4	'			
Standard Deviation					
Coefficient of Variation	1.496				
Mann-Kendall Test					
M-K Test Value (S)	71				
Tabulated p-value	0.003				
Standard Deviation of S	24.42				
Standardized Value of S	2.867				
Approximate p-value	0.00208				
1, 1 1 1 1 1 1					
Statistically significant evidence of an incre	easing				
trend at the specified level of significance.					
Lead-mw-75					
Leau-IIIw-75					
General Statistics	1				
Number or Reported Events Not Used					
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	0.0028				
Maximum	0.01				
Mean	0.00414				
Geometric Mean	0.00382				
Median	0.0032				
Standard Deviation	0.0021				
Coefficient of Variation					
Coefficient of Variation	0.500				
Mana Kandall Task					
Mann-Kendall Test	4.0				
M-K Test Value (S)					
Tabulated p-value	0.082				
Standard Deviation of S					
Standardized Value of S					
Approximate p-value	0.078				
Insufficient evidence to identify a significant	nt				
trend at the specified level of significance					
Lead-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events					
Number Values Reported (n)	9				
	5.0000E-4				
Maximum					
Mean	0.00532				
Geometric Mean	0.00135				

	3-11-					, , ,	1		
		5.0000E-4							
	d Deviation	0.0108							
Coefficient of	of Variation	2.035							
Mann-Kendall									
	t Value (S)	-10							
	ted p-value	0.179							
Standard De		8.679							
Standardized		-1.037							
Approxim	ate p-value	0.15							
Insufficient evidence to identify									
trend at the specified level of s	significance.								
	Mann-Ken	dall Trend	Test Analy	sis .					
User Selected Options	B	10/00/==:	256455						
Date/Time of Computation	ProUCL 5.								
From File	MultiUnit_l	NOFLUOR	IDEorRAD	IUMAsses	smentMon	t_Sept201	8.xls		
Full Precision	OFF								
Confidence Coefficient	0.95								
Level of Significance	Level of Significance 0.05								
4 464 6				I	I	I			
Lithium-backgr	round								
General Statis									
Number or Reported Event		0							
Number of Genera		28							
Number Values R		28							
	Minimum	0.37							
	Maximum	1.8							
	Mean	0.852							
Geom	netric Mean	0.759							
	Median	0.91							
	d Deviation	0.393							
Coefficient (	or Variation	0.462							
\$412. 1 H	T4								
Mann-Kendall		40							
	t Value (S)	-46 1.64F							
	'alue (0.05)	-1.645							
Standard De		49.93							
Standardized		-0.901 0.184							
Approxima	ate p-value	U. 184							
Incufficient evidence to ide-sife	a significa-								
Insufficient evidence to identify trend at the specified level of s	-								
trend at the specified level of s									
Limium-mw-	·01								
Conord Ctat	etice								
General Statis		0							
Number or Reported Event  Number of Genera		0 18							
Number Values R		18							
	Minimum	0.35							
	Maximum	0.44							

			I KEND AN		
Mean	0.38				
Geometric Mean	0.379				
Median	0.375				
Standard Deviation	0.0222				
Coefficient of Variation	0.0585				
Mann-Kendall Test					
M-K Test Value (S)	-22				
Tabulated p-value	0.205				
Standard Deviation of S	25.96				
Standardized Value of S	-0.809				
Approximate p-value	0.209				
у фр. охинало р танао	0.200				
Insufficient evidence to identify a significan	t				
trend at the specified level of significance.					
Lithium-mw-7					
Eta nam-1					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	18				
Number Values Reported (n)	18				
Minimum Maximum	0.75 1.2				
Mean	0.899				
Geometric Mean	0.894				
Median	0.9				
Standard Deviation	0.0981				
Coefficient of Variation	0.109				
Mann-Kendall Test					
M-K Test Value (S)	-40				
Tabulated p-value	0.066				
Standard Deviation of S	26.29				
Standardized Value of S	-1.483				
Approximate p-value	0.069				
Insufficient evidence to identify a significant					
trend at the specified level of significance.					
Lithium-mw-75					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11	 			
Minimum	0.4		<u> </u>		
Maximum	0.48	-			 
Mean	0.432				
Geometric Mean	0.431				
Median	0.43				
Standard Deviation	0.0209				
Coefficient of Variation	0.0484				
Mann-Kendall Test					
				1	

M-K Test Value							
Tabulated p-va							
Standard Deviation	of S 12.18						
Standardized Value	of S -0.821						
Approximate p-va	lue 0.206						
	· ·						
Insufficient evidence to identify a signi	ficant						
trend at the specified level of significa	nce.						
Lithium-mw-8							
General Statistics							
Number or Reported Events Not U	sed 0						
Number of Generated Eve							
Number Values Reported							
Minim							
Maxim							
	ean 1.178						
Geometric M			1			1	
Geometric M							
= 1							
Standard Devia		1	1		1	1	
Coefficient of Varia	tion 0.111						
Mann-Kendall Test							
M-K Test Value							
-	Tabulated p-value 0.46						
Standard Deviation							
Standardized Value	of S 0.236						
Approximate p-va	lue 0.407						
Insufficient evidence to identify a signi	icant						
trend at the specified level of significa	nce.						
Mann-	Kendall Trend	Test Anal	ysis				
User Selected Options							
Date/Time of Computation ProUC	L 5.19/23/201	8 5:38:51	PM				
From File MultiU	nit_NOFLUOF	RIDEorRAD	OIUMAsses	smentMon	t_Sept201	8.xls	
Full Precision OFF							
Confidence Coefficient 0.95							
Level of Significance 0.05							
Molybdenum-background							
, ,							
General Statistics							
Number or Reported Events Not U	sed 0					<u> </u>	
Number of Generated Eve							
Number Values Reported							
Number Values Reported							1
Minin	um 0.013						
Minin Maxim	um 0.013 um 0.096						
Minin Maxin M	oum 0.013 oum 0.096 ean 0.031						
Minin Maxin M Geometric M	oum 0.013 oum 0.096 ean 0.031 ean 0.0273						
Minin Maxin M Geometric M Med	um 0.013 um 0.096 ean 0.031 ean 0.0273 lian 0.026						
Minin Maxin M Geometric M	um 0.013 um 0.096 ean 0.031 ean 0.0273 lian 0.026 tion 0.0191						

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Mann-Kendall Test							
M-K Test Value (S)	-145						
Critical Value (0.05)	-1.645						
Standard Deviation of S	50.47						
Standardized Value of S	-2.853						
Approximate p-value	0.00217	7					
Statistically significant evidence of a decrea	asing						
trend at the specified level of significance.							
Molybdenum-mw-61							
·							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.069						
Maximum	0.085						
Mean	0.0766						
Geometric Mean	0.0764						
Median	0.0704						
Standard Deviation	0.0775						
Coefficient of Variation	0.00442						
Coefficient of Variation	0.0576						
Mann-Kendall Test							
	4.4						
M-K Test Value (S)	14						
Tabulated p-value	0.3						
Standard Deviation of S	26.18						
Standardized Value of S	0.497						
Approximate p-value	0.31						
Insufficient evidence to identify a significan							
trend at the specified level of significance.							
Molybdenum-mw-7							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.0022						
Maximum	0.041						
Mean	0.00862	2					
Geometric Mean	0.00564	1					
Median	0.0042						
Standard Deviation	0.0109						
Coefficient of Variation	1.263						
Mann-Kendall Test							
M-K Test Value (S)	-48						
Tabulated p-value	0.034						
Standard Deviation of S	26.34						
Standardized Value of S	-1.784						
Approximate p-value	0.0372						
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asing							
uog							
0							
0.0492							
0.467							
0							
9							
9							
0.011							
0.049							
0.0241							
0.021							
0.018							
0.0142							
0.589							
-18							
0.038							
asing							
19							
dell Trand	Test Analysi	6					
dall Trend	Test Analysi	s					
	11 11 0.16 0.18 0.169 0.169 0.17 0.00831 0.0492  -2 0.44 12 -0.0833 0.467  nt	0 11 11 11 0.16 0.18 0.169 0.169 0.17 0.00831 0.0492  -2 0.44 12 -0.0833 0.467  nt  0 9 9 0.011 0.049 0.0241 0.021 0.018 0.0142 0.589  -18 0.038 9.487 -1.792 0.0366	0 11 11 11 0.16 0.18 0.169 0.169 0.17 0.00831 0.0492  -2 0.44 12 -0.0833 0.467  nt  0 9 9 9 0.011 0.049 0.0241 0.021 0.018 0.0142 0.589  -18 0.038 9.487 -1.792 0.0366	0 11 11 11 0.16 0.18 0.169 0.169 0.17 0.00831 0.0492  -2 0.44 12 -0.0833 0.467  nt  0 9 9 9 0.011 0.049 0.0241 0.021 0.018 0.0142 0.589  -18 0.038 9.487 -1.792 0.0366	0	0 11 11 11 0.16 0.18 0.169 0.169 0.17 0.00831 0.0492  -2 0.44 12 -0.0833 0.467  nt  -1 10 0.09 9 9 9 0.011 0.049 0.0241 0.021 0.018 0.0142 0.589  -18 0.038 9.487 -1.792 0.0366	0 11

From File	MultiUnit_0	MultiUnit_COMBINEDRADIUM_AssessmentMont_Sept2018.xls							
Full Precision	OFF								
Confidence Coefficient	0.95								
Level of Significance	0.05								
Combined_Radium-l	nackground								
Combined_radiam i	odonground								
General Statis	otico								
		0							
Number or Reported Event		0							
Number of Genera		29							
Number Values R		29							
	Minimum	0.6							
	Maximum	3.5							
	Mean	1.723							
Geom	netric Mean	1.523							
	Median	1.7							
Standar	d Deviation	0.812							
Coefficient		0.471			1				
000.110.10111	0	0							
Mann-Kendall	Toet								
		-108							
	st Value (S)								
	/alue (0.05)	-1.645							
Standard De		53.21							
Standardized	Value of S	-2.011							
Approxim	ate p-value	0.0222							
Statistically significant evidence	e of a decrea	asing							
trend at the specified level of s									
Combined_Radiur									
General Statis	etice								
Number or Reported Event		0							
Number of Genera		18							
Number Values R		18							
	Minimum	0.5							
	Maximum	2.2							
	Mean	1.016							
Geom	netric Mean	0.909							
	Median	0.7							
Standar	d Deviation	0.537							
Coefficient	of Variation	0.528							
Mann-Kendali	Test								
	st Value (S)	-31							
	ted p-value	0.13							
Standard De	-	25.79							
					1				
Standardized		-1.163							
Approxim	ate p-value	0.122							
Insufficient evidence to identify	a significan	t							
trend at the specified level of s	significance.								
Combined_Radiu	-								
_ ····									

			1	1	1	1	1
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.6						
Maximum	3.3						
Mean	1.567						
Geometric Mean	1.384						
Median	1.3						
Standard Deviation	0.819						
Coefficient of Variation	0.523						
Mann-Kendall Test							
M-K Test Value (S)	-20						
Tabulated p-value	0.227						
Standard Deviation of S	26.2						
Standard Deviation of S	-0.725						
Approximate p-value	0.234						
, pproximate p-value	0.204						
Insufficient evidence to identify a significan	t						
trend at the specified level of significance.							
Combined_Radium-mw-75							
Combined_Radium-mw-75							
General Statistics							
	0						
Number or Reported Events Not Used							
Number of Generated Events	11						
Number Values Reported (n)	11						
Minimum	0.4						
Maximum	1.6						
Mean	0.882						
Geometric Mean	0.826						
Median	8.0						
Standard Deviation	0.346						
Coefficient of Variation	0.392						
Mann-Kendall Test							
M-K Test Value (S)	11						
Tabulated p-value	0.223						
Standard Deviation of S	12.66						
Standardized Value of S	0.79						
Approximate p-value	0.215						
Insufficient evidence to identify a significan	t						
trend at the specified level of significance.							
Combined_Radium-mw-8							
	·						
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	8						
Number Values Reported (n)	9						
Number Values Missing	1						
Number Values Used	8						
Minimum	0.7						
		<u> </u>	1	<u> </u>	1	1	1

			1					
	Maximum	1.9						
	Mean	1.25						
Geom	etric Mean	1.208						
	Median	1.25						
Standard	d Deviation	0.342						
Coefficient of	of Variation	0.274						
Mann-Kendall	Test							
M-K Tes	t Value (S)	-14						
	ed p-value	0.054						
Standard Dev		7.958						
Standardized		-1.634						
	ate p-value	0.0512						
Арргохіпта	ate p-value	0.0312						
Insufficient avidence to identify	o olanificon							
Insufficient evidence to identify								
trend at the specified level of si	ignificance.							
	Mann-Ken	dall Trend	Test Analy	/SIS				
User Selected Options								
Date/Time of Computation	ProUCL 5.							
From File	MultiUnit_I	NOFLUOF	RIDEorRAD	IUMAsse	ssmentMon	t_Sept201	8.xls	
Full Precision	OFF							
Confidence Coefficient	0.95							
Level of Significance	0.05							
Selenium-backg	round							
General Statis	tics							
Number or Reported Events		0						
Number of General		28						
Number Values Re		28						
	Minimum	0.0017						
	Maximum	0.0017						
	Mean	0.032						
00000	etric Mean	0.0317						
Geom								
04	Median	0.008						
	Deviation	0.0364						
Coefficient of	or variation	1.147						
h	<b>-</b>							
Mann-Kendall								
	t Value (S)	75						
	alue (0.05)	1.645						
Standard Dev		50.21						
Standardized		1.474						
Approxima	ate p-value	0.0703		-				
	'							
Insufficient evidence to identify	a significan	t						
trend at the specified level of s	ignificance.							
Selenium-mw								
General Statis	tics							
Number or Reported Events		0						
I inditibet of General	Number of Generated Events 18				1			1

Number Values Reported (n)	18				
Minimum	5.0000E-4				
Maximum	0.01				
Mean	0.00186	6			
Geometric Mean	0.00135	5			
Median	0.00128	3			
Standard Deviation	0.00215	j			
Coefficient of Variation	1.161				
Mann-Kendall Test					
M-K Test Value (S)	27				
Tabulated p-value	0.165				
Standard Deviation of S	25.84				
Standardized Value of S	1.006				
Approximate p-value	0.157				
Insufficient evidence to identify a significan	nt				
trend at the specified level of significance.					
Selenium-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	18				
Number Values Reported (n)	18				
Minimum	0.0026				
Maximum	0.0020				
Mean	0.00902	)			
Geometric Mean	0.00902	-			
Median	0.0099				
Standard Deviation	0.0042				
Coefficient of Variation	0.465				
Manual Kanadall Tank					
Mann-Kendall Test	7.1				
M-K Test Value (S)					
Tabulated p-value	0.002				
Standard Deviation of S	26.29				
Standardized Value of S	2.776				
Approximate p-value	0.00275	)			
Statistically significant evidence of an incre	easing				
trend at the specified level of significance.					
Selenium-mw-75					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	0.0021				
Maximum	0.01				
Mean	0.00325	5			
Geometric Mean	0.00283	3			
Median	0.0023				
Standard Deviation	0.00238	3			
					1

	IULTIUNIT					.,			
Coefficient of Va	ariation (	).732							
Mann-Kendall Test	t								
M-K Test Val	lue (S) 2	3							
Tabulated p		.043							
Standard Deviation		2.69							
Standardized Valu		1.734							
Approximate p		.0415							
Арріохіпате р	o-value 0	.0413							
Obstatistis - Herstandflood on the delegation	11	_							
Statistically significant evidence of a		g							
trend at the specified level of signific	cance.								
Selenium-mw-8									
General Statistics									
Number or Reported Events Not	t Used 0	)							
Number of Generated E		)							
Number Values Report	, ,								
Mir	nimum 8.40	00E-4							
Max	ximum 0	.013							
	Mean 0.	00382	)						
Geometric		00238							
		0016							
Standard Dev		00446	3						
Coefficient of Va		1.168	,						
Godinalan di va	induon	1.100							
Mann-Kendall Test									
		<u> </u>							
M-K Test Val									
Tabulated p		).46							
Standard Deviation		9.487							
Standardized Valu		).105							
Approximate p	o-value (	).458							
Insufficient evidence to identify a sig									
trend at the specified level of signifi	icance.								
Mai	nn-Kendall	Trend	Test Analy	/sis					
User Selected Options									
Date/Time of Computation Pro	UCL 5.19/2	3/201	8 8:18:52 F	PM					
-	ltiUnit_NOF	LUOF	IDEorRAD	IUMAsses	smentMon	t_Sept201	8.xls		
Full Precision OFI						-			
Confidence Coefficient 0.99	5								
Level of Significance 0.05									
20.01 01 0191111001100 0.00	-								
Thallium-backgroun	d								
i ilalliulii-backgiouli	u								
General Statistics									
					1	1			
Number or Reported Events Not									
Number of Generated E							<u> </u>		
Number Values Report									
Number Values N									
Number Values									
				1				1	1
Mir	nimum 1.00	00E-4							

Mean 0.00169  Geometric Mean 9.8686E-4  Median 0.0013  Standard Deviation 0.00311  Coefficient of Variation 1.836  Mann-Kendall Test  M-K Test Value (S) 12  Critical Value (0.05) 1.645  Standard Deviation of S 47.44  Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Median 0.0013  Standard Deviation 0.00311  Coefficient of Variation 1.836  Mann-Kendall Test  M-K Test Value (S) 12  Critical Value (0.05) 1.645  Standard Deviation of S 47.44  Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Standard Deviation 0.00311 Coefficient of Variation 1.836  Mann-Kendall Test M-K Test Value (S) 12 Critical Value (0.05) 1.645 Standard Deviation of S 47.44 Standardized Value of S 0.232 Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance. Thallium-mw-61  General Statistics Number or Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Minimum 1.1000E-4 Maximum 0.002	
Mann-Kendall Test  M-K Test Value (S) 12  Critical Value (0.05) 1.645  Standard Deviation of S 47.44  Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0 Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Mann-Kendall Test  M-K Test Value (S) 12  Critical Value (0.05) 1.645  Standard Deviation of S 47.44  Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0 Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Mann-Kendall Test  M-K Test Value (S) 12  Critical Value (0.05) 1.645  Standard Deviation of S 47.44  Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0 Number of Generated Events 18  Number Values Reported (n) 18  Minimum Minimum 0.002	
M-K Test Value (S) 12 Critical Value (0.05) 1.645 Standard Deviation of S 47.44 Standardized Value of S 0.232 Approximate p-value 0.408 Insufficient evidence to identify a significant trend at the specified level of significance. Thallium-mw-61  General Statistics Number or Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Minimum 1.1000E-4 Maximum 0.002	
M-K Test Value (S) 12 Critical Value (0.05) 1.645 Standard Deviation of S 47.44 Standardized Value of S 0.232 Approximate p-value 0.408 Insufficient evidence to identify a significant trend at the specified level of significance. Thallium-mw-61  General Statistics Number or Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Minimum 1.1000E-4 Maximum 0.002	
Critical Value (0.05) 1.645  Standard Deviation of S 47.44  Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Standard Deviation of S 47.44  Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Standardized Value of S 0.232  Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Approximate p-value 0.408  Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Insufficient evidence to identify a significant trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
trend at the specified level of significance.  Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Thallium-mw-61  General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
General Statistics  Number or Reported Events Not Used 0  Number of Generated Events 18  Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Number or Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Minimum 1.1000E-4 Maximum 0.002	
Number or Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Minimum 1.1000E-4 Maximum 0.002	
Number of Generated Events         18           Number Values Reported (n)         18           Minimum         1.1000E-4           Maximum         0.002	
Number Values Reported (n) 18  Minimum 1.1000E-4  Maximum 0.002	
Minimum 1.1000E-4  Maximum 0.002	
Maximum 0.002	
Mana 2 0770E 4	
Mean 3.8778E-4	
Geometric Mean 2.6702E-4	
Median 1.7000E-4	
Standard Deviation 4.5798E-4	
Coefficient of Variation 1.181	
Mann-Kendall Test	
M-K Test Value (S) 64	
Tabulated p-value 0.007	
Standard Deviation of S 25.97	
Standardized Value of S 2.425	
Approximate p-value 0.00764	
Statistically significant evidence of an increasing	
trend at the specified level of significance.	
Thallium-mw-7	
THOMATI-THW-7	
General Statistics	
Number or Reported Events Not Used 0	
Number of Generated Events 18	
Number Values Reported (n) 18	
Minimum 9.3000E-5	
Maximum 0.002	
Mean 3.6850E-4	
Geometric Mean 2.3710E-4	
Median 1.6500E-4	
Standard Deviation 4.6639E-4	
Coefficient of Variation 1.266	
Mann-Kendall Test	

M-K Test Value (S)	53				
Tabulated p-value	0.024				
Standard Deviation of S	26.1				
Standardized Value of S	1.993				
Approximate p-value	0.0232				
Statistically significant evidence of an incre	easing				
trend at the specified level of significance.					
Thallium-mw-75					
maillan niv 70					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
	11				
Number Values Reported (n)					
	1.7000E-4	+			
Maximum					
	6.1364E-4				
Geometric Mean					
	4.0000E-4				
Standard Deviation					
Coefficient of Variation	0.874				
Mann-Kendall Test					
M-K Test Value (S)	25				
Tabulated p-value	0.03				
Standard Deviation of S	11.65				
Standardized Value of S	2.061				
Approximate p-value	0.0197				
Statistically significant evidence of an incre	easing				
trend at the specified level of significance.					
Thallium-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	9				
	1.0000E-4				
Maximum	0.01				
Mean	0.00147	7			
Geometric Mean					
	1.4000E-4				
Standard Deviation	0.00326				
Coefficient of Variation	2.214	,			
Coefficient of variation	2.214				
Mann-Kendall Test					
	-10				
M-K Test Value (S)					
Tabulated p-value	0.179				
Standard Deviation of S					
Standardized Value of S	-0.986				
Approximate p-value	0.162				
Insufficient evidence to identify a signification	nt				

trend at the specified level of significance								
trend at the specified level of significance	•							
	J-11-7 ·	T						
	idali (rend	Test Analy	SIS					
User Selected Options								
•	ProUCL 5.110/9/2018 6:03:49 PM							
	Table2_AppendixA_Multiunit_FLUORIDEProUCLUpload_Sept2018.xls							
	OFF							
	0.95							
Level of Significance 0.05								
Fluoride-background								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	28							
Number Values Reported (n)	28							
Minimum	0.08							
Maximum	5						1	
Mean	2.18							
Geometric Mean	1.633							
Median	2							
Standard Deviation	1.353							
Coefficient of Variation	0.621							
Coefficient of variation	0.021							
Mann-Kendall Test								
M-K Test Value (S)	167							
Critical Value (0.05)								
Standard Deviation of S								
Standardized Value of S								
Approximate p-value	4.5402E-4							
0								
Statistically significant evidence of an increasing								
trend at the specified level of significance.								
Fluoride-mw-61								
General Statistics								
Number or Reported Events Not Used								
Number of Generated Events	18							
Number Values Reported (n)								
Minimum	0.91							
Maximum	1.6							
Mean	1.223							
Geometric Mean	1.215							
Median	1.2							
Standard Deviation	0.146							
Coefficient of Variation	0.12							
	1							
Mann-Kendall Test								
M-K Test Value (S)	52							
Tabulated p-value								
Standard Deviation of S								
Standard Deviation of S								
Approximate p-value								
Approximate p-value	0.0222							

### TABLE B-2 MULTIUNIT ProUCL MANN-KENDALL TREND ANALYSIS\*

	1		I		ı	l .	ı	
0	•							
Statistically significant evidence of an incre	easing							
trend at the specified level of significance.								
Fluoride-mw-7								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	0.35							
Maximum	4							
Mean	0.883							
Geometric Mean	0.693							
Median	0.8							
Standard Deviation	0.866							
Coefficient of Variation	0.981							
Mann-Kendall Test								
M-K Test Value (S)	62							
Tabulated p-value	0.009							
Standard Deviation of S	24.23							
Standardized Value of S	2.517							
Approximate p-value	0.00592	)						
, ipproximate p value	0.00002	-						
Statistically significant evidence of an incre	asina							
trend at the specified level of significance.	asing							
Fluoride-mw-75								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	11							
Number Values Reported (n)	11							
Minimum	1.2							
Maximum	2							
Mean	1.845							
Geometric Mean	1.821							
Median	2							
Standard Deviation	0.288							
Coefficient of Variation	0.156							
Coefficient of Variation	0.130							
Mana Kandali Tasa								
Mann-Kendall Test								
M-K Test Value (S)	-11							
Tabulated p-value	0.223							
Standard Deviation of S	9.983							
Standardized Value of S	-1.002							
Approximate p-value	0.158							
			1	1		<b>-</b>	+	
nsufficient evidence to identify a significar	ıt							
Insufficient evidence to identify a significar trend at the specified level of significance.  Fluoride-mw-8								
trend at the specified level of significance. Fluoride-mw-8								
trend at the specified level of significance.								

### TABLE B-2 MULTIUNIT ProUCL MANN-KENDALL TREND ANALYSIS\*

Number of Generated Events	9				
Number Values Reported (n)	9				
Minimum	0.4				
Maximum	5				
Mean	1.477				
Geometric Mean	1.064				
Median	0.91				
Standard Deviation	1.451				
Coefficient of Variation	0.982				
Mann-Kendall Test					
M-K Test Value (S)	-2				
Tabulated p-value	0.46				
Standard Deviation of S	9.487				
Standardized Value of S	-0.105				
Approximate p-value	0.458				
Insufficient evidence to identify a significan	t				
trend at the specified level of significance.					

Condrass	of Eit Too	t Statistics	for Data S	ets with No	n Dotooto			
User Selected Options	-ui-rit i es	ı olalistics	ior Data S	eis with INO	ii-Detects			
·	110/9/201	8 5:05:46 F	PM					
· ·				ProUCLU	nload Sen	t2018 vle		
Full Precision OFF	opendixA_	a.aaaniiA	Pholinivi A	_, 100010	piodu_oep	LEU 10.AIS		
Confidence Coefficient 0.95								
Confidence Coefficient 0.93								
								<del></del>
Antimony (background)								
,, (e.e.g.e)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	28	2	26	4	22	84.62%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	22	0.001	0.01	0.00434	0.004	0.003		
Statistics (Non-Detects Only)	4	3.3000E-4	4.8000E-4	3.7750E-4	3.5000E-4	6.8981E-5		
Statistics (All: NDs treated as DL value)	26	3.3000E-4		0.00373		0.00311		+
Statistics (All: NDs treated as DL/2 value)	26	3.3000E-4	0.005	0.00189	0.002	0.00152		+
Statistics (Normal ROS Imputed Data)	26	2.6840E-4		3.7750E-4		5.6173E-5		
Statistics (Gamma ROS Imputed Data)	26	3.3000E-4		0.00852		0.00354		+
Statistics (Lognormal ROS Imputed Data)	26					5.3522E-5		+
, , ,								+
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	44.09		8.5628E-6	_	0.17	-0.0215		
Statistics (NDs = DL)	1.303	1.178	0.00286		1.065	-0.177		
Statistics (NDs = DL/2)	1.62	1.459	0.00117		0.886	-0.134		
Statistics (Gamma ROS Estimates)	1.593	1.435	0.00535		1.211	-0.237		+
Statistics (Lognormal ROS Estimates)				-7.893	0.14	-0.0177		
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/	lormal RO				+
Correlation Coefficient R	0.854	0.907	0.897	0.992				+
	Test value	Crit. (0.05)	Со	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.744	0.748	Data Not I	Normal				
Shapiro-Wilk (NDs = DL)	0.81	0.92	Data Not I	Normal				
Shapiro-Wilk (NDs = DL/2)	0.791	0.92	Data Not I	Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.977	0.92	Data Appe	ear Normal				
Lilliefors (Detects Only)	0.405	0.375	Data Not I	Normal				
Lilliefors (NDs = DL)	0.273	0.17	Data Not I	Normal				1
Lilliefors (NDs = DL/2)	0.28	0.17	Data Not I	Normal				1
Lilliefors (Normal ROS Estimates)	0.105	0.17	Data Appe	ear Normal			<u> </u>	1
		ı	ı				<u> </u>	1
Ga	mma GOF	Test Resu	ilts					
	No NDs	NDs = DL	NDs = DL/	amma RO				
Correlation Coefficient R	0.887	0.928	0.93	0.454				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		1
Anderson-Darling (Detects Only)	0.684	0.656						1
Kolmogorov-Smirnov (Detects Only)	0.422	0.394	Data Not	Gamma Dis	stributed			†
Anderson-Darling (NDs = DL)	1.023	0.766						†
Kolmogorov-Smirnov (NDs = DL)	0.223	0.175	Data Not	Gamma Dis	stributed			†
· ,		1	1					

	UNIT PIOC	70L GOOD	11200 01		01100		
Anderson-Darling (NDs = DL/2)	1.219	0.761					
Kolmogorov-Smirnov (NDs = DL/2)	0.207	0.174	Data Not 0	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	7.887	0.761					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.527	0.174	Data Not 0	Gamma Dis	stributed		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.865	0.947	0.949	0.992			
		1					
		Crit. (0.05)		nclusion wi		.05)	
Shapiro-Wilk (Detects Only)	0.765		Data Appe		mal		
Shapiro-Wilk (NDs = DL)	0.882	0.92	Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.882	0.92	Data Not L				
Shapiro-Wilk (Lognormal ROS Estimates)	0.978	0.92		ear Lognori	mai		
Lilliefors (Detects Only)	0.397	0.375	Data Not I	ū			
Lilliefors (NDs = DL) Lilliefors (NDs = DL/2)	0.258	0.17 0.17	Data Not L Data Not L				
Lilliefors (NDS = DL/2)  Lilliefors (Lognormal ROS Estimates)	0.248	0.17		Lognormai ear Lognori	mal		
Lillielois (Logiloitilai NOS Estitiates)	0.100	0.17	Data Appe	ai Lugiiuli	ııaı		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended				
Troto. Capatitation motificate cach at DE of		0.100011111	onaoa.				
Antimony (mw-61)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	1	17	3	14	82.35%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	14	5.0000E-4	0.004	0.00246	0.0025	0.00149	
Statistics (Non-Detects Only)	3	2.3000E-4	2.9000E-4	2.5000E-4	2.3000E-4	3.4641E-5	
Statistics (All: NDs treated as DL value)	17	2.3000E-4	0.004	0.00207	0.001	0.0016	
Statistics (All: NDs treated as DL/2 value)	17	2.3000E-4	0.002	0.00106	5.0000E-4	7.7333E-4	
Statistics (Normal ROS Imputed Data)	17	2.0252E-4	2.9748E-4	2.5000E-4	2.5000E-4	2.9022E-5	
Statistics (Gamma ROS Imputed Data)	17	2.3000E-4	0.01	0.00828	0.01	0.00383	
Statistics (Lognormal ROS Imputed Data)	17	2.0683E-4	2.9851E-4	2.4996E-4	2.4848E-4	2.8201E-5	
	K hat	K Star		Log Mean	-	Log CV	
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A	
Statistics (NDs = DL)	1.336	1.14	0.00155		1.058	-0.16	
Statistics (NDs = DL/2)	1.723		6.1446E-4		0.866	-0.121	
Statistics (Gamma ROS Estimates)	1.219	1.043	0.00679		1.453	-0.276	
Statistics (Lognormal ROS Estimates)				-8.3	0.112	-0.0135	
		Tast D	la				
NO.	nnai GOF	Test Resu	ແຮ				
	No NDs	NDe - Di	NDs = DL/2	lormal PO			
Correlation Coefficient R	0.866	0.907	0.895	0.983			
Correlation Coefficient R	0.000	0.307	0.033	0.303			
	Test value	Crit. (0.05)	Col	nclusion wi	th Alnha(∩	05)	
Shapiro-Wilk (Detects Only)	0.75		Data Not N		,	.50,	
Shapiro-Wilk (NDs = DL)	0.795		Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.733		Data Not I				
Shapiro-Wilk (Normal ROS Estimates)	0.773		Data Not i				
Lilliefors (Detects Only)	0.385		Data Appe				
Limototo (Dototo Offiy)	0.000	J. 72J	· · · · · · · · · · · · ·				

	0.070		- · · · · ·				
Lilliefors (NDs = DL)		0.207	Data Not N				
Lilliefors (NDs = DL/2)		0.207	Data Not N				
Lilliefors (Normal ROS Estimates)	0.157	0.207	Data Appe	ear Normai			
Co	mma GOF	Test Rec	ılts				
		103111030					
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R		0.847	0.859	0.454			
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	N/A	N/A				,	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)		0.759					
Kolmogorov-Smirnov (NDs = DL)		0.214	Data Not (	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)		0.753					
Kolmogorov-Smirnov (NDs = DL/2)		0.212	Data Not (	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)		0.761					
Kolmogorov-Smirnov (Gamma ROS Est.)			Data Not (	Gamma Dis	stributed		
		71-11					
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.866	0.933	0.926	0.983			
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)			Data Not L		1 (-	,	
Shapiro-Wilk (NDs = DL)		0.892					
Shapiro-Wilk (NDs = DL/2)			Data Not L	-			
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe	-	mal		
Lilliefors (Detects Only)			Data Appe	_			
Lilliefors (NDs = DL)			Data Appe	_			
Lilliefors (NDs = DL/2)			Data Not L	_			
Lilliefors (Lognormal ROS Estimates)			Data Appe		mal		
Emiciora (Eagriormal Neo Estimates)	0.107	0.207	Data Appe	ar Logilori	i i i i		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Antimony (mw-7)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics		1	17	4	13	76.47%	
	<u>I</u>	<u> </u>	<u>I</u>		<u> </u>	1	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	13	5.0000E-4		0.00281		0.00257	
Statistics (Non-Detects Only)		1.6000E-4				3.8197E-4	
Statistics (All: NDs treated as DL value)		1.6000E-4		0.00225		0.00246	
Statistics (All: NDs treated as DL/2 value)		1.6000E-4			5.0000E-4		
Statistics (Normal ROS Imputed Data)		-3.709E-5				2.4442E-4	
Statistics (Gamma ROS Imputed Data)		1.6000E-4		0.00775		0.00419	
Statistics (Lognormal ROS Imputed Data)		1.2526E-4				12.0457E-4	
Casasso (Edg. John at 1100 Imputed Data)	.,		3.001	J. 1000L34		,	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)		0.713	1.9902E-4	-7.986	0.773	-0.0968	
Statistics (NDs = DL)	1.069	0.713	0.0021	-6.633	1.127	-0.17	
Statistics (NDs = DL/2)	1.341		8.7695E-4	-7.163	0.945	-0.17	
Statistics (NDS = DL/2)	1.341	1.143	o.7093E-4	-7.103	0.940	-0.132	

Normal GOF Test Results	Statistics (Gamma ROS Estimates)	1.001	0.012	0.00721	-5.401	1.516	-0.281	T	Т
Normail GOF Test Results		1.061	0.913	0.00731					
No NDs   NDs   DL NDs   DL NDs   DL NDs   DL NDs   DL NDs   D. NDS   D. N	Statistics (Logitornial ROS Estimates)		-		-0.190	0.507	-0.0019		
No NDs   NDs   DL NDs   DL NDs   DL NDs   DL NDs   DL NDs   D. NDS   D. N	NIa		Toot Book	lta					
Test value  Crit. (0.05	NC	illiai GOF	rest resu	its					-
Test value  Crit. (0.05		No NDs	NDs = DI	NDs = DL/1	Iormal RO				
Test value    Crit. (0.05)	Correlation Coefficient R								
Shapiro-Wilk (NDs = DLZ)	Correlation Coefficient 1	0.075	0.002	0.001	0.550				
Shapiro-Wilk (NDs = DLZ)		Test value	Crit (0.05)	Cor	nclusion wi	th Alpha(0	05)		-
Shapiro-Wilk (NDs = DL2)	Shaniro-Wilk (Detects Only)						.00)		
Shapiro-Wilk (NDs = DL/2)									-
Shapiro-Wilk (Normal ROS Estimates)   0.927   0.892   Data Appear Normal									
Lilliefors (Detects Only)   0.378   0.375   Data Not Normal   Lilliefors (NDs = DLZ)   0.282   0.207   Data Not Normal   Data Normal									1
Lilliefors (NDs = DL)									
Lilliefors (NDs = DL/2) 0.242 0.207 Data Not Normal  Lilliefors (Normal ROS Estimates) 0.158 0.207 Data Appear Normal  Gamma GOF Test Results    No NDs									
Correlation Coefficient R									
No NDs									1
No NDs   NDs = DL   NDs = DL   Amma RO	Elificiolo (Normal 1100 Estimates)	0.100	0.207	Data / tppc	ai i voiinai				
No NDs   NDs = DL   NDs = DL   Amma RO	Ga	mma GOF	Test Resi	ılts					
Test value									
Test value		No NDs	NDs = DL	NDs = DL/2	amma RO				
Test value   Crit. (0.05   Conclusion with Alpha(0.05)	Correlation Coefficient R								1
Anderson-Darling (Detects Only)									
Anderson-Darling (Detects Only)		Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)		
Kolmogorov-Smirnov (Detects Only) 0.345 0.398 Detected Data Appear Gamma Distributed Anderson-Darling (NDs = DL) 0.612 0.765 Kolmogorov-Smirnov (NDs = DL) 0.243 0.215 Detected Data appear Approximate Gamn Anderson-Darling (NDs = DL/2) 0.648 0.759 Kolmogorov-Smirnov (NDs = DL/2) 0.648 0.759 Kolmogorov-Smirnov (NDs = DL/2) 0.242 0.214 Detected Data appear Approximate Gamn Jerson-Darling (Gamma ROS Estimates) 4.092 0.765 Kolmogorov-Smirnov (Gamma ROS Estimates) 4.092 0.765 Kolmogorov-Smirnov (Gamma ROS Est.) 0.489 0.215 Data Not Gamma Distributed  Lognormal GOF Test Results    No NDs	Anderson-Darling (Detects Only)					F - (-	,		
Anderson-Darling (NDs = DL)				Detected D	Data Appea	ar Gamma	Distributed		
No NDs									
Anderson-Darling (NDs = DL/2)				Detected D	Data appea	ar Approxin	nate Gamn		
No NDs	-								
Acolemogorov-Smirnov (Gamma ROS Estimates)   4.092   0.765				Detected D	Data appea	ar Approxin	nate Gamn		
Lognormal GOF Test Results   No NDs   NDs = DL NDs = DL   Log ROS					•				
No NDs   NDs = DL   NDs = DL/  Log ROS	- '	0.489	0.215	Data Not C	Samma Dis	stributed			
No NDs   NDs = DL NDs = DL L Log ROS	,								
Correlation Coefficient R 0.95 0.973 0.974 0.974  Test value Crit. (0.05) Conclusion with Alpha(0.05)  Shapiro-Wilk (Detects Only) 0.917 0.748 Data Appear Lognormal  Shapiro-Wilk (NDs = DL) 0.944 0.892 Data Appear Lognormal  Shapiro-Wilk (NDs = DL/2) 0.946 0.892 Data Appear Lognormal  Shapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal  Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal  Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal  Lilliefors (NDs = DL/2) 0.208 0.207 Data Appear Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Interpretation methods such as DL or DL/2 are not recommended.	Logi	normal GO	F Test Res	sults					
Correlation Coefficient R 0.95 0.973 0.974 0.974  Test value Crit. (0.05) Conclusion with Alpha(0.05)  Shapiro-Wilk (Detects Only) 0.917 0.748 Data Appear Lognormal  Shapiro-Wilk (NDs = DL) 0.944 0.892 Data Appear Lognormal  Shapiro-Wilk (NDs = DL/2) 0.946 0.892 Data Appear Lognormal  Shapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal  Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal  Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal  Lilliefors (NDs = DL/2) 0.208 0.207 Data Appear Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Interpretation methods such as DL or DL/2 are not recommended.									
Test value Crit. (0.05) Conclusion with Alpha(0.05)  Shapiro-Wilk (Detects Only) 0.917 0.748 Data Appear Lognormal  Shapiro-Wilk (NDs = DL) 0.944 0.892 Data Appear Lognormal  Shapiro-Wilk (NDs = DL/2) 0.946 0.892 Data Appear Lognormal  Shapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal  Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal  Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal  Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Interest Commended.		No NDs	NDs = DL	NDs = DL/2	Log ROS				
Shapiro-Wilk (Detects Only) 0.917 0.748 Data Appear Lognormal Shapiro-Wilk (NDs = DL) 0.944 0.892 Data Appear Lognormal Shapiro-Wilk (NDs = DL/2) 0.946 0.892 Data Appear Lognormal Shapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal Lilliefors (Substitution methods such as DL or DL/2 are not recommended.	Correlation Coefficient R	0.95	0.973	0.974	0.974				
Shapiro-Wilk (Detects Only) 0.917 0.748 Data Appear Lognormal Shapiro-Wilk (NDs = DL) 0.944 0.892 Data Appear Lognormal Shapiro-Wilk (NDs = DL/2) 0.946 0.892 Data Appear Lognormal Shapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal Lilliefors (Substitution methods such as DL or DL/2 are not recommended.									
Shapiro-Wilk (NDs = DL) 0.944 0.892 Data Appear Lognormal Shapiro-Wilk (NDs = DL/2) 0.946 0.892 Data Appear Lognormal Shapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Note: Substitution methods such as DL or DL/2 are not recommended.			, ,				.05)		
Shapiro-Wilk (NDs = DL/2) 0.946 0.892 Data Appear Lognormal chapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal Lilliefors (NDs = DL/2) 0.208 0.207 Data Appear Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal Lilliefors (NDs = DL/2) Data Appear Lognormal	1 \ 7/		0.748						
hapiro-Wilk (Lognormal ROS Estimates) 0.958 0.892 Data Appear Lognormal  Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal  Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal  Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  lote: Substitution methods such as DL or DL/2 are not recommended.									
Lilliefors (Detects Only) 0.298 0.375 Data Appear Lognormal  Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal  Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal  Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  lote: Substitution methods such as DL or DL/2 are not recommended.    Num Obs   Num Miss   Num Valid   Detects   NDs   % NDs	. ,				_				
Lilliefors (NDs = DL) 0.185 0.207 Data Appear Lognormal Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  lote: Substitution methods such as DL or DL/2 are not recommended.    Num Obs   Num Miss   Num Valid   Detects   NDs   % NDs	Shapiro-Wilk (Lognormal ROS Estimates)								
Lilliefors (NDs = DL/2) 0.208 0.207 Data Not Lognormal Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  lote: Substitution methods such as DL or DL/2 are not recommended.    Num Obs   Num Miss   Num Valid   Detects   NDs   % NDs									
Lilliefors (Lognormal ROS Estimates) 0.13 0.207 Data Appear Lognormal  lote: Substitution methods such as DL or DL/2 are not recommended.  Intimony (mw-75)    Num Obs   Num Miss   Num Valid   Detects   NDs   % NDs						mal			
lote: Substitution methods such as DL or DL/2 are not recommended.  Intimony (mw-75)    Num Obs   Num Miss   Num Valid   Detects   NDs   % NDs	Lilliefors (NDs = DL/2)		0.207						
Num Obs Num Miss Num Valid Detects NDs % NDs	Lilliefors (Lognormal ROS Estimates)	0.13	0.207	Data Appe	ar Lognorr	mal			
Num Obs Num Miss Num Valid Detects NDs % NDs	Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Num Obs Num Miss Num Valid Detects NDs % NDs									
	Antimony (mw-75)								
Raw Statistics 11 1 10 1 9 90.00%									
	Raw Statistics	11	1	10	1	9	90.00%		

sted to use alternative site specific values	s determine	ed by the P	roject Tear	n to estima	ate environ	mental para	ameters (	e.g., EP
The data s	at for varial	hle Antimo	ov (mw-75)	was not n	rocesedi			
The data st	st ioi valia	DIG AHUHHOI	iy (IIIW-73)	was not p	locesseu!			
								1
Antimony (mw-8)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	9	1	8	3	5	62.50%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	5	0.001	0.005	0.0021	0.001	0.00175		
Statistics (Non-Detects Only)	3	4.8000E-4				5.1472E-4		
Statistics (All: NDs treated as DL value)	8	4.8000E-4	0.005	0.00162		0.00151		
Statistics (All: NDs treated as DL/2 value)	8	4.8000E-4				7.2613E-4		
Statistics (Normal ROS Imputed Data)	8	2.5563E-4				3.3636E-4		
Statistics (Gamma ROS Imputed Data)	8	4.8000E-4	0.01	0.00655		0.00477		
Statistics (Lognormal ROS Imputed Data)	8	3.7742E-4				3.1659E-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)	1.872	1.253	8.6288E-4	-6.719	0.772	-0.115		
Statistics (NDs = DL/2)	2.629	1.726	3.6469E-4	-7.152	0.642	-0.0898		
Statistics (Gamma ROS Estimates)	1.015	0.718	0.00645	-5.595	1.402	-0.251		
Statistics (Lognormal ROS Estimates)				-7.406	0.385	-0.052		
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL						
Correlation Coefficient R	0.894	0.851	0.851	0.909				
	Test value	Crit. (0.05)	Col	nclusion w	ith Alpha(0	05)		
Shapiro-Wilk (Detects Only)	0.799		Data Appe			.00)		
Shapiro-Wilk (NDs = DL)			Data Not N					
Shapiro-Wilk (NDs = DL/2)			Data Not N					
Shapiro-Wilk (Normal ROS Estimates)			Data Appe					
Lilliefors (Detects Only)	0.364		Data Appe					
Lilliefors (NDs = DL)	0.307		Data Not N					
Lilliefors (NDs = DL/2)	0.343		Data Not N					
Lilliefors (Normal ROS Estimates)		0.283	Data Appe	ear Normal				
Ga	mma GOF	Test Resu	ilts					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R	N/A	0.961	0.949	0.646				
	Toot	Orit (0.05)	_	nolusia - :	ith Almi /0	0E)		
Anderson Devline (Detects Only)		Crit. (0.05)	Col	nclusion w	ıııı Aıpna(U	.00)		
Anderson-Darling (Detects Only)	N/A	N/A						
Kolmogorov-Smirnov (Detects Only)  Anderson-Darling (NDs = DL)	N/A 0.535	N/A 0.725						
	U : 1.7:1	U./Z0	i					- 1

Anderson-Darling (NDs = DL/2)		0.722					
Kolmogorov-Smirnov (NDs = DL/2)	0.362	0.297	Data Not C	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	1.346	0.735					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.408	0.301	Data Not C	Gamma Dis	tributed		
Logi	normal GO	F Test Res	sults				
	No NDs		NDs = DL/2	•			
Correlation Coefficient R	0.912	0.959	0.882	0.914			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	.05)	
Shapiro-Wilk (Detects Only)	0.831	, ,	Data Appe			,	
Shapiro-Wilk (NDs = DL)	0.922		Data Appe				
Shapiro-Wilk (NDs = DL/2)	0.768		Data Not L				
Shapiro-Wilk (Lognormal ROS Estimates)	0.862		Data Appe		nal		
Lilliefors (Detects Only)	0.349		Data Appe	_			
Lilliefors (NDs = DL)	0.349		Data Appe	-			
Lilliefors (NDs = DL/2)	0.344		Data Not L				
Lilliefors (Lognormal ROS Estimates)	0.267		Data Not L		nal		
		II.	1				
Note: Substitution methods such as DL or	DL/2 are r	ot recomm	ended.				
Arsenic (background)							
Alseine (background)							
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	28	0	28	16	12	42.86%	
Traw diatistics	20	U	20	10	12	42.0070	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	12	0.002	0.01	0.00467	0.003	0.00342	
Statistics (Non-Detects Only)	16	8.8000E-4		0.00235		0.00123	
Statistics (All: NDs treated as DL value)	28	8.8000E-4		0.00334	0.0025	0.00264	
Statistics (All: NDs treated as DL/2 value)	28	8.8000E-4		0.00234	0.0021	0.00143	
Statistics (Normal ROS Imputed Data)	28	2.6717E-4		0.00204	0.00182	0.00109	
Statistics (Gamma ROS Imputed Data)	28	8.8000E-4		0.00563	0.0039	0.00396	
Statistics (Lognormal ROS Imputed Data)	28	7.6140E-4		0.00199	0.00161	0.00106	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	3.564	2.937	6.5935E-4	-6.2	0.578	-0.0932	
Statistics (NDs = DL)	2.212	1.999	0.00151	-5.944	0.691	-0.116	
Statistics (NDs = DL/2)	2.868	2.584	8.1699E-4	-6.241	0.624	-0.0999	
Statistics (Gamma ROS Estimates)	1.632	1.481	0.00345	-5.517	0.912	-0.165	
Statistics (Lognormal ROS Estimates)				-6.347	0.513	-0.0808	
Nia	rmal C∩⊏	Test Resu	lte				
INC	and GOF	103t 1103U					
	No NDs	NDs = DL	NDs = DL/2	lormal RO			
Correlation Coefficient R	0.96	0.875	0.934	0.974			
	Test value	Crit (0.05)	Co	nclusion wi	th Alpha/O	05)	
Shapiro-Wilk (Detects Only)	0.902	Crit. (0.05) 0.887	Data Appe		пт Агрпа(0.	.00)	
Shapiro-Wilk (NDs = DL)	0.902	0.887	Data Not N				
Shapiro-Wilk (NDs = DL)  Shapiro-Wilk (NDs = DL/2)	0.76	0.924	Data Not N				
Shapiro-Wilk (Normal ROS Estimates)	0.851	0.924					
Lilliefors (Detects Only)	0.942		Data Appe				
Lillielois (Detects Only)	0.177	0.213	Data Appe	aı NUIIIIdl			

			I=					
Lilliefors (NDs = DL)		0.164						
Lilliefors (NDs = DL/2)		0.164						
Lilliefors (Normal ROS Estimates)	0.122	0.164	Data Appe	ear Normal				
Go	mma GOF	Toet Post	ulto					
<u> </u>	illilla GOF	Test Nest	iii.S					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R		0.95	0.959	0.816				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)		0.743						
Kolmogorov-Smirnov (Detects Only)		0.216	Detected I	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	0.788	0.757						
Kolmogorov-Smirnov (NDs = DL)	0.145	0.167	Detected I	Data appea	ar Approxir	nate Gamm		
Anderson-Darling (NDs = DL/2)		0.754						
Kolmogorov-Smirnov (NDs = DL/2)		0.167	Data Not 0	Gamma Dis	stributed			
derson-Darling (Gamma ROS Estimates)		0.761						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.285	0.168	Data Not 0	Gamma Dis	stributed			
Log	normal GO	F Test Res	sults					
	No ND	NDs - Di	NDs = DL "	L = = DOO				
0 1 0	No NDs		NDs = DL/2	•				
Correlation Coefficient R	0.957	0.979	0.946	0.981				
	Tootyolyo	O.:: (0 0E)	Co	naluaian wi	th Alpha/O	OE)		
Chanina Wills (Data eta Only)		Crit. (0.05)		nclusion wi		.05)		
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)			Data Appe					
Shapiro-Wilk (NDs = DL/2)			Data Not L	_	IIai			
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe	-	mal			
Lilliefors (Detects Only)			Data Appe	_				
Lilliefors (NDs = DL)			Data Appe	_				
Lilliefors (NDs = DL/2)			Data Not I	_	IIai			
Lilliefors (Lognormal ROS Estimates)			Data Not t		mal			
Eilileiois (Eognormai NOS Estimates)	0.122	0.104	Бата Арре	ar Logitori	IIai			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Arsenic (mw-61)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	0	18	5	13	72.22%		
	Number		Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)		5.0000E-4		0.00219		0.00266		
Statistics (Non-Detects Only)						18.0747E-5		
Statistics (All: NDs treated as DL value)		4.2000E-4			6.0500E-4			
Statistics (All: NDs treated as DL/2 value)		2.5000E-4		9.4111E-4				
Statistics (Normal ROS Imputed Data)						17.9819E-5		
Statistics (Gamma ROS Imputed Data)		4.2000E-4		0.00737		0.00436		
Statistics (Lognormal ROS Imputed Data)	18	3.5521E-4	6.3000E-4	4.7380E-4	4.6756E-4	17.4716E-5	· <u> </u>	
	K hat	K Star		Log Mean	-	Log CV		
Statistics (Non-Detects Only)		21.14	1.0242E-5		0.157	-0.0208		
Statistics (NDs = DL)	1.123	0.973	0.00154	-6.865	0.931	-0.136		
Statistics (NDs = DL/2)	1.401		6.7155E-4	-7.366	0.834	-0.113		

Statistics (Commo DOS Estimates)	1.119	0.969	0.00654	-5.42	1 252	-0.25	Т
Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	1.119	0.969	0.00659	-5.42 -7.666	1.353 0.155	-0.25	-
Statistics (Logitornial ROS Estimates)				-7.000	0.100	-0.0203	-
Ne	rmal COE	Test Resu	lte				
, and a second	illiai GOI	restriesu	11.5				
	No NDs	NDs = DI	NDs = DL/2	Iormal RO			
Correlation Coefficient R	0.983	0.746	0.754	0.987			
Conclusion Coemicient 1	0.500	0.740	0.704	0.507			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	05)	
Shapiro-Wilk (Detects Only)	0.968		Data Appe			,	
Shapiro-Wilk (NDs = DL)			Data Not N				
Shapiro-Wilk (NDs = DL/2)			Data Not N				
Shapiro-Wilk (Normal ROS Estimates)			Data Appe				
Lilliefors (Detects Only)			Data Appe				
Lilliefors (NDs = DL)			Data Not N				
Lilliefors (NDs = DL/2)			Data Not N				
Lilliefors (Normal ROS Estimates)			Data Appe				
	0	0.202	Data , tppo				
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	0.972	0.922	0.908	0.555			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.257					· ·	
Kolmogorov-Smirnov (Detects Only)	0.232	0.357	Detected D	Data Appea	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)		0.764					
Kolmogorov-Smirnov (NDs = DL)		0.209	Data Not C	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)	1.123	0.758					
Kolmogorov-Smirnov (NDs = DL/2)	0.25	0.208	Data Not C	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	4.094	0.764					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.465	0.209	Data Not C	Gamma Dis	stributed		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.972	0.904	0.944	0.987			
	ı	T -	ı				
		Crit. (0.05)			th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.947		Data Appe	_	mal		
Shapiro-Wilk (NDs = DL)		0.897	Data Not L				
Shapiro-Wilk (NDs = DL/2)		0.897	Data Not L				
Shapiro-Wilk (Lognormal ROS Estimates)		0.897	Data Appe				
Lilliefors (Detects Only)	0.224	0.343		_	mal		
Lilliefors (NDs = DL)		0.202					
Lilliefors (NDs = DL/2)		0.202					
Lilliefors (Lognormal ROS Estimates)	0.171	0.202	Data Appe	ar Lognorr	mal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Arsenic (mw-7)							
	T		I '				
			Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	11	7	38.89%	

	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	7	5.0000E-4		0.00257		0.00335		
	11					0.00335 4.6373E-4		
Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value)		3.3000E-4			6.9500E-4			
,	18	2.5000E-4		9.6222E-4				
Statistics (All: NDs treated as DL/2 value)								
Statistics (Normal ROS Imputed Data)	18	-6.282E-6				4.2709E-4		
Statistics (Gamma ROS Imputed Data)	18	3.3000E-4			7.7000E-4			
Statistics (Lognormal ROS Imputed Data)	18	2.9486E-4	0.0021	0.0120E-4	5.9645E-4	3.8871E-4		
	17 15 -4	I/ Ot- ::	Th -4- h -4	I M	1 Otal	1 01/		
01 11 11 11 11 11 11 11 11 11 11 11 11 1	K hat	K Star		Log Mean	Ü	Log CV		
Statistics (Non-Detects Only)	4.76	3.523			0.446	-0.0611		
Statistics (NDs = DL)	1.25	1.079	0.00117		0.814	-0.117		
Statistics (NDs = DL/2)	1.806		5.3275E-4	_	0.706	-0.0974	<del> </del>	
Statistics (Gamma ROS Estimates)	0.739	0.653	0.00589		1.392	-0.223		
Statistics (Lognormal ROS Estimates)				-7.424	0.429	-0.0577	<u> </u>	
							<u> </u>	
No	rmal GOF	Test Resu	lts				i	
							i	
	No NDs	NDs = DL	NDs = DL/2	lormal RO			i	
Correlation Coefficient R	0.761	0.66	0.72	0.844				
							i	
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.616	0.85	Data Not I	Normal				
Shapiro-Wilk (NDs = DL)	0.465	0.897	Data Not I	Normal			·	
Shapiro-Wilk (NDs = DL/2)	0.547	0.897	Data Not I	Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.747	0.897	Data Not I	Normal				
Lilliefors (Detects Only)	0.38	0.251	Data Not I	Normal				
Lilliefors (NDs = DL)	0.331	0.202	Data Not I	Normal				
Lilliefors (NDs = DL/2)		0.202	Data Not I	Normal				
Lilliefors (Normal ROS Estimates)		0.202	Data Not I	Normal				
,								
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/2	amma RO			·	
Correlation Coefficient R	0.841	0.841	0.865	0.778				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	1.13	0.732				,		
Kolmogorov-Smirnov (Detects Only)	0.311	0.256	Data Not (	Gamma Dis	stributed			
Anderson-Darling (NDs = DL)	1.903	0.761						
Kolmogorov-Smirnov (NDs = DL)		0.208	Data Not (	Gamma Dis	stributed			
Anderson-Darling (NDs = DL/2)	1.322	0.754					1	
Kolmogorov-Smirnov (NDs = DL/2)	0.27	0.207	Data Not (	Gamma Dis	stributed			+
nderson-Darling (Gamma ROS Estimates)		0.207	Data NOC	Jannina Di	Janbuleu			
Kolmogorov-Smirnov (Gamma ROS Est.)	0.322	0.773	Data Not (	Gamma Dis	etributed			
Romogorov-Smirriov (Gamilia ROS ESt.)	0.322	0.212	Data NOL	Janima Di	siribuleu		i	1
l an	normal CO	F Test Res	ulte					
Logi	ioiniai GO	1 1691 1768	uito					
	No NDs	NDc - Di	NDc - DI "	Log BOS			i	
Com-1-1: C#: :		NDs = DL		•				
Correlation Coefficient R	0.891	0.904	0.94	0.926				<u> </u>
	T·	0 (0.05)	_	l	4L A L L /^	05)		
01		Crit. (0.05)		nclusion wi	tn Alpha(0	.05)		1
Shapiro-Wilk (Detects Only)	0.832	0.85	Data Not I	₋ognormal				

	UNIT PIOC	ICL GOOD	NESS OF	rii Siaik	31103			
Shapiro-Wilk (NDs = DL)	0.831	0.897	Data Not L	ognormal				
Shapiro-Wilk (NDs = DL/2)	0.897	0.897	Data Not L	ognormal				
Shapiro-Wilk (Lognormal ROS Estimates)	0.881	0.897	Data Not L	ognormal				
Lilliefors (Detects Only)	0.275	0.251	Data Not L	ognormal				
Lilliefors (NDs = DL)	0.247	0.202	Data Not L	ognormal				
Lilliefors (NDs = DL/2)	0.204	0.202	Data Not L	ognormal				
Lilliefors (Lognormal ROS Estimates)	0.201	0.202	Data Appe	ar Lognori	mal			<del>                                     </del>
, <u>-</u>								<del>                                     </del>
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Arsenic (mw-75)								
	Nium Oha	Num Miss	Nium Valid	Detects	NDa	% NDs		
Raw Statistics	11	0	11	0	NDs 11	% NDS		-
Traw Statistics	11	U	11		11	100.00 /0		
Warning: All observations are No	n-Detects (	NDs), there	efore all sta	tistics and	estimates s	should also	be NDsl	
Specifically, sample mean, UCLs, U								it!
The Project Team may decide to use alter								
<u> </u>		-			·		· · · · · · · ·	· · ·
The data s	set for varia	able Arseni	c (mw-75)	was not pro	ocessed!		-	-
Arsenic (mw-8)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	9	0	9	4	5	55.56%		
					ļ.			
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	5	5.0000E-4	0.01	0.0026	0.001	0.00414		
Statistics (Non-Detects Only)	4	5.3000E-4	0.0091	0.00273	6.4000E-4	0.00425		
Statistics (All: NDs treated as DL value)	9	5.0000E-4	0.01	0.00266	7.0000E-4	0.00392		
Statistics (All: NDs treated as DL/2 value)	9	2.5000E-4	0.0091	0.00193	5.3000E-4	0.00308		1
Statistics (Normal ROS Imputed Data)	9	-0.00752	0.0091	-6.242E-4	4.6743E-4	0.0047		<del>                                     </del>
Statistics (Gamma ROS Imputed Data)	9	5.3000E-4	0.01	0.00677	0.01	0.00463		+
Statistics (Lognormal ROS Imputed Data)		4.0099E-5			5.3000E-4	0.00292		†
, ,	1							†
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		+
Statistics (Non-Detects Only)	0.721	0.347	0.00379		1.365	-0.203		+
Statistics (NDs = DL)	0.748	0.573	0.00355		1.209	-0.18		+
Statistics (NDs = DL/2)	0.696	0.538	0.00338		1.26	-0.177		+
Statistics (Gamma ROS Estimates)	1.03	0.761	0.00270	-5.554	1.402	-0.252		+
Statistics (Carrina NOS Estimates)				-7.846	1.538	-0.232		+
	<u> </u>	<u> </u>			555	300		-
No	rmal GOF	Test Resu	lts					
								1
	No NDs	NDs = DL	NDs = DL/2	Normal RO			-	1
Correlation Coefficient R	0.795	0.77	0.771	0.936			-	1
	•	•						
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0.	05)		
Shapiro-Wilk (Detects Only)	0.645	0.748	Data Not N	Normal				
Shapiro-Wilk (NDs = DL)	0.59	0.829	Data Not N	Normal				1
Shapiro-Wilk (NDs = DL/2)	0.609	0.829	Data Not N	Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.899	0.829	Data Appe	ar Normal				
	1	1						

			1					,
Lilliefors (Detects Only)								
Lilliefors (NDs = DL)		0.274						
Lilliefors (NDs = DL/2)	0.434	0.274	Data Not	Normal				
Lilliefors (Normal ROS Estimates)	0.278	0.274	Data Not	Normal				
Ga	mma GOF	Test Resu	ilts					
0 10 0 5	No NDs			amma RC	,			
Correlation Coefficient R	0.975	0.909	0.958	0.627				
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha	(0.05)	-	
Anderson-Darling (Detects Only)	0.835	0.672				,		
Kolmogorov-Smirnov (Detects Only)		0.406	Data Not	Gamma Di	stributed			
Anderson-Darling (NDs = DL)		0.752	2010 1101					
Kolmogorov-Smirnov (NDs = DL)		0.289	Data Not	Gamma Di	stributed			
Anderson-Darling (NDs = DL/2)		0.756		DI			+	+
Kolmogorov-Smirnov (NDs = DL/2)		0.730	Data Not	Gamma Di	stributed		+	+
nderson-Darling (Gamma ROS Estimates)		0.23	2010 1101	Janina Di	J.I. IDUIGU		+	+
Kolmogorov-Smirnov (Gamma ROS Est.)		0.287	Data Not	Gamma Di	stributed		_	
(		0.201						
Logi	normal GO	F Test Res	ults					
	1	T	Ī	T				
	No NDs			Log ROS				
Correlation Coefficient R	0.833	0.85	0.89	0.947				
	I	1 -						
		Crit. (0.05)		nclusion w		(0.05)		
Shapiro-Wilk (Detects Only)				Lognormal				
Shapiro-Wilk (NDs = DL)				Lognormal				
Shapiro-Wilk (NDs = DL/2)	0.79			Lognormal				
Shapiro-Wilk (Lognormal ROS Estimates)				ear Lognor				
Lilliefors (Detects Only)				Lognormal				
Lilliefors (NDs = DL)				Lognormal				
Lilliefors (NDs = DL/2)				Lognormal				
Lilliefors (Lognormal ROS Estimates)	0.241	0.274	Data App	ear Lognor	mal			
Note: Substitution methods such as DL or	DI /2 are n	ot recomm	ended					
. 10.0. 04504.01104.040 0401.40 52 0.	DD2 0.0 1.		onaca.				+	1
Barium (background)							1	1
Raw Statistics								
Number of Valid Ob	servations	28						
Number of Distinct Ob	servations	10						
	Minimum	0.018						
	Maximum	0.042						
Mean of	Raw Data	0.0225						
Standard Deviation of	Raw Data							
	Khat	23.79						
	Theta hat	9.4424E-4						
	Kstar	21.27						
	Theta star	0.00106						
Mean of Log Transfo	rmed Data	-3.817						
Standard Deviation of Log Transfo	rmed Data	0.197						
Normal GOF Test Resu	lts							

Correlation Coefficient R	0.812					
Shapiro Wilk Test Statistic	0.675					
Shapiro Wilk Critical (0.05) Value						
Approximate Shapiro Wilk P Value						
• • • • • • • • • • • • • • • • • • • •						
Lilliefors Test Statistic						
Lilliefors Critical (0.05) Value	0.164					
Data not Normal at (0.05) Significance Level						
Gamma GOF Test Results						
Correlation Coefficient R	0.856					
A-D Test Statistic						
A-D Critical (0.05) Value						
K-S Test Statistic	0.299					
K-S Critical(0.05) Value	0.165					
Data not Gamma Distributed at (0.05) Significance L	evel					
, , ,						
Lognormal GOF Test Results						
Lognormal GOT Test Nesults						
<u> </u>						
Correlation Coefficient R						
Shapiro Wilk Test Statistic						
Shapiro Wilk Critical (0.05) Value	0.924					
Approximate Shapiro Wilk P Value	1.1183E-5					
Lilliefors Test Statistic	0.285					
Lilliefors Critical (0.05) Value						
Data not Lognormal at (0.05) Significance Level	0.101					
Data flot Logitoffial at (0.03) Significance Level						
Non-parametric GOF Test Results						
Data do not follow a discernible distribution at (0.05)	Level of Si					
Barium (mw-61)						
, ,						
Raw Statistics						
Number of Valid Observations	17					
Number of Missing Observations						
Number of Distinct Observations		 				
Minimum	0.013	 				
Maximum	0.016					
Mean of Raw Data						
Standard Deviation of Raw Data						
Khat						
	3.6606E-5					
Kstar		 			<u></u>	
Theta star	4.4444E-5	 				
Mean of Log Transformed Data	-4.274					
Standard Deviation of Log Transformed Data						
Normal GOF Test Results						
Normal GOF Lest Results						
Correlation Coefficient R						
Shapiro Wilk Test Statistic	0.755					
Shapiro Wilk Critical (0.05) Value	0.892					
1 ( )			l	1	1	1

Approximate Shapiro Wilk P Value	2.7875E-4					
Lilliefors Test Statistic	0.351					
Lilliefors Critical (0.05) Value	0.207					
Data not Normal at (0.05) Significance Level	1					
, , ,						
Gamma GOF Test Results						
Gailling Go. Foot (Goallo						
Correlation Coefficient R	0.866					
A-D Test Statistic						
A-D Critical (0.05) Value						
K-S Test Statistic						
K-S Critical(0.05) Value						
Data not Gamma Distributed at (0.05) Significance L	evel					
Lognormal GOF Test Results						
-						
Correlation Coefficient R	0.866					
Shapiro Wilk Test Statistic			1			
Shapiro Wilk Critical (0.05) Value			1			
Approximate Shapiro Wilk P Value						
Lilliefors Test Statistic						
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 (mw-7)						
Raw Statistics						
Number of Valid Observations	18					
Number of Distinct Observations	5					
Minimum	0.013					
Maximum	0.017					
Mean of Raw Data	0.0154					
Standard Deviation of Raw Data	0.00129					
Khat	149.3					
Theta hat	1.0309E-4					
Kstar						
Theta star						
Mean of Log Transformed Data						
_						
Standard Deviation of Log Transformed Data	0.0845					
Normal GOF Test Results						
Correlation Coefficient R	0.955	-				
Shapiro Wilk Test Statistic	0.896					
Shapiro Wilk Critical (0.05) Value			1			
Approximate Shapiro Wilk P Value						
Lilliefors Test Statistic						
Lilliefors Critical (0.05) Value						
Data appear Approximate Normal at (0.05) Significan	ice Level					
İ				1	1	

Gamma GOF Test Results				
Correlation Coefficient R	0.949			
A-D Test Statistic	0.762			
A-D Critical (0.05) Value	0.737			
K-S Test Statistic				
K-S Critical(0.05) Value				
Data appear Gamma Distributed at (0.05) Significance				
Data appear Gamma Distributed at (0.05) Significant	e resei			
Lognormal GOF Test Results				
	ı			
Correlation Coefficient R	0.955			
Shapiro Wilk Test Statistic	0.898			
Shapiro Wilk Critical (0.05) Value	0.897			
Approximate Shapiro Wilk P Value	0.0645			
Lilliefors Test Statistic				
Lilliefors Critical (0.05) Value				
Data appear Lognormal at (0.05) Significance Level				
appear Logitornial at (0.00) Digitilication Level				
Parium (mw 75)				
Barium (mw-75)				
Raw Statistics				
Number of Valid Observations	11			
Number of Distinct Observations	4			
Minimum	0.017			
Maximum	0.02			
Mean of Raw Data	0.0187			
Standard Deviation of Raw Data	0.0011			
Khat	317.2			
	5.9044E-5			
Kstar	230.7			
	8.1164E-5			
Mean of Log Transformed Data	-3.979			
Standard Deviation of Log Transformed Data	0.0589			
Normal GOF Test Results				
Correlation Coefficient R	0.912			
Shapiro Wilk Test Statistic				
Shapiro Wilk Critical (0.05) Value				
Approximate Shapiro Wilk P Value				
Lilliefors Test Statistic				
Lilliefors Critical (0.05) Value				
	0.251		1	
Data not Normal at (0.05) Significance Level				
Gamma GOF Test Results				
Correlation Coefficient R	0.909	 		
A-D Test Statistic	1.053			
A-D Critical (0.05) Value	0.726			
K-S Test Statistic				
K-S Critical(0.05) Value				
Data not Gamma Distributed at (0.05) Significance L				
Data not dannia Distributed at (0.00) Significance D	U 7 U I			

Lognormal GOF Test Results					
Correlation Coefficient R	0.914				
Shapiro Wilk Test Statistic	0.819				
Shapiro Wilk Critical (0.05) Value	0.85				
Approximate Shapiro Wilk P Value	0.0252				
Lilliefors Test Statistic	0.286				
Lilliefors Critical (0.05) Value	0.251				
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 (mw-8)					
Raw Statistics					
Number of Valid Observations	9				
Number of Distinct Observations	7				
Minimum	0.011				
Maximum	0.15				
Mean of Raw Data	0.0313				
Standard Deviation of Raw Data	0.0453				
Khat	1.203				
Theta hat	0.026				
Kstar	0.876				
Theta star	0.0358				
Mean of Log Transformed Data	-3.933				
Standard Deviation of Log Transformed Data	0.847				
Canada Beviation of Edg Transformed Bata	0.017				
Normal GOF Test Results					
Correlation Coefficient R	0.692				
Shapiro Wilk Test Statistic	0.507				
Shapiro Wilk Critical (0.05) Value	0.829				
Approximate Shapiro Wilk P Value					
Lilliefors Test Statistic	0.402				
Lilliefors Critical (0.05) Value	0.402				
Data not Normal at (0.05) Significance Level	0.274			1	1
Data Not Normal at (0.00) Significative Level					
Gamma GOF Test Results					
Gainina GOF Test Nesults				1	1
Correlation Coefficient R	0.884				
A-D Test Statistic	1.68				
A-D Critical (0.05) Value K-S Test Statistic	0.74				
	0.392				
K-S Critical(0.05) Value  Data not Gamma Distributed at (0.05) Significance Le					
Data not Gamma Distributed at (0.05) Significance Le	54 <b>C</b> I				
Lognormal COE Test Beautite					
Lognormal GOF Test Results					
01:: 0	0.040				
Correlation Coefficient R	0.813				
Shapiro Wilk Test Statistic	0.678				
Shapiro Wilk Critical (0.05) Value	0.829				

			00 0.	rii Siaii			
Approximate Shapiro W	lk P Value	6.9924E-4					
Lilliefors Te	st Statistic	0.344					
Lilliefors Critical (0	.05) Value	0.274					
Data not Lognormal at (0.05) Significance	Level						
Non-parametric GOF Test Results							
Non-parametric don restrictions							
Data do not follow a discernible distribution	at (0.05)	l evel of Si					
	(0.00)						
Beryllium (background)							
, , , ,							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	28	2	26	2	24	92.31%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	24	0.001	0.001	0.001	0.001	6.645E-19	
Statistics (Non-Detects Only)	2	7.5000E-4	0.001	8.7500E-4	8.7500E-4	1.7678E-4	
Statistics (All: NDs treated as DL value)	26	7.5000E-4	0.001	9.9038E-4	0.001	4.9029E-5	
Statistics (All: NDs treated as DL/2 value)	26	5.0000E-4	0.001	5.2885E-4	5.0000E-4	1.0786E-4	
Statistics (Normal ROS Imputed Data)	26	5.4692E-4	0.001	7.5684E-4	7.5285E-4	1.0784E-4	
Statistics (Gamma ROS Imputed Data)	26	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Imputed Data)	26	5.9370E-4	0.001	7.6157E-4	7.5246E-4	9.5565E-5	
	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)	356.6	315.5	2.7773E-6	-6.919	0.0564	-0.00815	
Statistics (NDs = DL/2)	36.31	32.14	1.4566E-5	-7.559	0.155	-0.0205	
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Estimates)				-7.188	0.124	-0.0173	
No	rmal GOF	Test Resul	lts				
				1			
	No NDs			lormal RO			
Correlation Coefficient R	1	0.417	0.526	0.999			
	<b>-</b>	0 :: (0 05)				05)	
OL : MEH (MB - BL)		Crit. (0.05)		nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (NDs = DL)	0.202	0.92	Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.302	0.92	Data Not I				
Shapiro-Wilk (Normal ROS Estimates)	0.996	0.92	рата Арре	ear Normal			
Lilliefors (Detects Only)	N/A	N/A	Date N. C.	MaunI			
Lilliefors (NDs = DL)	0.539	0.17	Data Not I				
Lilliefors (NDs = DL/2)	0.529	0.17	Data Not I				
Lilliefors (Normal ROS Estimates)	0.0427	0.17	Data Appe	ear Normal			
Ga	mma GOF	Test Resu	lts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	N/A	0.411	0.576	0.414			
				1			
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	N/A	N/A					
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)	9.567	0.742					
Kolmogorov-Smirnov (NDs = DL)	0.541	0.171	Data Not (	Gamma Dis	stributed		

Anderson-Darling (NDs = DL/2)	8.633							
Kolmogorov-Smirnov (NDs = DL/2)	0.533	0.171	Data Not G	amma Dis	tributed			
derson-Darling (Gamma ROS Estimates)	N/A	0.742						
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.171						
Logr	normal GO	F Test Res	sults					
	No NDs	NDs = DI	NDs = DL/2	Log ROS				
Correlation Coefficient R	1	0.417	0.532	N/A				
	•	<b>0</b> ,	0.002					
	Test value	Crit. (0.05	Con	nclusion wit	th Alpha((	).05)		
Shapiro-Wilk (NDs = DL)	0.202	0.92	Data Not L		1 (	,		
Shapiro-Wilk (NDs = DL/2)	0.307	0.92	Data Not L					
Shapiro-Wilk (Lognormal ROS Estimates)	0.996	0.92	Data Appe		nal			
Lilliefors (Detects Only)	N/A	N/A						
Lilliefors (NDs = DL)	0.539	0.17	Data Not L	ognormal				
Lilliefors (NDs = DL/2)	0.531	0.17	Data Not L					
Lilliefors (Lognormal ROS Estimates)	0.0427		Data Appe		nal			
, ,								
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Beryllium (mw-61)								
						0/ NID-		
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
	18 detected!	1 ProUCL (o	17	1 software) s	16 should no	94.12% t be used or		
Narning: Only one distinct data value was ested to use alternative site specific values	18 detected!	ProUCL (o	17 r any other a	1 software) s	16 should no te enviror	94.12% t be used or		
Warning: Only one distinct data value was	18 detected!	ProUCL (o	17 r any other a	1 software) s	16 should no te enviror	94.12% t be used or		
Warning: Only one distinct data value was ested to use alternative site specific values  The data se	18 detected!	ProUCL (o	17 r any other a	1 software) s	16 should no te enviror	94.12% t be used or		
Warning: Only one distinct data value was ested to use alternative site specific values  The data se	18 detected!	ProUCL (o	17 r any other a	1 software) s	16 should no te enviror	94.12% t be used or		
Warning: Only one distinct data value was ested to use alternative site specific values  The data se	18 detected! determine	ProUCL (or ed by the Follow Beryllium	r any other aroject Team	software) s n to estima was not pr	16 should no te enviror ocessed!	94.12%  It be used on mental par		
Warning: Only one distinct data value was ested to use alternative site specific values  The data se	detected! determine t for varial	ProUCL (or ed by the Follow Beryllium Num Miss	r any other a roject Team (mw-61)	software) s n to estima was not pr	should no te enviror ocessed!	94.12%  It be used on mental particular part		
Warning: Only one distinct data value was ested to use alternative site specific values  The data se	18 detected! determine	ProUCL (or ed by the Follow Beryllium	r any other aroject Team	software) s n to estima was not pr	16 should no te enviror ocessed!	94.12%  It be used on mental par		
Warning: Only one distinct data value was ested to use alternative site specific values  The data se  Beryllium (mw-7)	detected! s determine et for varial  Num Obs 18	ProUCL (ded by the Follow Beryllium Miss	r any other roject Team (mw-61)	software) son to estimate was not properties.	should no te enviror ocessed!  NDs 16	94.12%  It be used of mental parameters of the second of t	ameters	(e.g., EPC
Warning: Only one distinct data value was ested to use alternative site specific values  The data set the dat	detected! s determine et for varial  Num Obs 18	ProUCL (ded by the Folia Berylliu  Num Miss  1	r any other roject Team (mw-61)  Num Valid 17	software) son to estimate was not properties.  Detects 1  software) s	should no te enviror ocessed!  NDs 16	94.12%  It be used on mental parametrial p	ameters	(e.g., EPC
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Warning: Only one distinct data value was ested to use alternative site specific values  The data se  Beryllium (mw-7)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific values	detected! s determine et for varial  Num Obs 18  detected! s determine	ProUCL (deed by the Foundation of the Beryllium Missel 1  ProUCL (deed by the Foundation of the Beryllium Missel 1)	r any other and the control of the c	software) son to estima  Detects 1  software) son to estima	NDs 16 should note environ	94.12%  It be used on mental parametrial p	ameters	(e.g., EPC
Warning: Only one distinct data value was ested to use alternative site specific values.  The data set the da	detected! s determine et for varial  Num Obs 18  detected! s determine	ProUCL (deed by the Foundation of the Beryllium Missel 1  ProUCL (deed by the Foundation of the Beryllium Missel 1)	r any other roject Team (mw-61)  Num Valid 17	software) son to estima  Detects 1  software) son to estima	NDs 16 should note environ	94.12%  It be used on mental parametrial p	ameters	(e.g., EPC
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Warning: Only one distinct data value was ested to use alternative site specific values.  The data set the da	detected! s determine et for varial  Num Obs 18  detected! s determine	ProUCL (deed by the Foundation of the Beryllium Missel 1  ProUCL (deed by the Foundation of the Beryllium Missel 1)	r any other and the control of the c	software) son to estima  Detects 1  software) son to estima	NDs 16 should note environ	94.12%  It be used on mental parametrial p	ameters	(e.g., EPC
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Warning: Only one distinct data value was ested to use alternative site specific values  The data se  Beryllium (mw-7)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific values	detected! s determine et for varial  Num Obs 18  detected! s determine	ProUCL (ded by the Follow Mum Miss 1  ProUCL (ded by the Follow He	r any other and the control of the c	software) son to estima  Detects 1  software) son to estima	NDs 16 should note environ	94.12%  It be used on mental parametrial p	ameters	(e.g., EPC
Warning: Only one distinct data value was ested to use alternative site specific values  The data set the data set the data set the data set the data set the data set the data set the data set the data set the data value was ested to use alternative site specific values.  The data set the d	detected! s determine et for varial  Num Obs 18  detected! s determine	ProUCL (ded by the Follow Mum Miss 1  ProUCL (ded by the Follow He	r any other roject Team (mw-61)  Num Valid 17  r any other roject Team um (mw-7) v	software) son to estimate was not produced by the software of	NDs 16 should note environ te environ cessed!	94.12%  It be used on mental pare  % NDs 94.12%  It be used on mental pare	n such a	(e.g., EPC
Warning: Only one distinct data value was ested to use alternative site specific values  The data set alternative site specific values  Beryllium (mw-7)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific values  The data set alternative site specific values  Seryllium (mw-75)	18 detected! s determine et for varial  Num Obs 18 detected! s determine et for varia	ProUCL (ded by the Folia ble Berylliu ProUCL (ded by the Folia ble Ber	n any other project Team (mw-61)  Num Valid 17  r any other project Team um (mw-7) w	software) son to estimate was not produced by the software of	NDs te enviror  NDs te enviror  NDs NDs NDs	94.12%  It be used on mental pare  % NDs 94.12%  It be used on mental pare  % NDs 94.12%	n such a	(e.g., EPC
Warning: Only one distinct data value was ested to use alternative site specific values  The data set alternative site specific values  Beryllium (mw-7)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific values  The data set alternative site specific values  Seryllium (mw-75)	18 detected! s determine et for varial Num Obs 18 detected! s determine et for varia	ProUCL (ded by the Follow Mum Miss  1  ProUCL (ded by the Follow Mum Miss  Num Miss  1	r any other roject Team (mw-61)  Num Valid 17  r any other roject Team um (mw-7) v	software) son to estimate was not produced by the software of	NDs 16 should note environ te environ te environ NDs 16 should note environ te environ te environ te environ te environ	94.12%  It be used on mental pare    % NDs   94.12%  It be used on mental pare    % NDs   100.00%	n such a	data set!
Warning: Only one distinct data value was sted to use alternative site specific values  The data set alternative site specific values  Beryllium (mw-7)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific values  The data set alternative site specific values  Raw Statistics	18 detected! s determine et for varial Num Obs 18 detected! s determine et for varia	ProUCL (ded by the Fible Berylliu  Num Miss  1  ProUCL (ded by the Fible Berylliu  Num Miss  1  Num Miss  1	r any other roject Team (mw-61)  Num Valid 17  r any other roject Team um (mw-7) v	software) son to estimate was not produced by the software of	NDs 16 should no te enviror ocessed!  NDs 16 should no te enviror ocessed!	94.12%  t be used or mental parametrial pa	n such a ameters	data setl (e.g., EPC

et for varia	ble Berylliu	m (mw-75)	was not p	rocessed!			
						П	
Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
9	1	8	1	7	87.50%		
determine	ed by the P	roject Tear	n to estima	ite environ	mental par	ameters (e	e.g., EPC
et for varis	hle Bendlii	ım (mw-8)	wae not nr	ocesedi			
et ioi valia	ible belylli	iii (iiiw-o)	was not pr	ocesseu:			
				NDs	% NDs		
28	0	28	8	20	71.43%		
Numbor	Minimum	Maximum	Moon	Modian	SD.		
28							
28	1.2000E-4	0.01	0.00721	0.01	0.00449		
28	1.2000E-4	3.4424E-4	2.1903E-4	2.1508E-4	6.0894E-5		
			_	_			
			-0.403	0.207	-0.0339		
rmal GOF	Test Resu	lts					
No NDs	NDs = DL	NDs = DL/2	Normal RO				
0.965	0.845	0.849	0.99				
					.05)		
0.965		Data Appe					
0 202	. U /ŏ.3	Data Appe	ai ivormal				
0.203		Data Not N	Jormal				
0.366	0.164	Data Not Not Not Not Not Not Not Not Not Not					
	0.164 0.164	Data Not N	Normal				
0.366 0.264	0.164 0.164		Normal				
	Num Obs 9  I detected! Is determine  Set for varia  Num Obs 28  Number 20 8 28 28 28 28 28 28 28 0.771 2.487 0.79  Drmal GOF  No NDs 0.965  Test value 0.929 0.709 0.717	Num Obs   Num Miss   9	Num Obs   Num Miss   Num Valid   9	Num Obs   Num Miss   Num Valid   Detects	Num Obs	Num Obs   Num Miss   Num Valid   Detects   NDs   % NDs   87.50%	Num Obs   Num Miss  Num Valid   Detects   NDs   % NDs   9   1   8   1   7   87.50%

	N- ND-	ND DI	VD DL "	DO			
Correlation Coefficient D	No NDs 0.934	0.935	NDs = DL/2 0.931	0.514			
Correlation Coefficient R	0.934	0.935	0.931	0.514			
	Toot value	Crit. (0.05)	Co	naluaian wi	ith Alpha(0	OE)	
Anderson-Darling (Detects Only)	0.436	0.715	Co	iciusion wi	іш Аірпа(о	.03)	
Kolmogorov-Smirnov (Detects Only)		0.713	Detected	Data Anna	or Commo	Distributed	
Anderson-Darling (NDs = DL)	1.882	0.294	Detected	Jala Appe	ai Gaiiiiia	Distributed	
Kolmogorov-Smirnov (NDs = DL)	0.324	0.76	Data Nat (	Gamma Dis	-4+: d		
Anderson-Darling (NDs = DL/2)	1.886	0.756	Data Not 0	samma Di	stributed		
,			Data Nati	) Di	- 4 - 1 la - 1 la - 1		
Kolmogorov-Smirnov (NDs = DL/2)	0.23	0.167	Data Not (	Gamma Dis	stributed		
derson-Darling (Gamma ROS Estimates)	6.293	0.783	Data Nati	) Di	- 4 - 1 la - 1 la - 1		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.465	0.172	Data Not (	amma Dis	stributea		
Logi	normal GO	F Test Res	sults				
		NDs = DL					
Correlation Coefficient R	0.927	0.953	0.946	0.99			
	Test value	Crit. (0.05)	Co	nclusion wi	ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.866	0.818	Data Appe	ear Lognori	mal		
Shapiro-Wilk (NDs = DL)	0.9	0.924	Data Not I	ognormal			
Shapiro-Wilk (NDs = DL/2)	0.886	0.924	Data Not I	ognormal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.968	0.924	Data Appe	ear Lognori	mal		
Lilliefors (Detects Only)	0.258	0.283	Data Appe	ear Lognori	mal		
Lilliefors (NDs = DL)	0.28	0.164	Data Not I	ognormal			
Lilliefors (NDs = DL/2)	0.196	0.164	Data Not I	ognormal			
Lilliefors (Lognormal ROS Estimates)	0.1	0.164	Data Appe	ear Lognori	mal		
Note: Substitution methods such as DL or Cadmium (mw-61)	DL/2 are r	not recomm	ended.				
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	0.002	0.002	0.002	0.002	N/A	
Statistics (Non-Detects Only)	17	8.2000E-4				7.6283E-5	
Statistics (All: NDs treated as DL value)	18	8.2000E-4		0.001	9.4000E-4	2.6004E-4	
Statistics (All: NDs treated as DL/2 value)	18	8.2000E-4			9.4000E-4	7.5243E-5	
Statistics (Normal ROS Imputed Data)	18	8.2000E-4				7.4006E-5	
Statistics (Gamma ROS Imputed Data)	18	8.2000E-4			9.4000E-4		
Statistics (Lognormal ROS Imputed Data)		8.2000E-4				7.4009E-5	
,	<u> </u>	1	<u> </u>		l	<u> </u>	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	165.7	136.5	5.6874E-6	-6.97	0.0798	-0.0114	 
Statistics (NDs = DL)	23.39	19.53	4.2807E-5	-6.928	0.194	-0.028	
Statistics (NDs = DL/2)	169.8	141.6	5.5676E-6	-6.967	0.0788	-0.0113	
Statistics (Gamma ROS Estimates)	1.818	1.552	7.9498E-4	-6.839	0.563	-0.0823	
Statistics (Lognormal ROS Estimates)				-6.97	0.0774	-0.0111	
No	rmal GOF	Test Resu	lts				
			NDs = DL/2				

WIOLII							
Correlation Coefficient R	0.947	0.688	0.957	0.942			
	Test value	Crit. (0.05)	Coi	nclusion w	ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.899		Data Appe			,	
Shapiro-Wilk (NDs = DL)	0.505		Data Not N				
Shapiro-Wilk (NDs = DL/2)	0.917		Data Appe				
Shapiro-Wilk (Normal ROS Estimates)	0.891		Data Not N				
Lilliefors (Detects Only)	0.218		Data Not N				
Lilliefors (NDs = DL)			Data Not N				
Lilliefors (NDs = DL/2)	0.196		Data Appe				
Lilliefors (Normal ROS Estimates)	0.222		Data Not N				
Liniciois (Normal NOO Estimates)	0.222	0.202	Data Not i	Voimai			
Ga	mma GOF	Toet Poer	ılte				
Ga	IIIIIIa GOF	Test nest	IIIS				
	No NDs	NDc - DI	NDs = DL/2	amma DC			
Correlation Coefficient D	0.952		0.961				
Correlation Coefficient R	0.952	0.738	0.961	0.676			
	Toot	Orit /0.05		adusia :	ith Almk - /^	0E)	
Anderson Dedica (D. 1. C. 1.)		Crit. (0.05)	Col	iciusion W	ith Alpha(0	.00)	
Anderson-Darling (Detects Only)	0.712	0.736	D-t- : ::	D-4- A	0-	District	
Kolmogorov-Smirnov (Detects Only)	0.208		Detected L	Jata Appe	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)	2.669	0.739					
Kolmogorov-Smirnov (NDs = DL)	0.308	0.203	Data Not 0	3amma Di	stributed		
Anderson-Darling (NDs = DL/2)	0.613	0.737				_	
Kolmogorov-Smirnov (NDs = DL/2)	0.187		Data Appe	ear Gamma	a Distribute	ed	
nderson-Darling (Gamma ROS Estimates)	5.435	0.754					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.483	0.207	Data Not (	Gamma Di	stributed		
Logi	normal GO	F Test Res	sults				
	T	1			ı		
			NDs = DL/2	-			
Correlation Coefficient R		NDs = DL 0.766	NDs = DL/2 0.962	Log ROS 0.947			
Correlation Coefficient R	0.954	0.766	0.962	0.947			
	0.954 Test value	0.766 Crit. (0.05)	0.962 Coi	0.947	ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.954 Test value 0.911	0.766 Crit. (0.05) 0.892	0.962 Cor Data Appe	0.947 nclusion wear Lognor	ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)	0.954 Test value 0.911 0.617	0.766 Crit. (0.05) 0.892 0.897	0.962 Cor Data Appe Data Not L	0.947 nclusion wear Lognor	ith Alpha(0 mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2)	0.954  Test value 0.911 0.617 0.925	0.766 Crit. (0.05) 0.892 0.897	0.962 Cor Data Appe	0.947 nclusion wear Lognor	ith Alpha(0 mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)	0.954  Test value 0.911 0.617 0.925	0.766 Crit. (0.05) 0.892 0.897 0.897	0.962 Cor Data Appe Data Not L	0.947 nclusion wear Lognor cognormal ear Lognor	ith Alpha(0 mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2)	0.954  Test value 0.911 0.617 0.925 0.902 0.203	0.766 Crit. (0.05) 0.892 0.897 0.897 0.897	O.962  Cor Data Appe Data Not L Data Appe Data Appe Data Appe Data Appe	0.947  nclusion wear Lognor cognormal ear Lognor ear Lognor ear Lognor	ith Alpha(0 mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates)	0.954  Test value 0.911 0.617 0.925 0.902 0.203	0.766 Crit. (0.05) 0.892 0.897 0.897 0.897	Con Data Appe Data Not L Data Appe Data Appe	0.947  nclusion wear Lognor cognormal ear Lognor ear Lognor ear Lognor	ith Alpha(0 mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291	0.766 Crit. (0.05) 0.892 0.897 0.897 0.897 0.207	O.962  Cor Data Appe Data Not L Data Appe Data Appe Data Appe Data Appe	0.947  nclusion wear Lognor cognormal ear Lognor ear Lognor ear Lognor cognormal	ith Alpha(0 mal mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291	0.766 Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202	O.962  Cor Data Appe Data Not L Data Appe Data Appe Data Appe Data Appe Data Not L	0.947  nclusion wear Lognormal ear Lognorear Lognormal cognormal ear Lognormal ear Lognormal ear Lognor	ith Alpha(0 mal mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22	0.766 Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe	0.947  nclusion wear Lognormal ear Lognorear Lognormal cognormal ear Lognormal ear Lognormal ear Lognor	ith Alpha(0 mal mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22	0.766 Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe	0.947  nclusion wear Lognormal ear Lognorear Lognormal cognormal ear Lognormal ear Lognormal ear Lognor	ith Alpha(0 mal mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22	0.766 Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe	0.947  nclusion wear Lognormal ear Lognorear Lognormal cognormal ear Lognormal ear Lognormal ear Lognor	ith Alpha(0 mal mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22	0.766 Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe	0.947  nclusion wear Lognormal ear Lognorear Lognormal cognormal ear Lognormal ear Lognormal ear Lognor	ith Alpha(0 mal mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe	0.947  onclusion wear Lognormal ear Lognormal ear Lognormal ear Lognormal ear Lognormal ear Lognormal	ith Alpha(0 mal mal mal mal	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe Data Not L	0.947  onclusion wear Lognormal ear Lognormal ear Lognormal ear Lognormal ear Lognormal ear Lognormal	ith Alpha(0 mal mal mal mal		
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Cadmium (mw-7)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202  ot recomm	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe Data Not L Data Appe Data Not L	0.947  nclusion wear Lognor ear Lognor ear Lognor ear Lognor ear Lognor cognormal ear Lognor cognormal ear Lognor cognormal	ith Alpha(0 mal mal mal mal mal	% NDs	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Cadmium (mw-7)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202  ot recomm	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe Data Not L Data Appe Data Not L	0.947  nclusion wear Lognor cognormal car Lognor car Lognor car Lognor cognormal car Lognor cognormal car Lognor cognormal	ith Alpha(0 mal mal mal mal mal	% NDs	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Cadmium (mw-7)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202  ot recomm	O.962  Cor Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Not L Data Appe Data Not L  Mum Valid 18	0.947  nclusion wear Lognor cognormal car Lognor car Lognor car Lognor cognormal car Lognor cognormal car Lognor cognormal	ith Alpha(0 mal mal mal mal Mal Mal Mal Mal Mal Mal Mal Mal Mal M	% NDs 83.33%	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Cadmium (mw-7)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202  ot recomm	O.962  Cor Data Appe Data Not L Data Appe Data Appe Data Not L Data Appe Data Not L Data Appe Data Not L  Bata Not L  Mum Valid 18  Maximum 0.002	0.947  nclusion wear Lognor ear Lognor ear Lognor cognormal ear Lognor cognormal ear Lognor cognormal ear Lognor cognormal	ith Alpha(0 mal mal mal mal mal MDs 15 Median 1.0000E-4	% NDs 83.33%	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Cadmium (mw-7)  Raw Statistics  Statistics (Non-Detects Only)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n  Num Obs 18  Number 15	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202  ot recomm  Num Miss 0  Minimum 1.0000E-4	O.962  Cor Data Appe Data Not L Data Appe Data Appe Data Not L Data Appe Data Not L Data Appe Data Not L  Bata Appe Data Not L  Mum Valid 18  Maximum 0.002 0.0014	0.947  nclusion wear Lognor ear Lognor ear Lognor ear Lognor cognormal ear Lognor cognormal ear Lognor cognormal ear Lognor cognormal ear Lognor cognormal	ith Alpha(0 mal mal mal mal mal  NDs 15  Median 1.0000E-4	% NDs 83.33% SD 5.1501E-4	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Cadmium (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only)	0.954  Test value 0.911 0.617 0.925 0.902 0.203 0.291 0.182 0.22  DL/2 are n  Num Obs 18  Number 15	0.766  Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202  ot recomm  Num Miss 0  Minimum 1.0000E-4 1.0000E-4	O.962  Cor Data Appe Data Not L Data Appe Data Not L Data Appe Data Not L Data Appe Data Not L Data Appe Data Not L  Bended.  Num Valid 18  Maximum 0.002 0.0014 0.002	0.947  nclusion wear Lognor ar Logno	ith Alpha(0 mal mal mal mal mal mal mal mal mal mal	% NDs 83.33% SD 5.1501E-4 7.3928E-4	

	014111100							
Statistics (Normal ROS Imputed Data)	18	-0.00351			-0.00148			
Statistics (Gamma ROS Imputed Data)	18	1.0000E-4		0.00842		0.00363		
Statistics (Lognormal ROS Imputed Data)	18	8.7899E-8	0.0014	9.7443E-5	4.9603E-6	3.2731E-4	1	
							i	
	K hat	K Star		Log Mean	-	Log CV	İ	
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A	i	
Statistics (NDs = DL)	0.952	0.83	4.1686E-4	-8.443	1.041	-0.123		
Statistics (NDs = DL/2)	0.841	0.738	2.9012E-4	-9.02	1.1	-0.122		
Statistics (Gamma ROS Estimates)	1.302	1.122	0.00647	-5.207	1.471	-0.282		
Statistics (Lognormal ROS Estimates)				-12.04	2.394	-0.199		
							i	
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Iormal RO				
Correlation Coefficient R	0.879	0.786	0.756	0.989				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.773		Data Appe		•		·	
Shapiro-Wilk (NDs = DL)	0.628	0.897						
Shapiro-Wilk (NDs = DL/2)	0.586	0.897	Data Not I	Normal				
Shapiro-Wilk (Normal ROS Estimates)			Data Appe					
Lilliefors (Detects Only)	0.376		Data Appe					
Lilliefors (NDs = DL)		0.202						
Lilliefors (NDs = DL/2)	0.38		Data Not I					
Lilliefors (Normal ROS Estimates)	0.0998		Data Appe					
Emiliare (Normal Nee Leaminates)	0.0000	0.202	Data / tppt	our reorman			i	
Ga	mma GOF	Test Resu	ilte				<u> </u>	
<u> </u>	IIIIIa GOI	163111630						
	No NDs	NDe - DI	NDe - DL /	amma RO				
Correlation Coefficient R	N/A	0.959	0.948	0.45				
Correlation Coefficient N	IN/A	0.333	0.340	0.43				
	Toet value	Crit. (0.05)	Co	nclusion wi	th Alpha(A	05)		
Anderson-Darling (Detects Only)	N/A	N/A		ilciusion wi	ui Aipiia(u	.00)		
Kolmogorov-Smirnov (Detects Only)	N/A	N/A						
Anderson-Darling (NDs = DL)	2.217	0.769	Data Nat	2 Di-	اد د د . داند د			
Kolmogorov-Smirnov (NDs = DL)	0.322	0.21	Data Not (	Gamma Dis	stributea			
Anderson-Darling (NDs = DL/2)	1.919	0.774	D-4 N :	2	and the state of			
Kolmogorov-Smirnov (NDs = DL/2)	0.276	0.211	Data Not (	Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates)	5.125	0.76	<b>.</b>					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.522	0.208	Data Not (	Gamma Dis	stributed			
			•					
Logi	normal GO	F Test Res	suits					
			ı	,				
	No NDs		NDs = DL/2	Ü			<u> </u>	
Correlation Coefficient R	0.919	0.871	0.896	0.99				
		Crit. (0.05)		nclusion wi		.05)	<u> </u>	
Shapiro-Wilk (Detects Only)	0.844	0.767		ear Lognorr	mal		<u> </u>	
Shapiro-Wilk (NDs = DL)		0.897	Data Not I	-				
Shapiro-Wilk (NDs = DL/2)	0.792	0.897	Data Not I	ognormal				
Shapiro-Wilk (Lognormal ROS Estimates)	0.984	0.897	Data Appe	ear Lognorr	mal			
Lilliefors (Detects Only)	0.343	0.425	Data Appe	ear Lognorr	mal			
Lilliefors (NDs = DL)	0.325	0.202	Data Not I	ognormal				
Lilliefors (NDs = DL/2)	0.289	0.202	Data Not I	ognormal				

Lilliefors (Lognormal ROS Estimates) 0	.0998	0.202	Data Appe	ar Lognorr	mal		
1		<u> </u>					
Note: Substitution methods such as DL or DL/2	are no	t recomme	ended.				
Cadmium (mw-75)							
Raw Statistics							
Number of Valid Observa		11					
Number of Distinct Observa		5					
	imum	0.0019					
	imum	0.0024					
Mean of Raw Standard Deviation of Raw		0.00213					
Standard Deviation of Raw	Khat	1.9540E-4 131.9					
Tho		1.6123E-5					
	Kstar	96.02					
		30.02 2.2155E-5					
Mean of Log Transformed		-6.157					
Standard Deviation of Log Transformed		0.0911					
Citation of Log Transformed	Dutu	0.0011					
Normal GOF Test Results							
Correlation Coeffici	ient R	0.937					
Shapiro Wilk Test St	atistic	0.852					
Shapiro Wilk Critical (0.05)		0.85					
Approximate Shapiro Wilk P		0.0764					
Lilliefors Test St	atistic	0.288					
Lilliefors Critical (0.05)	Value	0.251					
Data appear Approximate Normal at (0.05) Sign	nificano	ce Level					
Gamma GOF Test Results							
Correlation Coeffici		0.937					
A-D Test Sta		0.782					
A-D Critical (0.05)		0.726					
K-S Test Sta		0.295					
K-S Critical(0.05)		0.254					
Data not Gamma Distributed at (0.05) Significa	nce Le	vel					
Lognormal COF Task Describe							
Lognormal GOF Test Results							
Correlation Coeffici	ient D	0.939					
Shapiro Wilk Test St		0.939					
Shapiro Wilk Critical (0.05)		0.85					
Approximate Shapiro Wilk P		0.0839					
Lilliefors Test Sta		0.0033					
Lilliefors Critical (0.05)		0.251					
Data appear Approximate_Lognormal at (0.05)							
						1	
Cadmium (mw-8)							
	. 0-	Muse NA	Nicose V. P. I	Detail	ND	0/ ND	 
			Num Valid	Detects	NDs	% NDs	<u> </u>
Raw Statistics 9	`	0	9	8	1	11.11%	

	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	0.002	0.002	0.002	0.002	N/A	
Statistics (Non-Detects Only)	8	1.1000E-4	9.6000E-4	3.4875E-4	2.1000E-4	3.1814E-4	
Statistics (All: NDs treated as DL value)	9	1.1000E-4	0.002	5.3222E-4	2.2000E-4	6.2572E-4	
Statistics (All: NDs treated as DL/2 value)	9	1.1000E-4	0.001	4.2111E-4	2.2000E-4	3.6836E-4	
Statistics (Normal ROS Imputed Data)	9	1.1000E-4	9.6000E-4	3.4875E-4	2.2000E-4	2.9759E-4	
Statistics (Gamma ROS Imputed Data)	9	1.1000E-4	0.01	0.00142	2.2000E-4	0.00323	
Statistics (Lognormal ROS Imputed Data)	9	1.1000E-4	9.6000E-4			2.9910E-4	
, ,							
	K hat	K Star	Theta hat	Log Mean	Loa Stdv	Log CV	
Statistics (Non-Detects Only)	1.825		1.9112E-4	_	0.78	-0.0944	
Statistics (NDs = DL)	1.15		4.6260E-4		0.998	-0.124	
Statistics (NDs = DL/2)	1.632		2.5808E-4		0.857	-0.106	
Statistics (Gamma ROS Estimates)	0.491	0.401	0.00289		1.42	-0.181	-
Statistics (Lognormal ROS Estimates)		0.401		-8.26	0.729	-0.0883	
Statistics (Logitorniai 1103 Estimates)				-0.20	0.723	-0.0003	
Nia	rmal COE	Test Resu	lte				
INC.	illiai GOF	rest resu	ilið				
	No NDs	NDo - Di	VIDo - DI "	lorme! DO	l		
Correlation Coefficient R	No NDs	0.839		Jormal RO			
Correlation Coefficient R	0.857	0.839	0.884	0.875			
	T'	O.:: (0.05)	_	malu-i-	i4h Δ1-1 /2	OE)	<u> </u>
		Crit. (0.05)		nclusion w	ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.733		Data Not I				
Shapiro-Wilk (NDs = DL)	0.716		Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.761		Data Not I				
Shapiro-Wilk (Normal ROS Estimates)	0.766	0.829					
Lilliefors (Detects Only)	0.372		Data Not I				
Lilliefors (NDs = DL)	0.341	0.274	Data Not I	Normal			
Lilliefors (NDs = DL/2)	0.346	0.274	Data Not I	Normal			
Lilliefors (Normal ROS Estimates)	0.297	0.274	Data Not I	Normal			
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/	amma RC			
Correlation Coefficient R	0.949	0.975	0.928	0.914			
	Test value	Crit. (0.05)	Со	nclusion w	ith Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.761	0.726					
Kolmogorov-Smirnov (Detects Only)	0.318	0.298	Data Not	Gamma Di	stributed		
Anderson-Darling (NDs = DL)	0.738	0.741					
Kolmogorov-Smirnov (NDs = DL)	0.319	0.286	Detected	Data appea	ar Approxir	nate Gamn	<del> </del>
Anderson-Darling (NDs = DL/2)	0.801	0.733			1. 14. 4		<del>                                     </del>
Kolmogorov-Smirnov (NDs = DL/2)	0.3	0.284	Data Not	Gamma Di	stributed		
nderson-Darling (Gamma ROS Estimates)	1.399	0.772					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.337	0.772	Data Not	Gamma Di	stributed		
	3.007	3.234	2010 1101	Carrilla Di			
Logi	normal GO	F Test Res	ults				-
Logi	.5						
	No NDs	NDe - DI	NDe - DI /	Log ROS			1
Correlation Coefficient D	0.937	0.946	0.94	0.939			-
Correlation Coefficient R	0.837	0.940	0.94	0.939			1
	Tootool	O-it (0.05)	_	malur-i-	i4h Δ1-1 /2	OE)	<u> </u>
OL : WELL (D : C : .		Crit. (0.05)		nclusion w		.05)	
Shapiro-Wilk (Detects Only)	0.87	0.818		ear Lognor			
Shapiro-Wilk (NDs = DL)	0.886	0.829	Data Appe	ear Lognor	mal		

	2.22							
Shapiro-Wilk (NDs = DL/2)	0.86		Data Appe	•				
Shapiro-Wilk (Lognormal ROS Estimates)	0.878		Data Appe					
Lilliefors (Detects Only)	0.268		Data Appe	_				
Lilliefors (NDs = DL)	0.27		Data Appe	-				
Lilliefors (NDs = DL/2)	0.252		Data Appe	-	mal			
Lilliefors (Lognormal ROS Estimates)	0.278	0.274	Data Not I	_ognormal				
Note: Substitution methods such as DL or	DI /2 oro m	ot rocomm	andad					
Note: Substitution methods such as DL or	DL/2 are ii	ot recomm	enaea.					
Chromium (background)								
Cilionilani (background)								
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs	<u> </u>	
Raw Statistics	28	2	26	8	18	69.23%		
Traw Statistics	20	2	20	0	10	09.2370		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	18	0.001	0.02	0.00539		0.00458	i	
Statistics (Non-Detects Only)	8	6.5000E-4			8.3500E-4			
Statistics (All: NDs treated as DL value)	26	6.5000E-4		0.00135				1
Statistics (All: NDs treated as DL/2 value)	26	5.0000E-4	0.02	0.00413		0.00420		
Statistics (Ali. NDs treated as DL/2 value)  Statistics (Normal ROS Imputed Data)	26	5.5041E-5			9.4584E-4			-
Statistics (Normal ROS Imputed Data)  Statistics (Gamma ROS Imputed Data)	26	6.5000E-4		0.00118		0.00411		
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	26	4.8522E-4	0.0035			6.7157E-4	i	-
Statistics (Logitorinal ROS Imputed Data)	20	4.00ZZE-4	0.0033	0.0011	6.9300E-4	0.7137⊑-4		
	K hat	K Star	Thata hat	Log Mean	Log Ctdy	Log CV		
Ctatiatics (Nam Datasts Only)			5.3761E-4	-	0.641	Log CV -0.094		
Statistics (Non-Detects Only)	2.513							
Statistics (NDs = DL)	1.361	1.23	0.00305		0.933	-0.158		
Statistics (NDs = DL/2)	1.858	1.67	0.00123		0.753	-0.118		
Statistics (Gamma ROS Estimates)	1.49	1.344	0.00493		1.096	-0.207		
Statistics (Lognormal ROS Estimates)				-6.923	0.462	-0.0667		
Nie		Test Resu	14					-
NC.	rmai GOF	rest Resu	its					
	No NDs	NDs = DL	VIDa - DI /	Iormal DO				
Correlation Coefficient R	0.823	0.841		0.942				
Correlation Coefficient R	0.823	0.641	0.845	0.942				
	Took volue	C-:+ (0.0E)	Co	nclusion wi	th Alpha/A	OE)		
Shapira Wilk (Datasta Only)		Crit. (0.05)			ш Арпа(о	.03)	i	
Shapiro-Wilk (Detects Only)	0.68		Data Not N					
Shapiro-Wilk (NDs = DL)	0.723	0.92	Data Not N				i	-
Shapiro-Wilk (NDs = DL/2)	0.73	0.92	Data Not N				i	-
Shapiro-Wilk (Normal ROS Estimates)	0.898	0.92	Data Not N					
Lilliefors (Detects Only)	0.409		Data Not N					
Lilliefors (NDs = DL)	0.283	0.17	Data Not N					
Lilliefors (NDs = DL/2)	0.247	0.17	Data Not N					-
Lilliefors (Normal ROS Estimates)	0.191	0.17	Data Not N	vormal				-
		Tank Di	la.					
Ga	mma GOF	Test Resu	IITS					-
	N. N.	ND 5:	UD 51 "					
	No NDs		NDs = DL/2					-
Correlation Coefficient R	0.924	0.956	0.953	0.615				
		T =						
		Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	1.183	0.723		_			<u> </u>	
Kolmogorov-Smirnov (Detects Only)	0.394	0.297	Data Not 0	Gamma Dis	stributed		<u> </u>	
Anderson-Darling (NDs = DL)	0.787	0.765						

		1						
Kolmogorov-Smirnov (NDs = DL)	0.171	0.175	Detected [	Data appea	ar Approxin	nate Gamn		
Anderson-Darling (NDs = DL/2)	0.941	0.759						
Kolmogorov-Smirnov (NDs = DL/2)	0.19	0.174	Data Not 0	Gamma Di	stributed			
nderson-Darling (Gamma ROS Estimates)	5.01	0.762						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.44	0.174	Data Not 0	Gamma Di	stributed			
Logr	normal GO	F Test Res	sults					
		1			T			
	No NDs		NDs = DL/2	•				
Correlation Coefficient R	0.869	0.972	0.972	0.957				
	<del>-</del>	0 : (0.05)		1		05)		
OI : M/II (D O I )		Crit. (0.05)			ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.75		Data Not L	•				
Shapiro-Wilk (NDs = DL)	0.935	0.92	Data Appe					
Shapiro-Wilk (NDs = DL/2)	0.943	0.92	Data Appe		maı			1
Shapiro-Wilk (Lognormal ROS Estimates)	0.92	0.92	Data Not L					1
Lilliefors (Detects Only)	0.363		Data Not L					
Lilliefors (NDs = DL)	0.156	0.17	Data Appe		mal		<u> </u>	
Lilliefors (NDs = DL/2)	0.183	0.17	Data Not L				<u> </u>	
Lilliefors (Lognormal ROS Estimates)	0.19	0.17	Data Not L	_ognormal				
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Chromium (mw-61)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	1	17	4	13	76.47%		
	Number		Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	13	5.0000E-4		0.00246		0.00267		
Statistics (Non-Detects Only)	4		7.5000E-4					
Statistics (All: NDs treated as DL value)	17	5.0000E-4			7.5000E-4	0.00245		
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4			6.2000E-4	0.00119		
Statistics (Normal ROS Imputed Data)	17		7.5000E-4					
Statistics (Gamma ROS Imputed Data)	17	5.2000E-4		0.00779		0.00411		
Statistics (Lognormal ROS Imputed Data)	17	2.5133E-4	7.5000E-4	4.4469E-4	4.2861E-4	1.2535E-4		
	17 ' '	I/ O:	There	1 14	1 - 0::	1- 01		
Otalialia (N. D. C. C. C.	K hat	K Star		Log Mean	ŭ	Log CV		1
Statistics (Non-Detects Only)	42.81	10.87	1.4074E-5		0.175	-0.0235		1
Statistics (NDs = DL)	1.107	0.951	0.00183		0.995	-0.148		
Statistics (NDs = DL/2)	1.332		8.1278E-4	-7.248	0.914	-0.126		+
Statistics (Gamma ROS Estimates)	1.351	1.151	0.00577	-5.269 -7.754	1.236	-0.235		
Statistics (Lognormal ROS Estimates)				-7.754	0.276	-0.0356		-
No	rmal GOF	Test Resu	lts					
	No NDs		NDs = DL/2					
Correlation Coefficient R	0.931	0.81	0.825	0.991				
	Test value	Crit. (0.05)	Col	nclusion w	ith Alpha(0	05)		
Shapiro-Wilk (Detects Only)	0.857	` ′	Data Appe			.50,		+
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)	0.657	0.748	Data Not N					+
Shapiro-Wilk (NDs = DL/2)	0.697							+
Shapiro-Wilk (Normal ROS Estimates)	0.097		Data Not I					+
Gnapho-vviik (Normai 703 Estimates)	0.307	0.092	Data Appe	aı NUIIIdl				

-		1	1				
Lilliefors (Detects Only)			Data Appe				
Lilliefors (NDs = DL)		0.207					
Lilliefors (NDs = DL/2)		0.207					
Lilliefors (Normal ROS Estimates)	0.148	0.207	Data Appe	ear Normal			-
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DI	NDs = DL/2	amma RO			
Correlation Coefficient R	0.952	0.957	0.954	0.535			
Conclusion Coombient 1	0.002	0.007	0.001	0.000			<u> </u>
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.432	0.656					
Kolmogorov-Smirnov (Detects Only)	0.313	0.394	Detected I	Data Appea	ar Gamma	Distributed	 I
Anderson-Darling (NDs = DL)		0.764					
Kolmogorov-Smirnov (NDs = DL)		0.215	Data Not (	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)		0.759					
Kolmogorov-Smirnov (NDs = DL/2)		0.214	Data Appe	ear Gamma	a Distribute	d	
nderson-Darling (Gamma ROS Estimates)		0.759					
Kolmogorov-Smirnov (Gamma ROS Est.)		0.214	Data Not (	Gamma Dis	stributed		
Loa	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.936	0.917	0.961	0.992			<del></del>
	Test value	Crit. (0.05)	Co	nclusion wi	ith Alpha(0	.05)	 I
Shapiro-Wilk (Detects Only)	0.863	0.748	Data Appe	ear Lognori	mal		·
Shapiro-Wilk (NDs = DL)	0.828	0.892	Data Not I	ognormal			
Shapiro-Wilk (NDs = DL/2)	0.913		Data Appe		mal		
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe				
Lilliefors (Detects Only)			Data Appe	_			
Lilliefors (NDs = DL)	0.22		Data Not I	_			
Lilliefors (NDs = DL/2)			Data Appe		mal		
Lilliefors (Lognormal ROS Estimates)			Data Appe				
		ı					
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Chromium (mw-7)							<u> </u>
	N O'	Nivers NA	NI V . 7 . 7	D-t	ND	0/ NID	
D 04-4" 1"			Num Valid		NDs	% NDs	
Raw Statistics	18	1	17	8	9	52.94%	
	Numbor	Minimum	Maximum	Moon	Median	6D	
Statistics (Non-Detects Only)	Number 9			Mean		SD 0.00149	
		5.0000E-4		0.00172		0.00148	
Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value)	8 17	4.1000E-4		0.00209			
,		4.1000E-4			0.0018	0.00136	
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4		0.00144			
Statistics (Normal ROS Imputed Data)	17	-8.595E-4			8.9944E-4	0.00131	
Statistics (Gamma ROS Imputed Data)		4.1000E-4		0.00628		0.00416	
Statistics (Lognormal ROS Imputed Data)	17	3.0967E-4	0.0047	0.00135	8.5939E-4	0.00113	
	l/ h - +	N 04	Thete ''	l og M	Loc Ct-l	10~01	
Otatiotics (Non-Data-ti-O. 1.)	K hat	K Star		Log Mean	-	Log CV	
Statistics (Non-Detects Only)	2.686	1.762	7.7904E-4		0.735	-0.115	
Statistics (NDs = DL)	1.869	1.578	0.00101	-6.559	0.834	-0.127	

	1014111100		INESS OF F	017111	01100			
Statistics (NDs = DL/2)	1.45	1.233	9.9341E-4	-6.926	0.978	-0.141		
Statistics (Gamma ROS Estimates)	1.52	1.291	0.00413	-5.434	1.029	-0.189	1	
Statistics (Lognormal ROS Estimates)				-6.884	0.755	-0.11		
No	ormal GOF	Test Resu	lts					
			l/.				<del></del>	
	No NDs		NDs = DL/2lc					
Correlation Coefficient R	0.945	0.95	0.929	0.954				
	Test value	Crit. (0.05)	Conc	lusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)			Data Appea					+
Shapiro-Wilk (NDs = DL)		0.892						
Shapiro-Wilk (NDs = DL/2)			Data Not No				 I	
Shapiro-Wilk (Normal ROS Estimates)			Data Appea	r Normal				
Lilliefors (Detects Only)			Data Appea				 I	+
Lilliefors (NDs = DL)	0.157	0.207	Data Appea	r Normal			 I	+
Lilliefors (NDs = DL/2)	0.157	0.207	Data Appea	r Normal				+
Lilliefors (Normal ROS Estimates)	0.171	0.207	Data Appea	r Normal				
	"		ll .					
Ga	mma GOF	Test Resu	ılts					
			I					
			NDs = DL/aa					
Correlation Coefficient R	0.965	0.97	0.972	0.752				
	Test value	Crit. (0.05)	Conc	lucion wi	th Alpha(0	05)		_
Anderson-Darling (Detects Only)		0.722	Conc	JUSIOIT WI	tii Aipiia(0	.00)		-
Kolmogorov-Smirnov (Detects Only)		0.722	Detected Da	ata Annea	ar Gamma	Distributed	·	+
Anderson-Darling (NDs = DL)			Detected Bt	ла пррес	ar Garriina	Distributed	·	+
Kolmogorov-Smirnov (NDs = DL)			Data Appea	r Gamma	Distribute	d	<u> </u>	_
Anderson-Darling (NDs = DL/2)			Data , spoo		. 2.012410			
Kolmogorov-Smirnov (NDs = DL/2)			Data Appea	r Gamma	Distribute	d		+
derson-Darling (Gamma ROS Estimates)		0.755						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.341	0.213	Data Not Ga	amma Dis	stributed		 I	+
	1	I.					<u> </u>	
Log	normal GO	F Test Res	sults					
	No NDs	NDc - DI	NDs = DL/2 L	og DOS				
Correlation Coefficient R		0.957	0.953	0.983				-
Correlation Cocincient 1	0.040	0.507	0.500	0.000			<u> </u>	+
	Test value	Crit. (0.05)	Cond	lusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)		` '	Data Appea					
Shapiro-Wilk (NDs = DL)		0.892					·	+
Shapiro-Wilk (NDs = DL/2)	0.89	0.892						
Shapiro-Wilk (Lognormal ROS Estimates)	0.961	0.892	Data Appea	r Lognorr	mal			
Lilliefors (Detects Only)	0.244	0.283	Data Appea	r Lognorr	mal			
Lilliefors (NDs = DL)	0.188	0.207	Data Appea	r Lognorr	mal			
Lilliefors (NDs = DL/2)	0.183	0.207	Data Appea	r Lognorr	mal			
Lilliefors (Lognormal ROS Estimates)	0.139	0.207	Data Appea	r Lognorr	mal		-	
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
								+
Chromium (mw-75)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	 I	

Raw Statistics	11	1	10	0	10	100.00%		
Warning: All observations are Nor	n-Detects (	NDs), there	efore all sta	tistics and	estimates	should also	be NDs!	
Specifically, sample mean, UCLs, U	PLs, and o	ther statist	ics are also	NDs lying	below the	largest det	ection lim	it!
The Project Team may decide to use alter	native site	specific val	lues to estir	mate envir	onmental p	arameters	(e.g., EPC	, BTV).
The data se	t for variab	ole Chromiu	ım (mw-75)	) was not p	rocessed!			
Chromium (mw-8)								
	Ni Ob	NI NA:	NI \ / = 1; =1	D-44-	ND-	0/ ND-		
Daw Statistics	9		Num Valid		NDs	% NDs		
Raw Statistics	9	1	8	6	2	25.00%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	2	0.001	0.0025	0.0017	7.7.7	0.00106		
Statistics (Non-Detects Only)	6	6.0000E-4			7.9500E-4	0.00100		
Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	8	6.0000E-4			7.9300E-4	0.0078		
Statistics (All: NDs treated as DL/2 value)	8	5.0000E-4			7.9500E-4	0.00676		
Statistics (Normal ROS Imputed Data)	8	6.0000E-4			9.4519E-4	0.0067		
Statistics (Gamma ROS Imputed Data)	8	6.0000E-4		0.00557		0.00714		
Statistics (Lognormal ROS Imputed Data)	8	6.0000E-4		0.00329	8.1114E-4	0.00676		
,								
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	0.595	0.408	0.00688	-6.54	1.329	-0.203		
Statistics (NDs = DL)	0.7	0.521	0.00501	-6.517	1.151	-0.177		
Statistics (NDs = DL/2)	0.631	0.478	0.00521	-6.691	1.183	-0.177		
Statistics (Gamma ROS Estimates)	0.699	0.52	0.00797	-6.056	1.437	-0.237		
Statistics (Lognormal ROS Estimates)				-6.658	1.146	-0.172		
No	rmal GOF	Test Resu	lts					
	No NDs		NDs = DL/2		1			
Correlation Coefficient R	0.711	0.682	0.66	0.677				
	- ·	0 :	_		' A	05)		
Observed Mills (Dec. 11 Centre)		Crit. (0.05)			ith Alpha(0.	U5)		
Shapiro-Wilk (Detects Only)	0.531		Data Not N					
Shapiro-Wilk (NDs = DL)	0.494		Data Not N					
Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Normal ROS Estimates)	0.465 0.488		Data Not Not Not Not Not Not Not Not Not Not					
Lilliefors (Detects Only)	0.488		Data Not N					
Lilliefors (NDs = DL)			Data Not N					
Lilliefors (NDs = DL/2)								
Lilliefors (Normal ROS Estimates)			Data Not N					
	5.110	5.200						
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/2	amma RC				
Correlation Coefficient R		0.909	0.899	0.969				
	1	I .	]		l			
	Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0.	05)		
Anderson-Darling (Detects Only)	1.243	0.73				-		
Kolmogorov-Smirnov (Detects Only)	0.401	0.347	Data Not C	Gamma Di	stributed			

			NESS OF I	111 0171110	31100			
Anderson-Darling (NDs = DL)	1.372	0.749						
Kolmogorov-Smirnov (NDs = DL)	0.318	0.305	Data Not C	Gamma Dis	stributed			
Anderson-Darling (NDs = DL/2)	1.608	0.753						
Kolmogorov-Smirnov (NDs = DL/2)	0.403	0.306	Data Not C	Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates)	0.853	0.749						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.294	0.305	Detected [	Data appea	ır Approxim	ate Gamm		
Logi	normal GO	F Test Res	ults					
	No NDs	NDs = DL	NDs = DL/2	-				
Correlation Coefficient R	0.82	0.858	0.828	0.778			<u> </u>	
	T4	O.::+ (0.0E)	0	1 :	41- A11/O	05)		
Objective Wills (Detecte Only)		Crit. (0.05)			th Alpha(0.	05)		
Shapiro-Wilk (Detects Only)	0.692		Data Not L					
Shapiro-Wilk (NDs = DL)	0.753		Data Not L					
Shapiro-Wilk (NDs = DL/2)	0.709		Data Not L					
Shapiro-Wilk (Lognormal ROS Estimates)	0.632		Data Not L					
Lilliefors (Detects Only)	0.332		Data Not L	-				-
Lilliefors (NDs = DL) Lilliefors (NDs = DL/2)	0.258 0.29		Data Appe Data Not L	-	ııdı			-
Lilliefors (NDS = DL/2)  Lilliefors (Lognormal ROS Estimates)	0.29		Data Not L	-				
Lillelois (Logiloitilai NOS Estiffates)	0.333	0.203	Data NULL	.ognomial				+
Note: Substitution methods such as DL or	DI /2 are r	ot recomm	ended					
Note: Substitution methods such as DE of	DDZ ale i	iot recommi	enueu.					
Cobalt (background)								
Cobait (background)								
			Num Valid	Detects	NDs	% NDs		
Raw Statistics	28	0	28	14	14	50.00%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	14	0.001	0.01	0.00407	0.002	0.00347		+
Statistics (Non-Detects Only)	14	6.4000E-4		0.00298		0.00101		-
Statistics (All: NDs treated as DL value)	28	6.4000E-4		0.00353	0.0029	0.00257		
Statistics (All: NDs treated as DL/2 value)	28	5.0000E-4		0.00251	0.0025	0.00148		
Statistics (Normal ROS Imputed Data)	28	3.1925E-4	0.0045	0.00228	0.00223	0.00115		+
Statistics (Gamma ROS Imputed Data)	28	6.4000E-4	0.01	0.00649	0.00725	0.00364		
Statistics (Lognormal ROS Imputed Data)	28	6.4000E-4	0.0045	0.00228	0.0021	0.00109		
	12.1 :	14.0:	<b>T</b>		1			
Ober a Al Division	K hat	K Star		Log Mean		Log CV		
Statistics (Non-Detects Only)	6.137	4.869	4.8585E-4	-5.899	0.488	-0.0828		1
Statistics (NDs = DL)	2.416	2.181	0.00146	-5.868	0.681	-0.116	<u> </u>	1
Statistics (NDs = DL/2)	2.356	2.127	0.00106	-6.215	0.752	-0.121		
Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	2.483	2.24	0.00261	-5.252 6.206	0.741 0.525	-0.141		
Statistics (Lognormal ROS Estimates)				-6.206	0.525	-0.0845		
No	rmal GOF	Test Resu	lts					
								1
	No NDs	NDs = DL	NDs = DL/2	lormal RO				
Correlation Coefficient R	0.974	0.886	0.973	0.993				
	Tostvel	Orit (0.05)		aducies ·· '	th Almh = /0	OE)	<u> </u>	
Chapire Wills / Datasta Cally		Crit. (0.05)			th Alpha(0.	uo)		
Shapiro-Wilk (Detects Only)	0.955		Data Not N					
Shapiro-Wilk (NDs = DL)								
Shapiro-Wilk (NDs = DL/2)	0.924	0.924	Data Appe	ar ivormal				

			-					
Shapiro-Wilk (Normal ROS Estimates)		0.924	• • •				<u> </u>	
Lilliefors (Detects Only)			Data Appe				ļ	
Lilliefors (NDs = DL)			Data Not N				<u> </u>	
Lilliefors (NDs = DL/2)			Data Not N				<u> </u>	
Lilliefors (Normal ROS Estimates)	0.0879	0.164	Data Appe	ar Normal			<u> </u>	
Ga	mma GOF	Test Resu	ılts					
	I	I	1		1			
	No NDs		NDs = DL/2					
Correlation Coefficient R	0.932	0.948	0.95	0.798			ļ	
	Toot value	C=i+ (0.0E)	C = -		ارمطمالا طفا	OE)		
	0.668	Crit. (0.05) 0.737	Col	nclusion wi	ıtıı Aipria(t	1.05)		
Anderson-Darling (Detects Only)			D-44-4	D-4- A	0	Distrikus		
Kolmogorov-Smirnov (Detects Only)	0.17	0.229	Detected I	<b>Јата Арре</b> а	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	0.698	0.756	D . A		D:		ļ	
Kolmogorov-Smirnov (NDs = DL)	0.125	0.167	Data Appe	ar Gamma	וט נistribute	ea	<del>                                     </del>	
Anderson-Darling (NDs = DL/2)	0.79	0.756	D				-	
Kolmogorov-Smirnov (NDs = DL/2)	0.161	0.167	Detected [	Jata appea	ar Approxii	mate Gamm		
nderson-Darling (Gamma ROS Estimates)		0.756					<u> </u>	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.326	0.167	Data Not 0	Gamma Dis	stributed		ļ	
Las		C Took Doo						
Lögr	iormai GO	F Test Res	SUITS					
	No NDs	NDe = DI	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.871	0.978	0.953	0.986				
Correlation Coefficient IV	0.071	0.370	0.333	0.300				
	Test value	Crit. (0.05)	Cor	nclusion wi	ith Alpha((	1.05)		
Shapiro-Wilk (Detects Only)	0.78		Data Not L			1.03)		
Shapiro-Wilk (NDs = DL)	0.953		Data Not E		mal			
Shapiro-Wilk (NDs = DL/2)	0.888		Data Not L	_	illai			
Shapiro-Wilk (Lognormal ROS Estimates)	0.961		Data Appe	-	mal			
Lilliefors (Detects Only)	0.301		Data Appe	-				
Lilliefors (NDs = DL)	0.189		Data Appe	-				
Lilliefors (NDs = DL/2)			Data Appe					
Lilliefors (Lognormal ROS Estimates)	0.138		Data Appe	-				
Eliliciois (Edgilorniai 1100 Estimates)	0.113	0.104	Бата Арре	ar Lognon	illai			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				<u> </u>	
Cobalt (mw-61)								
Raw Statistics								
Number of Valid Ob	servations	18						
Number of Distinct Ob	servations	8						
	Minimum	0.01						
	Maximum	0.017						
Mean of	Raw Data	0.0138						
Standard Deviation of								
	Khat							
		2.3991E-4						
	Kstar	47.89						<del>                                     </del>
		2.8767E-4						
Mean of Log Transfo		-4.293						
Standard Deviation of Log Transfo								<del>                                     </del>
		1						<del>                                     </del>
						1		

			,		1		
Normal GOF Test Resu	ilts						
Correlation Co	pefficient R	0.986					
Shapiro Wilk Te	est Statistic	0.972					
Shapiro Wilk Critical (	0.05) Value	0.897					
Approximate Shapiro W	ilk P Value	0.822					
Lilliefors Te	est Statistic	0.136					
Lilliefors Critical (	).05) Value	0.202					
Data appear Normal at (0.05) Significance							
Gamma GOF Test Resi	ılts						
damma der Teernee							
Correlation Co	officient D	0.981					
	est Statistic	0.332					
		0.332					
A-D Critical ((	-						
	est Statistic	0.146					
K-S Critical(0	•	0.203					 1
Data appear Gamma Distributed at (0.05)	Significand	e Level					
Lognormal GOF Test Re	sults						
		-					
Correlation Co	pefficient R	0.978					
Shapiro Wilk Te	est Statistic	0.957					
Shapiro Wilk Critical (	0.05) Value	0.897					
Approximate Shapiro W							
		0.141					
Lilliefors Te	est Statistic	0.141					
Lilliefors Te		-					
Lilliefors To	0.05) Value	0.141					
Lilliefors Te	0.05) Value	-					
Lilliefors To Lilliefors Critical (I Data appear Lognormal at (0.05) Signification	0.05) Value	-					
Lilliefors To	0.05) Value	-					
Lilliefors To Lilliefors Critical (I Data appear Lognormal at (0.05) Signification	0.05) Value Ince Level	0.202	Num Valid	Detects	NDe	9/ NDs	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significa  Cobalt (mw-7)	0.05) Value Ince Level	0.202 Num Miss	Num Valid		NDs	% NDs	
Lilliefors To Lilliefors Critical (I Data appear Lognormal at (0.05) Signification	0.05) Value Ince Level	0.202	Num Valid 18	Detects 7	NDs 11	% NDs 61.11%	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significa  Cobalt (mw-7)	Num Obs	0.202 Num Miss 0	18	7	11	61.11%	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significa  Cobalt (mw-7)  Raw Statistics	Num Obs	0.202  Num Miss 0	18 Maximum	7 Mean	11 Median	61.11% SD	
Lilliefors To Lilliefors Critical (I  Data appear Lognormal at (0.05) Signification  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only)	Num Obs Number	0.202  Num Miss 0  Minimum 5.0000E-4	18 Maximum 0.01	7 Mean 0.00191	11 Median 5.0000E-4	61.11% SD 0.00278	
Lilliefors To Lilliefors Critical (I  Data appear Lognormal at (0.05) Signification  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only)	Num Obs 18  Number 11 7	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4	18 Maximum 0.01 0.0028	7 Mean 0.00191 0.00161	11 Median 5.0000E-4 0.0015	61.11% SD 0.00278 7.3875E-4	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Signification  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value)	Num Obs 18  Number 11 7 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4	18 Maximum 0.01 0.0028 0.01	7 Mean 0.00191 0.00161 0.00179	11 Median 5.0000E-4 0.0015 0.0015	SD 0.00278 7.3875E-4 0.00218	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Signification  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value)	Num Obs 18  Number 11 7 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 2.5000E-4	Maximum 0.01 0.0028 0.01 0.005	7 Mean 0.00191 0.00161 0.00179 0.00121	Median 5.0000E-4 0.0015 0.0015	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data)	Num Obs 18  Number 11 7 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4	Maximum 0.01 0.0028 0.01 0.005	7 Mean 0.00191 0.00161 0.00179	Median 5.0000E-4 0.0015 0.0015	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Signification  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value)	Num Obs 18  Number 11 7 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 2.5000E-4	18  Maximum 0.01 0.0028 0.01 0.005 0.0028	7 Mean 0.00191 0.00161 0.00179 0.00121	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data)	Num Obs 18  Number 11 7 18 18 18	0.202 Num Miss 0 Minimum 5.0000E-4 6.5000E-4 2.5000E-4 -0.00127	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	Num Obs 18  Number 11 7 18 18 18	0.202 Num Miss 0 Minimum 5.0000E-4 6.5000E-4 2.5000E-4 -0.00127 6.5000E-4	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	Num Obs 18  Number 11 7 18 18 18 18	0.202 Num Miss 0 Minimum 5.0000E-4 6.5000E-4 2.5000E-4 -0.00127 6.5000E-4	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01 0.0028	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	Num Obs 18  Number 11 7 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 2.5000E-4 -0.00127 6.5000E-4 2.0966E-4	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01 0.0028	7  Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	Num Obs 18  Number 11 7 18 18 18 18 18 4.954	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 2.5000E-4 -0.00127 6.5000E-4 2.0966E-4  K Star 2.926	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01 0.0028 Theta hat 3.2525E-4	7  Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4  Log Mean -6.535	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4 Log Stdv 0.516	61.11% SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4 Log CV -0.079	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 -0.00127 6.5000E-4 2.0966E-4  K Star 2.926 1.23	18  Maximum  0.01  0.0028  0.01  0.0028  0.01  0.0028  Theta hat 3.2525E-4  0.00128	7  Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4  Log Mean -6.535 -6.712	11 Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4 Log Stdv 0.516 0.84	61.11%  SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4  Log CV -0.079 -0.125	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (NDs = DL/2)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 2.5000E-4 2.0966E-4  K Star 2.926 1.23 1.152	18  Maximum 0.01 0.0028 0.01 0.0028 0.01 0.0028  Theta hat 3.2525E-4 0.00125 9.0475E-4	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4 Log Mean -6.535 -6.712 -7.135	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4 Log Stdv 0.516 0.84 0.963	SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4 Log CV -0.079 -0.125 -0.135	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value; Statistics (All: NDs treated as DL/2 value; Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 2.5000E-4 2.0966E-4  K Star 2.926 1.23 1.152 1.33	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01 0.0028 Theta hat 3.2525E-4 0.00125 9.0475E-4 0.00434	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4  Log Mean -6.535 -6.712 -7.135 -5.356	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4 Log Stdv 0.516 0.84 0.963 1.015	61.11%  SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4  Log CV -0.079 -0.125 -0.135 -0.19	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (NDs = DL/2)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 2.5000E-4 2.0966E-4  K Star 2.926 1.23 1.152	18  Maximum 0.01 0.0028 0.01 0.0028 0.01 0.0028  Theta hat 3.2525E-4 0.00125 9.0475E-4	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4 Log Mean -6.535 -6.712 -7.135	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4 Log Stdv 0.516 0.84 0.963	SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4 Log CV -0.079 -0.125 -0.135	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 -0.00127 6.5000E-4 2.0966E-4  K Star 2.926 1.23 1.152 1.33	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01 0.0028 Theta hat 3.2525E-4 0.00125 9.0475E-4 0.00434	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4  Log Mean -6.535 -6.712 -7.135 -5.356	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4 Log Stdv 0.516 0.84 0.963 1.015	61.11%  SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4  Log CV -0.079 -0.125 -0.135 -0.19	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 -0.00127 6.5000E-4 2.0966E-4  K Star 2.926 1.23 1.152 1.33	18  Maximum 0.01 0.0028 0.01 0.005 0.0028 0.01 0.0028 Theta hat 3.2525E-4 0.00125 9.0475E-4 0.00434	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4  Log Mean -6.535 -6.712 -7.135 -5.356	Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4 Log Stdv 0.516 0.84 0.963 1.015	61.11%  SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4  Log CV -0.079 -0.125 -0.135 -0.19	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 18 10 18 18 18 18 18 18 18 18 18 18 18 18 18	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 -0.00127 6.5000E-4 2.0966E-4  K Star 2.926 1.23 1.152 1.33  Test Resu	18  Maximum 0.01 0.0028 0.01 0.0028 0.01 0.0028  Theta hat 3.2525E-4 0.00125 9.0475E-4 0.00434	7  Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4  Log Mean -6.535 -6.712 -7.135 -5.356 -7.22	11  Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4  Log Stdv 0.516 0.84 0.963 1.015 0.732	61.11%  SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4  Log CV -0.079 -0.125 -0.135 -0.19	
Lilliefors Te Lilliefors Critical (I Data appear Lognormal at (0.05) Significat  Cobalt (mw-7)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	Num Obs 18  Number 11 7 18 18 18 18 18 18 18 18 18 18 No No NDs	0.202  Num Miss 0  Minimum 5.0000E-4 6.5000E-4 -0.00127 6.5000E-4 2.0966E-4  K Star 2.926 1.23 1.152 1.33  Test Resu	18  Maximum 0.01 0.0028 0.01 0.0028 0.01 0.0028  Theta hat 3.2525E-4 0.00125 9.0475E-4 0.00434	7 Mean 0.00191 0.00161 0.00179 0.00121 5.9088E-4 0.00674 9.4425E-4  Log Mean -6.535 -6.712 -7.135 -5.356	11  Median 5.0000E-4 0.0015 0.0015 0.001 5.5888E-4 0.01 6.8088E-4  Log Stdv 0.516 0.84 0.963 1.015 0.732	61.11%  SD 0.00278 7.3875E-4 0.00218 0.0012 0.00108 0.00423 7.2449E-4  Log CV -0.079 -0.125 -0.135 -0.19	

	<b>-</b>						
		Crit. (0.05)			ith Alpha(C	0.05)	
Shapiro-Wilk (Detects Only)	0.951		Data Appe				
Shapiro-Wilk (NDs = DL)		0.897					
Shapiro-Wilk (NDs = DL/2)		0.897					
Shapiro-Wilk (Normal ROS Estimates)			Data Appe				
Lilliefors (Detects Only)			Data Appe				
Lilliefors (NDs = DL)		0.202					
Lilliefors (NDs = DL/2)			Data Not N				
Lilliefors (Normal ROS Estimates)	0.0893	0.202	Data Appe	ar Normal			
0.0		Test Resu	-la-c				
Ga	IIIIIIa GOF	Test rest	IIIS				
	No NDs	NDs = DL	NDs = DL/2	amma RC			
Correlation Coefficient R	0.972	0.865	0.978	0.692			
	Test value	Crit. (0.05)	Сог	nclusion w	ith Alpha(C	0.05)	
Anderson-Darling (Detects Only)	0.313						
Kolmogorov-Smirnov (Detects Only)	0.212	0.313	Detected [	Data Appe	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)		0.758					
Kolmogorov-Smirnov (NDs = DL)		0.208	Data Not 0	Gamma Di	stributed		
Anderson-Darling (NDs = DL/2)		0.76					
Kolmogorov-Smirnov (NDs = DL/2)		0.208	Data Appe	ar Gamma	a Distribute	ed	
nderson-Darling (Gamma ROS Estimates)		0.756					
Kolmogorov-Smirnov (Gamma ROS Est.)		0.207	Data Not 0	Gamma Di	stributed		
		0.20					
Log	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R		0.92	0.952	0.989			
	Test value	Crit. (0.05)	Coi	nclusion w	ith Alpha(C	0.05)	
Shapiro-Wilk (Detects Only)	0.928	0.803	Data Appe	ar Lognor	mal		
Shapiro-Wilk (NDs = DL)	0.845	0.897	Data Not L	ognormal			
Shapiro-Wilk (NDs = DL/2)	0.891		Data Not L	-			
Shapiro-Wilk (Lognormal ROS Estimates)	0.971		Data Appe		mal		
Lilliefors (Detects Only)	0.24		Data Appe				
Lilliefors (NDs = DL)	0.188		Data Appe				
Lilliefors (NDs = DL/2)			Data Not L	-			
Lilliefors (Lognormal ROS Estimates)			Data Appe		mal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Cobalt (mw-75)							
Raw Statistics							
Number of Valid Ob	servations	11					
Number of Distinct Ob	servations	8					
	Minimum	0.039					
	Maximum	0.049					
Mean of	Raw Data	0.0446					
Standard Deviation of	Raw Data	0.00298					
	Khat						
	Theta hat	1.8248E-4					
		1			1	1	 

MOLTIONI	1 1 100		NEOU OI	III OIAIN	31100		
	Kstar	178					
		2.5083E-4					
Mean of Log Transformed		-3.111					
Standard Deviation of Log Transformed	d Data	0.0673					
Normal GOF Test Results							
Correlation Coeffic	ient R	0.98					
Shapiro Wilk Test St	atistic	0.96					
Shapiro Wilk Critical (0.05)	Value	0.85					
Approximate Shapiro Wilk P	Value	0.773					
Lilliefors Test St	atistic	0.144					
Lilliefors Critical (0.05)	Value	0.251					
Data appear Normal at (0.05) Significance Lev	el						
Gamma GOF Test Results							
Correlation Coeffic	ient R	0.979					
A-D Test St	atistic	0.259					
A-D Critical (0.05)		0.726					
K-S Test St		0.152					
K-S Critical(0.05)		0.254					
Data appear Gamma Distributed at (0.05) Sign							
Data appear Gamma Dioaibated at (0.00) eign	mounc	O LOVOI					
Lognormal GOF Test Results							
Lognormal dor Test Nesalis							
Correlation Coeffic	ient R	0.978					
Shapiro Wilk Test St	-						
Shapiro Wilk Critical (0.05)							
Approximate Shapiro Wilk P		0.83					
Lilliefors Test St							
Lilliefors Critical (0.05)							
Data appear Lognormal at (0.05) Significance		0.231					
Data appear Lognormar at (0.05) Significance	revei						
O-b-16 ( 0)							
Cobalt (mw-8)							
l N	01	N. N.	NI N/ 12 I	D	ND	0/ ND	
		Num Miss			NDs	% NDs	
Raw Statistics	9	0	9	6	3	33.33%	
	mber	Minimum		Mean	Median	SD	
( )	3	5.0000E-4	0.01		5.0000E-4	0.00548	
, , , , , , , , , , , , , , , , , , , ,	6	5.3000E-4	0.019	0.00431	0.00155		
`	9	5.0000E-4	0.019	0.0041	0.0013	0.00634	
`	9	2.5000E-4	0.019	0.00348		0.006	
` '	9	-0.0119		5.6843E-4		0.00849	
	9	5.3000E-4	0.019	0.00621	0.0023	0.00638	
Statistics (Lognormal ROS Imputed Data)	9	8.4233E-5	0.019	0.00298	9.3000E-4	0.00605	
K	hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	0.742	0.482	0.00581	-6.254	1.235	-0.197	
Statistics (NDs = DL)	0.694	0.536	0.00591	-6.37	1.316	-0.207	
Statistics (NDs = DL/2)	0.649	0.506	0.00537	-6.601	1.404	-0.213	
Statistics (Gamma ROS Estimates)	0.935	0.697	0.00664	-5.705	1.278	-0.224	
Statistics (Lognormal ROS Estimates)	-			-6.978	1.559	-0.223	
/							 

No	rmal GOF	Test Resu	lts			
	No NDs		NDs = DL/alormal RO			
Correlation Coefficient R	0.745	0.795	0.75 0.905			
	Test value	Crit. (0.05)	Conclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.58		Data Not Normal		,	
Shapiro-Wilk (NDs = DL)	0.645	0.829	Data Not Normal			
Shapiro-Wilk (NDs = DL/2)	0.588	0.829	Data Not Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.849	0.829	Data Appear Normal			
Lilliefors (Detects Only)	0.443	0.325	Data Not Normal			
Lilliefors (NDs = DL)	0.389	0.274	Data Not Normal			
Lilliefors (NDs = DL/2)	0.356	0.274	Data Not Normal			
Lilliefors (Normal ROS Estimates)	0.308	0.274	Data Not Normal			
Ga	mma GOF	Test Resu	ılts			
	No NDs	NDs = DI	NDs = DL/amma RO			
Correlation Coefficient R	0.941	0.973	0.953 0.952			
220.0		2.0.0	3.302			
	Test value	Crit. (0.05)	Conclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.796	0.721			,	
Kolmogorov-Smirnov (Detects Only)	0.367	0.344	Data Not Gamma Dis	stributed		
Anderson-Darling (NDs = DL)	0.849	0.756				
Kolmogorov-Smirnov (NDs = DL)	0.286	0.29	Detected Data appea	ar Approxir	nate Gamm	
Anderson-Darling (NDs = DL/2)	0.542	0.759				
Kolmogorov-Smirnov (NDs = DL/2)	0.232	0.291	Data Appear Gamma	Distribute	ed	
derson-Darling (Gamma ROS Estimates)	0.565	0.746				
(Gamma ROS Est.)	0.243	0.288	Data Appear Gamma	Distribute	ed	
1.00	named CO	F Test Res	v dia			
Logi	ioiniai GO	r rest nes	buits			
	No NDs	NDs = DL	NDs = DL/2 Log ROS			
Correlation Coefficient R	0.926	0.939	0.978 0.974			
	Toot value	Crit. (0.05)	Conclusion wi	th Alpha(A	0E)	
Shapiro-Wilk (Detects Only)	0.876	0.788			.03)	
Shapiro-Wilk (NDs = DL)	0.867	0.788	11 0			
Shapiro-Wilk (NDs = DL/2)	0.867	0.829				
Shapiro-Wilk (Lognormal ROS Estimates)	0.963	0.829				
Lilliefors (Detects Only)	0.903	0.325				
Lilliefors (NDs = DL)	0.189		Data Appear Lognor			
Lilliefors (NDs = DL/2)	0.132	0.274				
Lilliefors (Lognormal ROS Estimates)	0.17	0.274				
		I	1			
lote: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.			
ead (background)						
		T	N 7 1 1 5 1 1	NB	0/ ND	1
	Num Obs	Num Miss	Num Valid Detects	NDs	% NDs	

Th	t for	de l "		\a= == 4	mage = = = = = = = = = = = = = = = = = = =		
The data se	t tor variat	DIE Lead (b	ackground)	) was not p	rocessed!		
ead (mw-61)							
(							
		Num Miss			NDs	% NDs	
Raw Statistics	18	0	18	11	7	38.89%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	7	0.002	0.01	0.00357	0.002	0.00305	
Statistics (Non-Detects Only)	11	7.8000E-4	0.001	8.5455E-4	8.3000E-4	6.6085E-5	
Statistics (All: NDs treated as DL value)	18	7.8000E-4	0.01	0.00191	9.0500E-4	0.00227	
Statistics (All: NDs treated as DL/2 value)	18	7.8000E-4	0.005	0.00122	9.0500E-4	0.00102	
Statistics (Normal ROS Imputed Data)	18	7.8000E-4	0.001	8.5455E-4	8.5455E-4	5.7525E-5	
Statistics (Gamma ROS Imputed Data)	18	7.8000E-4	0.01	0.00441	9.0500E-4	0.00459	
Statistics (Lognormal ROS Imputed Data)	18	7.8000E-4	0.001	8.5407E-4	8.5231E-4	5.7283E-5	
					<u> </u>		
	K hat	K Star		Log Mean	-	Log CV	
Statistics (Non-Detects Only)	191.2	139.1	4.4692E-6		0.0752		
Statistics (NDs = DL)	1.637	1.401	0.00117		0.723	-0.11	
Statistics (NDs = DL/2)	3.416		3.5617E-4		0.469	-0.0683	
Statistics (Gamma ROS Estimates)	0.857	0.751	0.00515		1.237	-0.202	
Statistics (Lognormal ROS Estimates)				-7.068	0.0656	-0.00928	
No	rmal GOF	Test Resu	lts				
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.954	0.717	0.639	0.967			
	<del>-</del>	0 : (0.05)			Al I (0	05)	
		Crit. (0.05)		nclusion wi		.05)	
Shapiro-Wilk (Detects Only)	0.911	0.85		ear Normal			
Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2)	0.537		Data Not N				
Shapiro-Wilk (Normal ROS Estimates)	0.435		Data Not N				
Lilliefors (Detects Only)	0.937		Data Appe				
Lilliefors (NDs = DL)	0.19		Data Not N				
Lilliefors (NDs = DL/2)	0.373		Data Not I				
Lilliefors (Normal ROS Estimates)	0.473		Data Not i				
	0.120	0.202	, ppc				
Ga	mma GOF	Test Resu	lts				
	No ND	NDa - Di	VIDa = DI "				
Correlation Coefficient R	No NDs 0.962	0.882	NDs = DL/2 0.771	0.782			
Correlation Coefficient N	0.302	0.002	0.771	0.702			
		Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)	
	0.375	0.726					
Anderson-Darling (Detects Only)							
Kolmogorov-Smirnov (Detects Only)	0.192	0.254	Detected I	Data Appea	ar Gamma	Distributed	
	0.192 2.199 0.293	0.254 0.755	Detected I	Data Appea	ar Gamma	Distributed	

		, or acop	NESS OF	0.,	000		
Kolmogorov-Smirnov (NDs = DL/2)		0.205	Data Not	Gamma Di	stributed		
nderson-Darling (Gamma ROS Estimates)	3.145	0.773					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.374	0.211	Data Not	Gamma Di	stributed		
Logi	normal GO	F Test Res	sults				
		ND DI	UD 51 #	4. 500	T		
	No NDs			Log ROS			
Correlation Coefficient R	0.963	0.866	0.738	0.974			1
	Toot value	Crit. (0.05)	Co	nalusian w	ith Alpha/A	OE)	-
Shapiro-Wilk (Detects Only)	0.926	0.85		nclusion wi		.03)	+
Shapiro-Wilk (NDs = DL)	0.920		Data Not I		ıııaı		
Shapiro-Wilk (NDs = DL/2)	0.755			Lognormal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.948			ear Lognor	mal		
Lilliefors (Detects Only)	0.348		• • •	ear Lognor			
Lilliefors (NDs = DL)	0.183			Lognormal	iiiui		+
Lilliefors (NDs = DL/2)	0.278			Lognormal			1
Lilliefors (Lognormal ROS Estimates)	0.425			ear Lognor	mal		1
Zimololo (Logiloliliai 1100 Estilliates)	U.112	0.202	Data Appl	cai Logilon	ui		1
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
							<u> </u>
Lead (mw-7)							 1
	Num Obc	Num Miss	Num Valio	Detects	NDs	% NDs	+
Raw Statistics	18	0	18	2	16	% NDS 88.89%	+
Raw Statistics	10	U	10		10	00.09%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	16	1.0000E-4	0.01	0.00173	5.0000E-4	0.00253	
Statistics (Non-Detects Only)	2	4.5000E-4	8.2000E-4	6.3500E-4	6.3500E-4	2.6163E-4	
Statistics (All: NDs treated as DL value)	18	1.0000E-4			5.0000E-4		
Statistics (All: NDs treated as DL/2 value)	18	5.0000E-5			2.5000E-4		
Statistics (Normal ROS Imputed Data)	18			13.0861E-4			
Statistics (Gamma ROS Imputed Data)	18	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Imputed Data)	18	1.8696E-4	8.2000E-4	13.8209E-4	3.5541E-4	1.5148E-4	
	167	14.0:		1			
Obstitut (N. D. C. C. C.	K hat	K Star		Log Mean	-	Log CV	 4
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A	 4
Statistics (NDs = DL)	0.924	0.807	0.00174		1.076	-0.152	1
Statistics (NDs = DL/2)	0.97		8.6281E-4		1.073	-0.14	1
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A -0.0462	
Statistics (Lognormal ROS Estimates)				-7.936	0.367	-0.0462	1
No	rmal GOF	Test Resu	lts				+
			•				+
	No NDs	NDs = DL	NDs = DL/	Jormal RO			<del>                                     </del>
Correlation Coefficient R	1	0.737	0.751	0.991			
	-	ı	ı				
	Test value			nclusion w	ith Alpha(0	.05)	
Shapiro-Wilk (NDs = DL)	0.567		Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.587		Data Not I				
Shapiro-Wilk (Normal ROS Estimates)	0.987		Data Appe	ear Normal			
Lilliefors (Detects Only)	N/A	N/A					
Lilliefors (NDs = DL)	0.323		Data Not I				
Lilliefors (NDs = DL/2)	0.334	0.202	Data Not I	Normal			

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							
Lilliefors (Normal ROS Estimates)	0.0674	0.202	Data Appea	ar Normal			
Ga	mma GOF	Test Resu	lts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	N/A	0.93	0.932	0.439			
	Test value	Crit. (0.05)	Con	clusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	N/A	N/A				,	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)	1.851	0.77					
Kolmogorov-Smirnov (NDs = DL)	0.326	0.21	Data Not G	amma Dis	tributed		
Anderson-Darling (NDs = DL/2)	1.494	0.768					
Kolmogorov-Smirnov (NDs = DL/2)	0.291	0.21	Data Not G	amma Dis	tributed		
iderson-Darling (Gamma ROS Estimates)	N/A	0.737					
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.203					
Logi	normal GO	F Test Res	ults				
		ND DI	ND D1 4	. 500			
Open-1-4: O45:	No NDs		NDs = DL/2				
Correlation Coefficient R	1	0.915	0.93	N/A			
	Toot volue	Crit (0.0E)	Con	clusion wi	th Alpha/A	OE)	
Shapiro-Wilk (NDs = DL)	0.853	Crit. (0.05)	Data Not L		ш Аірпа(о	.03)	
Shapiro-Wilk (NDs = DL/2)	0.879		Data Not L	-			
Shapiro-Wilk (Lognormal ROS Estimates)	0.987	0.897	Data Not L		nal		
Lilliefors (Detects Only)	N/A		Data Appe	ai Logiloii	IIai		
,		N/A 0.202	Data Not L	ognormal			
Lilliefors (NDs = DL)	0.302	0.202	Data Not L	-			
,	0.302 0.271	0.202 0.202	Data Not London	ognormal	nal		
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)	0.302 0.271 0.0674	0.202 0.202 0.202	Data Not L Data Appe	ognormal	nal		
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)	0.302 0.271 0.0674	0.202 0.202 0.202	Data Not L Data Appe	ognormal	nal		
Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	0.302 0.271 0.0674	0.202 0.202 0.202	Data Not L Data Appe	ognormal	nal		
Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	0.302 0.271 0.0674 <b>DL/2 are n</b>	0.202 0.202 0.202 ot recomm	Data Not L Data Appea	ognormal ar Lognorr			
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)	0.302 0.271 0.0674 <b>DL/2 are n</b>	0.202 0.202 0.202 ot recomm	Data Not L Data Apper ended.  Num Valid	ognormal ar Lognorr	NDs	% NDs	
Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	0.302 0.271 0.0674 <b>DL/2 are n</b>	0.202 0.202 0.202 ot recomm	Data Not L Data Appea	ognormal ar Lognorr		% NDs 27.27%	
Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)	0.302 0.271 0.0674 <b>DL/2 are n</b>	0.202 0.202 0.202 ot recomm	Data Not L Data Apper ended.  Num Valid	ognormal ar Lognorr	NDs		
Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)	0.302 0.271 0.0674 <b>DL/2 are n</b> Num Obs	0.202 0.202 0.202 ot recomm	Data Not L Data Appea ended.	ognormal ar Lognorr Detects	NDs 3	27.27%	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3	0.202 0.202 0.202 ot recomm	Data Not L Data Apper ended.  Num Valid 11  Maximum	ognormal ar Lognorr  Detects 8  Mean	NDs 3 Median 0.005 0.0031	27.27% SD	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3 8	0.202 0.202 0.202 ot recomm Num Miss 0 Minimum 0.005 0.0028	ended.  Num Valid 11  Maximum 0.01 0.0041 0.01	Detects 8  Mean 0.00667 0.00319 0.00414	NDs 3 Median 0.005 0.0031 0.0032	SD 0.00289 3.9074E-4 0.0021	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (All: NDs treated as DL/2 value)	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3 8 11	0.202 0.202 0.202 ot recomm Num Miss 0 Minimum 0.005 0.0028 0.0028	Pata Not L Data Appear ended. Num Valid 11 Maximum 0.01 0.0041 0.01 0.005	Detects 8  Mean 0.00667 0.00319 0.00414 0.00323	NDs 3 Median 0.005 0.0031 0.0032	SD 0.00289 3.9074E-4 0.0021 7.2676E-4	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (All: NDs treated as DL/2 value)  Statistics (Normal ROS Imputed Data)	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3 8 11 11	0.202 0.202 0.202 ot recomm Num Miss 0 Minimum 0.005 0.0028 0.0028 0.0025 0.0028	Pata Not L Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.01 0.005 0.0041	Detects  Mean 0.00667 0.00319 0.00323 0.00319	NDs 3 Median 0.005 0.0031 0.0032 0.0031	SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (Normal ROS Imputed Data)  Statistics (Gamma ROS Imputed Data)	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3 8 11 11 11	0.202 0.202 0.202 ot recomm Num Miss 0 Minimum 0.005 0.0028 0.0028 0.0028 0.0028	Data Not L Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.005 0.0041 0.01	Detects  Mean 0.00667 0.00319 0.00319 0.00319 0.00319	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032	SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4 0.0032	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (Normal ROS Imputed Data)  Statistics (Gamma ROS Imputed Data)	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3 8 11 11	0.202 0.202 0.202 ot recomm Num Miss 0 Minimum 0.005 0.0028 0.0028 0.0025 0.0028	Pata Not L Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.01 0.005 0.0041	Detects  Mean 0.00667 0.00319 0.00323 0.00319	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032	SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (All: NDs treated as DL/2 value)  Statistics (Normal ROS Imputed Data)	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3 8 11 11 11 11	0.202 0.202 0.202 ot recomm 0.005 0.0028 0.0028 0.0028 0.0028 0.0028	Data Not L Data Apper ended.  Num Valid 11  Maximum 0.01 0.0041 0.005 0.0041 0.01	Detects 8  Mean 0.00667 0.00319 0.00414 0.00323 0.00319 0.00505 0.00318	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032 0.0031	SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4 0.0032 3.3498E-4	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (Normal ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)	0.302 0.271 0.0674  DL/2 are n  Num Obs 11  Number 3 8 11 11 11 11 11 K hat	0.202 0.202 0.202  ot recomm  Num Miss 0  Minimum 0.005 0.0028 0.0028 0.0028 0.0028 0.0028 K Star	Data Not L Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.005 0.0041 0.01 0.001	Detects 8  Mean 0.00667 0.00319 0.00414 0.00323 0.00318 0.00505 0.00318	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032 0.0031	27.27% SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4 0.0032 3.3498E-4 Log CV	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (Normal ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)	0.302 0.271 0.0674 DL/2 are n Num Obs 11 Number 3 8 11 11 11 11 11 K hat 85.35	0.202 0.202 0.202 ot recomm  Num Miss 0  Minimum 0.005 0.0028 0.0028 0.0028 0.0028 0.0028 K Star 53.43	Data Not L. Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.005 0.0041 0.01 0.0041 Theta hat 3.7347E-\$	Detects 8  Mean 0.00667 0.00319 0.00414 0.00323 0.00318 0.00505 0.00318 Log Mean -5.754	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032 0.0031 Log Stdv 0.113	27.27%  SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4 0.0032 3.3498E-4  Log CV -0.0196	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (Normal ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)	0.302 0.271 0.0674  DL/2 are n  Num Obs 11  Number 3 8 11 11 11 11 11 11 6 hat 85.35 6.487	0.202 0.202 0.202  ot recomm  Num Miss 0  Minimum 0.005 0.0028 0.0028 0.0028 0.0028 0.0028 X Star 53.43 4.778	Data Not L Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.01 0.005 0.0041 0.01 0.0041 Theta hat 3.7347E-5 6.3764E-4	Detects  8  Mean 0.00667 0.00319 0.00414 0.00323 0.00319 0.00505 0.00318  Log Mean -5.754 -5.567	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032 0.0031 Log Stdv 0.113 0.379	SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4 0.0032 3.3498E-4 Log CV -0.0196 -0.0681	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (Normal ROS Imputed Data)  Statistics (Gamma ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (NDS = DL)  Statistics (NDS = DL/2)	0.302 0.271 0.0674  DL/2 are n  Num Obs 11  Number 3 8 11 11 11 11 11 11 11 11 11 K hat 85.35 6.487 25.27	0.202 0.202 0.202 0.202  ot recomm  Num Miss 0  Minimum 0.005 0.0028 0.0028 0.0028 0.0028 0.0028 4.778 18.44	Data Not L Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.005 0.0041 0.01 0.0041 0.01 0.0041 0.7 0.0041 0.7 0.0041 0.0041 0.01 0.0041 0.01 0.0041	Detects  8  Mean 0.00667 0.00319 0.00414 0.00323 0.00319 0.00505 0.00318  Log Mean -5.754 -5.567 -5.756	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032 0.0031 Log Stdv 0.113 0.379 0.202	SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4 0.0032 3.3498E-4 Log CV -0.0196 -0.0681 -0.0351	
Lilliefors (NDs = DL)  Lilliefors (NDs = DL/2)  Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lead (mw-75)  Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (Normal ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)	0.302 0.271 0.0674  DL/2 are n  Num Obs 11  Number 3 8 11 11 11 11 11 11 6 hat 85.35 6.487	0.202 0.202 0.202  ot recomm  Num Miss 0  Minimum 0.005 0.0028 0.0028 0.0028 0.0028 0.0028 X Star 53.43 4.778	Data Not L Data Appea ended.  Num Valid 11  Maximum 0.01 0.0041 0.01 0.005 0.0041 0.01 0.0041 Theta hat 3.7347E-5 6.3764E-4	Detects  8  Mean 0.00667 0.00319 0.00414 0.00323 0.00319 0.00505 0.00318  Log Mean -5.754 -5.567	NDs 3 Median 0.005 0.0031 0.0032 0.0031 0.0032 0.0031 Log Stdv 0.113 0.379	SD 0.00289 3.9074E-4 0.0021 7.2676E-4 3.3589E-4 0.0032 3.3498E-4 Log CV -0.0196 -0.0681	

			INESS OF I	0.7.11				
No	rmai GOF	Test Resu	ITS					
	No NDs	NDs = DI	NDs = DL/2	lormal RO				
Correlation Coefficient R	0.837	0.783	0.887	0.853				
Correlation Coefficient 1	0.007	0.700	0.007	0.000				
	Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.733		Data Not N			,		
Shapiro-Wilk (NDs = DL)	0.636	0.85	Data Not N					
Shapiro-Wilk (NDs = DL/2)	0.801	0.85	Data Not N	lormal				
Shapiro-Wilk (Normal ROS Estimates)	0.759	0.85	Data Not N	lormal				
Lilliefors (Detects Only)	0.362	0.283	Data Not N	lormal				
Lilliefors (NDs = DL)	0.308	0.251	Data Not N	lormal				
Lilliefors (NDs = DL/2)	0.333	0.251	Data Not N	lormal				
Lilliefors (Normal ROS Estimates)	0.303	0.251	Data Not N	lormal				
Ga	mma GOF	Test Resu	ılts					
					1			
			NDs = DL/2					
Correlation Coefficient R	0.858	0.867	0.917	0.865				
	<b>-</b>	0 : (0 0=			' A	05)		1
A 1 D 11 (D 1 1 2 1 1		Crit. (0.05)	Cor	nclusion w	ith Alpha(0	.05)		1
Anderson-Darling (Detects Only)	0.923		D N	D:				
Kolmogorov-Smirnov (Detects Only)	0.346		Data Not C	amma Di	stributed			
Anderson-Darling (NDs = DL)	1.307	0.731 0.256	Data Not C	Samma Di	atributad			
Kolmogorov-Smirnov (NDs = DL)  Anderson-Darling (NDs = DL/2)	0.325 0.792	0.236	Data Not C	aamma Di	stributed			
Kolmogorov-Smirnov (NDs = DL/2)	0.792	0.729	Data Not C	Samma Die	etributed			
derson-Darling (Gamma ROS Estimates)	1.856		Data Not C	aaiiiiia Di	Silibuleu			
Kolmogorov-Smirnov (Gamma ROS Est.)	0.362	0.257	Data Not C	Gamma Di	stributed			
Logi	normal GO	F Test Res	sults					
	No NDs	NDo - DI	NDs = DL/2	Log DOS				
Correlation Coefficient R	0.862	0.859	0.923	0.874				
Correlation Coefficient N	0.802	0.039	0.923	0.074				
	Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0	05)		
Shapiro-Wilk (Detects Only)	0.776	` '	Data Not L			,		
Shapiro-Wilk (NDs = DL)	0.751	0.85	Data Not L					
Shapiro-Wilk (NDs = DL/2)	0.862		Data Appe		mal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.796	0.85	Data Not L		-			
Lilliefors (Detects Only)	0.34	0.283		-				
Lilliefors (NDs = DL)	0.317	0.251						
Lilliefors (NDs = DL/2)	0.296							
Lilliefors (Lognormal ROS Estimates)	0.278	0.251	Data Not L	.ognormal				
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
_ead (mw-8)								
	Niver Ot	Niuma NAS	Ni una VI-II	Date etc	ND-	0/ ND-		
Da Chaki-ki	Num Obs 9	Num Miss	Num Valid 9	Detects 3	NDs	% NDs		
Raw Statistics	Э	U	9	ა	6	66.67%		1
	Number	Minimum	Maximum	Mean	Median	SD		1
Statistics (Non-Detects Only)	6	5.0000E-4			5.0000E-4	0.00384		
Citation (Non Detects Only)		3.0000L	0.01	0.00217	J.0000L-4	0.0000-	1	

Statistics (Non-Detects Only)	3	5.0000E-4		0.0116		0.0185		
Statistics (All: NDs treated as DL value)	9	5.0000E-4	0.033	0.00532	5.0000E-4	0.0108		
Statistics (All: NDs treated as DL/2 value)	9	2.5000E-4	0.033	0.0046	5.0000E-4	0.0108		
Statistics (Normal ROS Imputed Data)	9	-0.0549	0.033	-0.018	-0.0234	0.0261	<del></del>	
Statistics (Gamma ROS Imputed Data)	9	5.0000E-4	0.033	0.0105	0.01	0.00929		
Statistics (Lognormal ROS Imputed Data)	9	6.6962E-7	0.033	0.00389	3.4777E-5	0.0109		
	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)	0.467	0.385	0.0114	-6.611	1.551	-0.235		
Statistics (NDs = DL/2)	0.391	0.334	0.0118		1.708	-0.241		
Statistics (Gamma ROS Estimates)	1.199	0.874	0.00879		1.259	-0.251		
Statistics (Lognormal ROS Estimates)				-9.585	3.258	-0.34	<u> </u>	
Otatistics (Eognormal 1000 Estimates)				-3.505	3.230	-0.04		
No	rmal GOF	Test Resu	lte					
No	illiai doi	i est i tesu	110					
	No NDs	NDs = DL	NDe – DI "	lormal PO				
Correlation Coefficient R	0.878	0.716	0.671	0.97			<u> </u>	
Correlation Coefficient R	0.676	0.716	0.671	0.97				
	Test value	Crit. (0.05)	Co	nolucion wi	th Alpha(0	05)		
Shapiro-Wilk (Detects Only)	0.771		Data Appe			.00)		
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)								
. ,	0.537							
Shapiro-Wilk (NDs = DL/2)	0.48							
Shapiro-Wilk (Normal ROS Estimates)	0.951		Data Appe					
Lilliefors (Detects Only)	0.376		Data Appe					
Lilliefors (NDs = DL)	0.419		Data Not N					
Lilliefors (NDs = DL/2)	0.395		Data Not N				<del> </del>	
Lilliefors (Normal ROS Estimates)	0.199	0.274	Data Appe	ear Normal				
			•					
Ga	mma GOF	Test Resu	lits					
	No NDo	NDs = DL	UD DL /	amma DO				
Completion Coefficient D								
Correlation Coefficient R	N/A	0.962	0.943	0.883				
						<b></b> \		
		Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	N/A	N/A						
Kolmogorov-Smirnov (Detects Only)	N/A	N/A						
Anderson-Darling (NDs = DL)	1.515	0.777						
Kolmogorov-Smirnov (NDs = DL)	0.37	0.295	Data Not (	Gamma Dis	stributed		<u> </u>	
Anderson-Darling (NDs = DL/2)	1.372	0.791						
Kolmogorov-Smirnov (NDs = DL/2)	0.343	0.298	Data Not (	Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates)	1.138	0.74						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.377	0.286	Data Not 0	Gamma Dis	stributed		<u></u>	
		·		<del></del>		<del></del>		
Logi	normal GO	F Test Res	ults				<u> </u>	
							·	
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.96	0.846	0.881	0.977				
							i	
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.921	0.767	Data Appe	ear Lognori	mal			
Shapiro-Wilk (NDs = DL)	0.714	0.829	Data Not I	ognormal				
Shapiro-Wilk (NDs = DL/2)	0.775	0.829	Data Not L	ognormal				
Shapiro-Wilk (Lognormal ROS Estimates)	0.961	0.829	Data Appe	ear Lognori	mal		<u> </u>	

Lilliefors (Detects Only)	0.294	0.425	Data App	ear Logno	rmal			
Lilliefors (NDs = DL)	0.294			Lognorma				
Lilliefors (NDs = DL/2)	0.288			Lognorma				
Lilliefors (Lognormal ROS Estimates)	0.199			ear Logno				
Note: Substitution methods such as DL or D	L/2 are n	ot recomm	ended.			1		
.ithium (background)								
Raw Statistics								
Number of Valid Obs		28						
Number of Distinct Obs		17						
	Minimum	0.37						
	Maximum	1.8						
Mean of F		0.852						
Standard Deviation of F		0.393						
	Khat	4.487					1	
	Theta hat	0.19						
	Kstar	4.03						
	heta star	0.211						
Mean of Log Transform		-0.276						
Standard Deviation of Log Transform	ned Data	0.505						
Normal GOF Test Result	S							
Correlation Coe	efficient R	0.943						
Shapiro Wilk Tes		0.881						
Shapiro Wilk Critical (0.0	-	0.924						
Approximate Shapiro Will	k P Value	0.00392						
Lilliefors Tes		0.214						
Lilliefors Critical (0.0	05) Value	0.164						
Data not Normal at (0.05) Significance Leve								
Gamma GOF Test Result	ne .							
Gamma GOT Test Nesun	.5							
Correlation Coe	fficient R	0.946						
	t Statistic	1.703						
A-D Critical (0.0		0.749					-	
	t Statistic	0.749					-	
K-S Critical(0.0		0.229						
Data not Gamma Distributed at (0.05) Signi	-							
Lognormal GOF Test Resu	ilts							
Correlation Coe	efficient R	0.934						
Shapiro Wilk Tes		0.856					+	
Shapiro Wilk Critical (0.		0.924			+		+	
Approximate Shapiro Will	,						+	
Lilliefors Tes		0.233					+	
Lilliefors Critical (0.							+	
Data not Lognormal at (0.05) Significance L		0.104					1	
<u> </u>								
Non-parametric GOF Test Results							+	
				1	-		1	+

Data do not follow a discernible distribution at (0.05) Level of Signature (0.05) Level of Signa	
Raw Statistics	
Raw Statistics	
Number of Valid Observations         18           Number of Distinct Observations         8           Minimum         0.35           Maximum         0.44           Mean of Raw Data         0.38           Standard Deviation of Raw Data         0.0222           Khat         321           Theta hat         0.00118	
Number of Valid Observations         18           Number of Distinct Observations         8           Minimum         0.35           Maximum         0.44           Mean of Raw Data         0.38           Standard Deviation of Raw Data         0.0222           Khat         321           Theta hat         0.00118	
Number of Distinct Observations         8           Minimum         0.35           Maximum         0.44           Mean of Raw Data         0.38           Standard Deviation of Raw Data         0.0222           Khat         321           Theta hat         0.00118	
Minimum         0.35           Maximum         0.44           Mean of Raw Data         0.38           Standard Deviation of Raw Data         0.0222           Khat         321           Theta hat         0.00118	
Maximum         0.44           Mean of Raw Data         0.38           Standard Deviation of Raw Data         0.0222           Khat         321           Theta hat         0.00118	
Mean of Raw Data         0.38           Standard Deviation of Raw Data         0.0222           Khat         321           Theta hat         0.00118	
Standard Deviation of Raw Data         0.0222           Khat         321           Theta hat         0.00118	
Khat         321           Theta hat         0.00118	
Theta hat 0.00118	1
Kstar 267.5	
13341 207.3	
Theta star 0.00142	
Mean of Log Transformed Data -0.969	
Standard Deviation of Log Transformed Data 0.0569	
Normal GOF Test Results	
Correlation Coefficient R 0.947	
Shapiro Wilk Test Statistic 0.905	
Shapiro Wilk Critical (0.05) Value 0.897	
Approximate Shapiro Wilk P Value 0.0689	
Lilliefors Test Statistic 0.174	
Lilliefors Critical (0.05) Value 0.202	
Data appear Normal at (0.05) Significance Level	
Data appear Normal at (0.00) Significance Level	
Gamma GOF Test Results	
danina doi Test Nesalis	
Correlation Coefficient R 0.955	
A-D Test Statistic 0.543	
A-D Critical (0.05) Value 0.737	
K-S Test Statistic 0.176	
Data appear Gamma Distributed at (0.05) Significance Level	
Lawrence COST Task Describe	
Lognormal GOF Test Results	
Operate State Confliction B	
Correlation Coefficient R 0.957	
Shapiro Wilk Test Statistic 0.921	
Shapiro Wilk Critical (0.05) Value 0.897	
Approximate Shapiro Wilk P Value 0.134	
Lilliefors Test Statistic 0.17	
Lilliefors Critical (0.05) Value 0.202	
Data appear Lognormal at (0.05) Significance Level	
Lithium (mw-7)	
Raw Statistics	
Number of Valid Observations 18	
Number of Distinct Observations 14	
Minimum 0.75	
Maximum 1.2	

Mean of Raw Data	0.899			
Standard Deviation of Raw Data	0.0981			
Khat	96.19			
Theta hat	0.00934			
Kstar	80.2			
Theta star	0.0112			
Mean of Log Transformed Data	-0.112			
Standard Deviation of Log Transformed Data	0.103			
Standard Deviation of Log Transformed Data	0.103			
Normal GOF Test Results				
Normal GOF Test Results				
0 1 0	0.004			
Correlation Coefficient R	0.924			
Shapiro Wilk Test Statistic	0.876			
Shapiro Wilk Critical (0.05) Value	0.897			
Approximate Shapiro Wilk P Value	0.0175			
Lilliefors Test Statistic	0.171			
Lilliefors Critical (0.05) Value	0.202			
Data appear Approximate Normal at (0.05) Significar	ce Level			
Gamma GOF Test Results				
Correlation Coefficient R	0.937			-
A-D Test Statistic	0.506			
A-D Critical (0.05) Value	0.737			
K-S Test Statistic	0.15			
K-S Critical(0.05) Value	0.203			
Data appear Gamma Distributed at (0.05) Significand	e Level			
Lognormal GOF Test Results				
Correlation Coefficient R	0.95			
Shapiro Wilk Test Statistic	0.922			
Shapiro Wilk Critical (0.05) Value	0.897			
Approximate Shapiro Wilk P Value	0.12			
Lilliefors Test Statistic	0.148			
Lilliefors Critical (0.05) Value	0.202			
Data appear Lognormal at (0.05) Significance Level				
- and appear to green at (eree) engineering to the				
Lithium (mw-75)				
Etalian (IIIW-70)				
Raw Statistics				
	4.4			
Number of Valid Observations	11			
Number of Distinct Observations	7			
Minimum	0.4			
Maximum	0.48	 		
Mean of Raw Data	0.432			
Standard Deviation of Raw Data	0.0209			
Khat	480.9			
Theta hat	8.9787E-4			
Kstar	349.8			
Theta star	0.00123			
Mean of Log Transformed Data	-0.841			
Standard Deviation of Log Transformed Data	0.0476			
Standard Deviation of Log Transformed Data	0.0470			

Normal GOF Test Results				
Correlation Coefficient R	0.935			
Shapiro Wilk Test Statistic	0.898			
Shapiro Wilk Critical (0.05) Value	0.85			
Approximate Shapiro Wilk P Value	0.11			
Lilliefors Test Statistic				
Lilliefors Critical (0.05) Value				
Data appear Approximate Normal at (0.05) Significan				
Data appear / pproximate fromtal at (0.00) digitillocal	100 20101			
Gamma GOF Test Results				
Gaillilla GOF Test Nesults				
O-malation O-officiant D	0.040			
Correlation Coefficient R				
A-D Test Statistic				
A-D Critical (0.05) Value				
K-S Test Statistic				
K-S Critical(0.05) Value				
Data appear Gamma Distributed at (0.05) Significant	ce Level			
Lognormal GOF Test Results				
Correlation Coefficient R	0.942			
Shapiro Wilk Test Statistic	0.91			
Shapiro Wilk Critical (0.05) Value				
Approximate Shapiro Wilk P Value				
Lilliefors Test Statistic				
Lilliefors Critical (0.05) Value				
Data appear Approximate_Lognormal at (0.05) Signi				
Data appear Approximate_Lognormal at (0.05) Signi	ilicalice Lev			
1.96.1 (2000.0)				
Lithium (mw-8)				
Raw Statistics	T			
Number of Valid Observations				
Number of Distinct Observations	3			
Minimum	1.1			
Maximum	1.5			
Mean of Raw Data	1.178			
Standard Deviation of Raw Data	0.13			
Khat	103.2			
Theta hat				
	0.0114			
Kstar	68.86			
Kstar Theta star	68.86 0.0171			
Kstar Theta star Mean of Log Transformed Data	68.86 0.0171 0.159			
Kstar Theta star	68.86 0.0171 0.159			
Kstar Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data	68.86 0.0171 0.159			
Kstar Theta star Mean of Log Transformed Data	68.86 0.0171 0.159			
Kstar Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data Normal GOF Test Results	68.86 0.0171 0.159 0.102			
Kstar Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data Normal GOF Test Results  Correlation Coefficient R	68.86 0.0171 0.159 0.102			
Kstar Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data  Normal GOF Test Results  Correlation Coefficient R Shapiro Wilk Test Statistic	68.86 0.0171 0.159 0.102 0.796 0.652			
Kstar Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data  Normal GOF Test Results  Correlation Coefficient R Shapiro Wilk Test Statistic Shapiro Wilk Critical (0.05) Value	68.86 0.0171 0.159 0.102 0.796 0.652 0.829			
Kstar Theta star Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data  Normal GOF Test Results  Correlation Coefficient R Shapiro Wilk Test Statistic Shapiro Wilk Critical (0.05) Value Approximate Shapiro Wilk P Value	68.86 0.0171 0.159 0.102 0.796 0.652 0.829 3.6530E-4			
Kstar Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data  Normal GOF Test Results  Correlation Coefficient R Shapiro Wilk Test Statistic Shapiro Wilk Critical (0.05) Value Approximate Shapiro Wilk P Value Lilliefors Test Statistic	0.796 0.652 0.36530E-4 0.321			
Kstar Theta star Mean of Log Transformed Data Standard Deviation of Log Transformed Data  Normal GOF Test Results  Correlation Coefficient R Shapiro Wilk Test Statistic Shapiro Wilk Critical (0.05) Value Approximate Shapiro Wilk P Value	0.796 0.652 0.36530E-4 0.321			

			1					
005 Tab Bank								
Gamma GOF Test Result	ts							
	· · · · · ·	0.040						
Correlation Coe								
	t Statistic							
A-D Critical (0.0	-							
	t Statistic							
K-S Critical(0.0								
Data not Gamma Distributed at (0.05) Signif	ificance Le	evel						
Lognormal GOF Test Resu	JITS							
0 1:: 0	"· · · · · · · · · · · · · · · · · · ·	0.010						
Correlation Coe								
Shapiro Wilk Test								
Shapiro Wilk Critical (0.0	-							
Approximate Shapiro Wilk								
Lilliefors Test								
Lilliefors Critical (0.0	,	0.274						
Data not Lognormal at (0.05) Significance L	_evel							
Non manamatria COE Tast Bassilta								
Non-parametric GOF Test Results								
	. (0.00)							
Data do not follow a discernible distribution	at (0.05)	Level of Si	!					
Mercury (background)								
	N. O	la ac	la veri		ND	0/ ND		
			Num Valid		NDs	% NDs		
	Num Obs 28	Num Miss 2	Num Valid 26	Detects	NDs 25	% NDs 96.15%		
Raw Statistics	28	2	26	1	25	96.15%		
Raw Statistics Warning: Only one distinct data value was d	28	2 ProUCL (o	26 or any other	1 software)	25 should no	96.15%		
Raw Statistics Warning: Only one distinct data value was d	28	2 ProUCL (o	26 or any other	1 software)	25 should no	96.15%		
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of	28 detected! determine	ProUCL (o	26 or any other Project Tear	1 software) on to estima	25 should not	96.15%		
Raw Statistics Warning: Only one distinct data value was d	28 detected! determine	ProUCL (o	26 or any other Project Tear	1 software) on to estima	25 should not	96.15%		
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of	28 detected! determine	ProUCL (o	26 or any other Project Tear	1 software) on to estima	25 should not	96.15%		
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of	28 detected! determine	ProUCL (o	26 or any other Project Tear	1 software) on to estima	25 should not	96.15%		
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28 detected! determine	ProUCL (o	26 or any other Project Tear	1 software) on to estima	25 should not	96.15%		
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28 detected! determine	ProUCL (o	26 or any other Project Tear	1 software) on to estima	25 should not	96.15%		
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28 detected! determine	ProUCL (deed by the F	26 or any other Project Tear (backgroun	1 software) on to estimated was not	should not te enviror processed	96.15%  t be used or mental para		
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28 detected! determine or variable	ProUCL (ded by the Fee Mercury (	r any other Project Tear backgroun	1 software) on to estimate d) was not Detects	should not te enviror processed NDs	96.15%  be used or amental para	ameters (	
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28 detected! determine	ProUCL (deed by the F	26 or any other Project Tear (backgroun	1 software) on to estimated was not	should not te enviror processed	96.15%  t be used or mental para	ameters (	
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18	ProUCL (ded by the Fee Mercury (	r any other roject Tear backgroun	1 software) on to estimate d) was not Detects	should not te enviror processed NDs	96.15%  the used or mental parametrical para	ameters (	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18	ProUCL (ded by the Fee Mercury (	r any other roject Teal (backgroun) Num Valid 17	1 software) on to estimate d) was not Detects 0 extistics and	should not te enviror processed  NDs 17	96.15%  t be used or mental para  !!  % NDs 100.00%	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28 detected! determine or variable Num Obs 18 -Detects (I	ProUCL (ded by the Fee Mercury (description)  Num Miss 1  NDs), therewere statistics	r any other roject Teal (backgroun) Num Valid 17 efore all sta	software) or not o estimated was not o estimated.  Detects  Detects  O  Attistics and o NDs lying	should not te enviror processed NDs 17 estimates below the	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28 detected! determine or variable Num Obs 18 -Detects (I	ProUCL (ded by the Fee Mercury (description)  Num Miss 1  NDs), therewere statistics	r any other roject Teal (backgroun) Num Valid 17 efore all sta	software) or not o estimated was not o estimated.  Detects  Detects  O  Attistics and o NDs lying	should not te enviror processed NDs 17 estimates below the	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear (backgroun Num Valid 17 efore all statics are also lues to estimate the roject Tear of the roject Tear	1 software) on to estimate on the state of t	should not the environ processed NDs 17 estimates below the onmental processed the commental processed	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear (backgroun Num Valid 17 efore all statics are also lues to estimate the roject Tear of the roject Tear	1 software) on to estimate on the state of t	should not the environ processed NDs 17 estimates below the onmental processed the commental processed	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear (backgroun Num Valid 17 efore all statics are also lues to estimate the roject Tear of the roject Tear	1 software) on to estimate on the state of t	should not the environ processed NDs 17 estimates below the onmental processed the commental processed	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear (backgroun Num Valid 17 efore all statics are also lues to estimate the roject Tear of the roject Tear	1 software) on to estimate on the stimate environment of the software) of the stimate of the software of the software of the stimate of the software of the so	should not the environ processed NDs 17 estimates below the onmental processed the commental processed	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear (backgroun Num Valid 17 efore all statics are also lues to estimate the roject Tear of the roject Tear	1 software) on to estimate on the stimate environment of the software) of the stimate of the software of the software of the stimate of the software of the so	should not the environ processed NDs 17 estimates below the onmental processed the commental processed	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear (backgroun Num Valid 17 efore all statics are also lues to estimate the roject Tear of the roject Tear	1 software) on to estimate on the stimate environment of the software) of the stimate of the software of the software of the stimate of the software of the so	should not the environ processed NDs 17 estimates below the onmental processed the commental processed	96.15%  the used or mental para  the way of the used or mental para  th	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for the data set for the data set for the data set for the data set for the data set for the data set for the data set for the data set for the Project Team may decide to use alternative site specifically, sample mean, UCLs, UP The Project Team may decide to use alternative site specifically, sample mean, UCLs, UP The Project Team may decide to use alternative site specifically.  The data set for the data set	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear backgroun  Num Valid 17  efore all statics are also lues to estimate to estimate to the state of t	1 software) on to estimate to estimate environment of the content	should not the enviror processed  NDs 17  estimates below the promental processed!	96.15%  be used or mental para  l!  % NDs 100.00%  should also arameters	o be NDsl	e.g., EPC
Raw Statistics  Warning: Only one distinct data value was dested to use alternative site specific values of the data set for the data set for the data set for the data set for the data set for the data set for the data set for the data set for the data set for the Project Team may decide to use alternative site specifically, sample mean, UCLs, UP The Project Team may decide to use alternative site specifically, sample mean, UCLs, UP The Project Team may decide to use alternative site specifically.  The data set for the data set	28  detected! determine or variable  Num Obs 18  Detects (I	ProUCL (ded by the Fee Mercury (	r any other roject Tear (backgroun Num Valid 17 efore all statics are also lues to estimate the roject Tear of the roject Tear	1 software) on to estimate to estimate environment of the content	should not the environ processed NDs 17 estimates below the onmental processed the commental processed	96.15%  the used or mental para  the way of the used or mental para  th	b be NDsi ection lim (e.g., EP	e.g., EPC

OCTOBER 2018

Warning: All observations are Non-De	tects (1	NDs), there	fore all sta	tistics and	estimates	should also	be NDs!	
Specifically, sample mean, UCLs, UPLs,								t!
The Project Team may decide to use alternativ								
		- p - c - c - c - c - c - c - c - c - c					(g.,	, ,.
The data set fo	or varia	hle Mercu	rv (mw-7) v	vas not nro	cessed			
The data set is	or vario	IDIC WICICU	13 ( 7 / 1	tuo not pre	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
M								
Mercury (mw-75)								
[								
			Num Valid		NDs	% NDs		
Raw Statistics 1	11	1	10	1	9	90.00%		
Warning: Only one distinct data value was dete								
ested to use alternative site specific values det	termine	d by the P	roject Tean	n to estima	ate enviror	nmental para	ameters (e	.g., EPC, E
The data set fo	r varia	ble Mercur	y (mw-75)	was not pr	ocessed!			
Mercury (mw-8)								
, ,								
Nur	n Ohs	Num Miss	Num Valid	Detects	NDs	% NDs		
	9	1	8	0	8	100.00%		
Traw Otalistics	5	'	U	-	U	100.0070		
Warning: All observations are Non-De								
Specifically, sample mean, UCLs, UPLs,								
The Project Team may decide to use alternativ	e site s	specific val	ues to estir	nate envir	onmental <sub>l</sub>	parameters	(e.g., EPC	, BTV).
The data set for	or varia	able Mercu	ry (mw-8) v	vas not pro	cessed!			
Molybdenum (background)								
, , ,								
Raw Statistics								
Number of Valid Observ	ations	28						
Number of Distinct Observ		21						
	nimum	0.013						
	kimum	0.096						
Mean of Rav		0.031						
Standard Deviation of Rav	v Data	0.0191						
	Khat	4.121						
The	eta hat	0.00751						
	Kstar	3.704						
The	ta star	0.00836						
Mean of Log Transformed	d Data	-3.601						
Standard Deviation of Log Transformed		0.475						
		00						
Normal GOF Test Results								
I INUITIAL GOT LEST RESURS								
	siont D	0.044						
Correlation Coeffic		0.844						
	tatistic	0.844 0.724 0.924						

MIDETIONIT PIOC			111 017(1	101100			
Approximate Shapiro Wilk P Value							
Lilliefors Test Statistic	0.255						
Lilliefors Critical (0.05) Value	0.164						
Data not Normal at (0.05) Significance Level							
Gamma GOF Test Results							
Correlation Coefficient R	0.926						
A-D Test Statistic							
A-D Critical (0.05) Value							
K-S Test Statistic							
K-S Critical(0.05) Value							
Data not Gamma Distributed at (0.05) Significance L	evei						
Lawrence COF Task Bassika							
Lognormal GOF Test Results							
0 1 2 2 2 2	0.055						
Correlation Coefficient R							
Shapiro Wilk Test Statistic				<u> </u>			
Shapiro Wilk Critical (0.05) Value							
Approximate Shapiro Wilk P Value							
Lilliefors Test Statistic	0.163						
Lilliefors Critical (0.05) Value	0.164						
Data appear Approximate_Lognormal at (0.05) Signi	ficance Lev						
Molybdenum (mw-61)							
, ,							
Raw Statistics							
Number of Valid Observations	18						
Number of Distinct Observations							
Minimum							
Maximum							
Mean of Raw Data							
Standard Deviation of Raw Data							
Khat							
	2.4306E-4						
Kstar							
	2.9164E-4						
Mean of Log Transformed Data							
Standard Deviation of Log Transformed Data	0.0581						
Normal GOF Test Results							
Correlation Coefficient R	0.98	-					
Shapiro Wilk Test Statistic	0.955						
Shapiro Wilk Critical (0.05) Value	0.897						
Approximate Shapiro Wilk P Value	0.526						
Lilliefors Test Statistic				<u> </u>			
Lilliefors Critical (0.05) Value							
Data appear Normal at (0.05) Significance Level							
11(,				+			
Gamma GOF Test Results							
Callina Co. 100t Noouto							
Correlation Coefficient R	0.978						
A-D Test Statistic							
	. u4/n		1	1	1	1	1

A-D Critical (0							
	st Statistic						
K-S Critical(0.	05) Value	0.203					
Data appear Gamma Distributed at (0.05)	Significand	e Level					
Lognormal GOF Test Res	ults						
		0.070					
Correlation Co							
Shapiro Wilk Te							
Shapiro Wilk Critical (0							
Approximate Shapiro W							
Lilliefors Te							
Lilliefors Critical (0		0.202					
Data appear Lognormal at (0.05) Significa	nce Level						
Mahahadamuma (massa 7)							
Molybdenum (mw-7)							
	Num Oha	Num Mico	Num Valid	Detects	NDs	% NDs	
Dow Statistics	18	0	18	16	2	% NDS	
Raw Statistics	10	U	10	10	۷	11.1170	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	2	0.005	0.01	0.0075	0.0075	0.00354	
Statistics (Non-Detects Only)	16	0.003	0.041	0.0073	0.0073	0.00334	
Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	18	0.0022	0.041	0.00870	0.004	0.0113	
Statistics (All: NDs treated as DL/2 value)	18	0.0022	0.041	0.00802	0.0042	0.0109	
Statistics (All. NDs freated as DD2 value)  Statistics (Normal ROS Imputed Data)	18	0.0022	0.041	0.00821	0.004	0.011	
Statistics (Gamma ROS Imputed Data)	18	0.0022	0.041	0.00845	0.0042	0.0109	
Statistics (Garrina ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	18	0.0022	0.041	0.0089	0.0042	0.0109	
Statistics (Lognormal NOS imputed Data)	10	0.0022	0.041	0.00027	0.00414	0.0103	
	K hat	K Star	Theta hat	l og Mean	Log Stdy	Log CV	
Statistics (Non-Detects Only)	1.208	1.023	0.00726	-5.205	0.852	-0.164	
Statistics (NDs = DL)	1.322	1.139	0.00652	-5.177	0.813	-0.157	
Statistics (NDs = DL/2)	1.248	1.077	0.00657	-5.254	0.821	-0.156	
Statistics (Gamma ROS Estimates)	1.341	1.155	0.00663	-5.139	0.823	-0.16	
Statistics (Lognormal ROS Estimates)				-5.232	0.804	-0.154	
					0.00		
No	rmal GOF	Test Resu	lts				
	No NDs	NDs = DL	NDs = DL/2	ormal RO			
Correlation Coefficient R	0.739	0.746	0.723	0.73			
			1				
	Test value	Crit. (0.05)	Cor	clusion wi	th Alpha(0.	.05)	
Shapiro-Wilk (Detects Only)	0.558	0.887	Data Not N	lormal			
Shapiro-Wilk (NDs = DL)	0.57	0.897	Data Not N	lormal			
Shapiro-Wilk (NDs = DL/2)	0.537	0.897	Data Not N	lormal			
Shapiro-Wilk (Normal ROS Estimates)	0.547	0.897	Data Not N	lormal			
Lilliefors (Detects Only)	0.424	0.213	Data Not N	Iormal			
Lilliefors (NDs = DL)	0.391	0.202	Data Not N	lormal			
Lilliefors (NDs = DL/2)	0.431	0.202	Data Not N	lormal			
Lilliefors (Normal ROS Estimates)	0.411	0.202	Data Not N	Iormal			
			1				
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			

Correlation Coefficient R	0.908	0.912	0.896 0.	926			
	Test value	Crit. (0.05)	Conclusio	on with	Alpha((	05)	
Anderson-Darling (Detects Only)	2.561	0.76	000.00		7pa(c		
Kolmogorov-Smirnov (Detects Only)	0.376	0.22	Data Not Gamm	na Distr	ibuted		
Anderson-Darling (NDs = DL)		0.76					
Kolmogorov-Smirnov (NDs = DL)		0.208	Data Not Gamm	a Distr	ibuted		
Anderson-Darling (NDs = DL/2)	2.808	0.761					
Kolmogorov-Smirnov (NDs = DL/2)	0.377	0.208	Data Not Gamm	a Distr	ibuted		
derson-Darling (Gamma ROS Estimates)		0.76	2010 1101 0011111				
Kolmogorov-Smirnov (Gamma ROS Est.)	0.308		Data Not Gamm	na Distr	ibuted		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DI	NDs = DL/2 Log F	308			
Correlation Coefficient R	0.856	0.882	_	.84			
	0.000	0.002	0.00				
	Test value	Crit. (0.05)	Conclusio	on with	Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.737		Data Not Lognor	rmal	•		
Shapiro-Wilk (NDs = DL)	0.782		Data Not Lognor				
Shapiro-Wilk (NDs = DL/2)	0.745		Data Not Lognor				
Shapiro-Wilk (Lognormal ROS Estimates)	0.714		_				
Lilliefors (Detects Only)	0.312		Data Not Lognor				
Lilliefors (NDs = DL)	0.29		Data Not Lognor				
Lilliefors (NDs = DL/2)	0.308		Data Not Lognor				
,			_				
Lillietors (Lognormal ROS Estimates)	0.331	0.202	Data Not Lognor	rmal			
Lilliefors (Lognormal ROS Estimates)	0.331	0.202	Data Not Lognor	rmal			
Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or				rmal			
				rmal			
				rmal			
Note: Substitution methods such as DL or				rmal			
Note: Substitution methods such as DL or				rmal			
Note: Substitution methods such as DL or Molybdenum (mw-75)	DL/2 are n	ot recomm		rmal			
Note: Substitution methods such as DL or Molybdenum (mw-75)  Raw Statistics	DL/2 are n	ot recomm		rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob	DL/2 are n	ot recomm		rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob	DL/2 are n	ot recomm		rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob	DL/2 are n servations servations Minimum	11 3 0.16		rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob	servations servations Minimum Maximum Raw Data	11 3 0.16 0.18	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob	servations servations Minimum Maximum Raw Data	11 3 0.16 0.18 0.169 0.00831	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob	servations servations Minimum Maximum Raw Data Raw Data Khat	11 3 0.16 0.18 0.169 0.00831	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob	servations servations Minimum Maximum Raw Data Raw Data Khat	11 3 0.16 0.18 0.00831 456.9	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar Theta star	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar Theta star rmed Data	11 3 0.16 0.18 0.00831 456.9 3.7008E-4 332.4 5.0876E-4	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Mean of Log Transfo	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar Theta star rmed Data rmed Data	11 3 0.16 0.18 0.00831 456.9 3.7008E-4 332.4 5.0876E-4	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar Theta star rmed Data rmed Data	11 3 0.16 0.18 0.00831 456.9 3.7008E-4 332.4 5.0876E-4	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Mean of Log Transfo  Standard Deviation of Log Transfo  Normal GOF Test Resu	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar Theta star rmed Data rmed Data	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4 332.4 5.0876E-4 -1.778 0.049	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Mean of Log Transfo  Standard Deviation of Log Transfo  Normal GOF Test Resu  Correlation Co	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar Theta star rmed Data rmed Data	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4 332.4 5.0876E-4 -1.778 0.049	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Mean of Log Transfo  Standard Deviation of Log Transfo  Normal GOF Test Resu  Correlation Co	servations servations Minimum Maximum Raw Data Raw Data Khat Theta hat Kstar Theta star rmed Data rmed Data rmed Data	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4 332.4 5.0876E-4 -1.778 0.049	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Standard Deviation of Log Transfo  Standard Deviation of Log Transfo  Orrelation Co  Shapiro Wilk Critical (0	servations servations Minimum Maximum Raw Data Khat Theta hat Kstar Theta star rmed Data rmed Data rmed Data sefficient R st Statistic .05) Value	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4 332.4 5.0876E-4 -1.778 0.049 0.921 0.819 0.85	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Standard Deviation of Log Transfo  Normal GOF Test Resu  Correlation Cc  Shapiro Wilk Te  Shapiro Wilk Critical (0  Approximate Shapiro W	servations servations Minimum Maximum Raw Data Raw Data Theta hat Kstar Theta star rmed Data rmed Data rmed Data rmed Data sefficient R st Statistic 0.05) Value ilk P Value	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4 332.4 5.0876E-4 -1.778 0.049 0.921 0.819 0.85 0.0312	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Standard Deviation of Log Transfo  Standard Deviation of Log Transfo  Orrelation Co  Shapiro Wilk Critical (0	servations servations Minimum Maximum Raw Data Raw Data Theta hat Kstar Theta star rmed Data rmed Data rmed Data rmed Data sefficient R st Statistic 0.05) Value ilk P Value	11 3 0.16 0.18 0.169 0.00831 456.9 3.7008E-4 332.4 5.0876E-4 -1.778 0.049 0.921 0.819 0.85 0.0312	ended.	rmal			
Note: Substitution methods such as DL or  Molybdenum (mw-75)  Raw Statistics  Number of Valid Ob  Number of Distinct Ob  Mean of  Standard Deviation of  Standard Deviation of Log Transfo  Normal GOF Test Resu  Correlation Cc  Shapiro Wilk Te  Shapiro Wilk Critical (0  Approximate Shapiro W	servations servations Minimum Maximum Raw Data Raw Data Khat Theta star Theta star Tmed Data Tmed Data Tmed Data Theta Star Theta Star Tmed Data	0.16 0.18 0.169 0.00831 456.9 3.7008E-4 332.4 5.0876E-4 -1.778 0.049 0.921 0.819 0.85 0.0312 0.227 0.251	ended.	rmal			

Gamma GOF Test Results				
Correlation Coefficient R	0.918			
A-D Test Statistic	0.889			
A-D Critical (0.05) Value	0.726			
K-S Test Statistic	0.24			
K-S Critical(0.05) Value	0.254			
Data follow Appr. Gamma Distribution at (0.05) Signif				
, , ,				
Lognormal GOF Test Results				
Correlation Coefficient R	0.921			
Shapiro Wilk Test Statistic	0.819			
Shapiro Wilk Critical (0.05) Value	0.85			
Approximate Shapiro Wilk P Value	0.0315			
Approximate Snapiro Wilk P Value  Lilliefors Test Statistic				
	0.229			
Lilliefors Critical (0.05) Value	0.251			
Data appear Approximate_Lognormal at (0.05) Signif	icance Lev			
Molybdenum (mw-8)				
Raw Statistics				
Number of Valid Observations	9			
Number of Distinct Observations	7			
Minimum	0.011			
Maximum	0.049			
Mean of Raw Data	0.0241			
Standard Deviation of Raw Data	0.0142			
Khat	3.781			
Theta hat	0.00638			
Kstar	2.595			
Theta star	0.00929			
Mean of Log Transformed Data	-3.863			
Standard Deviation of Log Transformed Data	0.541			
Otalidate Deviation of Edg Transformed Data	0.0+1			
Normal GOF Test Results				
Normal GOT Test Nesults				
Correlation Coefficient R	0.905			
Shapiro Wilk Test Statistic				
-	0.807			
Shapiro Wilk Critical (0.05) Value	0.829			
Approximate Shapiro Wilk P Value	0.0323			
Lilliefors Test Statistic	0.333			
Lilliefors Critical (0.05) Value	0.274			
Data not Normal at (0.05) Significance Level				
Gamma GOF Test Results				
Correlation Coefficient R	0.952			
A-D Test Statistic	0.702			
A-D Critical (0.05) Value	0.725			
K-S Test Statistic	0.309			
K-S Critical(0.05) Value	0.281			
Data follow Appr. Gamma Distribution at (0.05) Signif	icance Lev			

			Г				
Lognormal GOF Test Res	sults						
Correlation Co							
Shapiro Wilk Te							
Shapiro Wilk Critical (0	).05) Value	0.829					
Approximate Shapiro W	ilk P Value	0.193					
Lilliefors Te	st Statistic	0.279					+
Lilliefors Critical (0	).05) Value	0.274					
Data appear Approximate_Lognormal at (	,						+
	, <b>g</b>						
Selenium (background)							
zolomam (zaolgrouna)							
	Num Obe	Num Mice	Num Valid	Detects	NDs	% NDs	
Raw Statistics	28	0	28	18	10	35.71%	
Naw Statistics	20	U	20	10	10	33.7170	_
	Number	Minimum	Maximum	Mean	Median	SD	+
Chalieties (No. 10-10-10 Co. 10)				Mean			+
Statistics (Non-Detects Only)	10	0.002	0.012	0.005	0.002	0.00414	4
Statistics (Non-Detects Only)		0.0017	0.092	0.0465	0.061	0.0379	 1
Statistics (All: NDs treated as DL value)		0.0017	0.092	0.0317	0.008	0.0364	1
Statistics (All: NDs treated as DL/2 value)		0.001	0.092	0.0308	0.004	0.037	
Statistics (Normal ROS Imputed Data)	28	-0.0226	0.092	0.0331	0.0181	0.0364	
Statistics (Gamma ROS Imputed Data)	28	0.0017	0.092	0.0354	0.0175	0.0338	
Statistics (Lognormal ROS Imputed Data)	28	6.7957E-4	0.092	0.0312	0.00469	0.0367	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	0.627	0.56	0.0742	-4.046	1.867	-0.461	
Statistics (NDs = DL)	0.545	0.51	0.0582	-4.602	1.729	-0.376	
Statistics (NDs = DL/2)	0.468	0.442	0.0658	-4.85	1.902	-0.392	
Statistics (Gamma ROS Estimates)	0.782	0.722	0.0453	-4.101	1.491	-0.364	+
Statistics (Lognormal ROS Estimates)	0.702	0.722		-4.679	1.767	-0.378	
Statistics (Logitornial NOS Estimates)		_		-4.079	1.707	-0.376	_
Ne	rmal GOE	Test Resu	lto				
NC	Jillai GOF	Test Nesu	ilo				
	No NDo	NDo - DI	NDo - DL /	Iormal DO			+
Correlation Coefficient R	No NDs 0.9	0.87	NDs = DL/2 0.859	0.939			+
Correlation Coefficient R	0.9	0.87	0.659	0.939			
	T4 · l·	O.:: (0.0E)	0	11	h Al-b-(0	05)	
Observe Maria (D. 1. 1. C. 1.)		Crit. (0.05)		nclusion wit	ıı Aipna(0	(כט.	1
Shapiro-Wilk (Detects Only)	0.784	0.897					4
Shapiro-Wilk (NDs = DL)							
Shapiro-Wilk (NDs = DL/2)		0.924					
Shapiro-Wilk (Normal ROS Estimates)							
Lilliefors (Detects Only)		0.202	Data Not N	Normal			
Lilliefors (NDs = DL)	0.313	0.164	Data Not N	Normal			
Lilliefors (NDs = DL/2)	0.356	0.164	Data Not N	Normal			1
Lilliefors (Normal ROS Estimates)	0.2	0.164	Data Not N	Normal			1
	1	I	II.				1
Ga	mma GOF	Test Resu	ilts				1
							1
	No NDs	NDs = DL	NDs = DL/2	amma RO			+
Correlation Coefficient R		0.843	0.825	0.884			+
225.3		1.0.0	020	2.001			+
	Test value	Crit. (0.05)	Cor	nclusion wit	h Alnha(N	05)	+
Anderson-Darling (Detects Only)		0.789		.5.451011 1111		,	+
Anderson-Daning (Detects Only)	2.093	0.769					

1810211	011111100	JOE GOOD	11200 01	111 017(11)	01100		
Kolmogorov-Smirnov (Detects Only)		0.213	Data Not (	Gamma Dis	stributed		
Anderson-Darling (NDs = DL)		0.806					
Kolmogorov-Smirnov (NDs = DL)	0.282	0.174	Data Not (	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)	2.933	0.817					
Kolmogorov-Smirnov (NDs = DL/2)	0.25	0.176	Data Not (	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	1.252	0.783					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.202	0.172	Data Not (	Gamma Dis	stributed		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DI	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.841	0.887	0.897	0.91			
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.682					•	
Shapiro-Wilk (NDs = DL)	0.759		Data Not I	-			
Shapiro-Wilk (NDs = DL/2)	0.778		Data Not I	-			
Shapiro-Wilk (Lognormal ROS Estimates)			Data Not I				
Lilliefors (Detects Only)	0.357		Data Not I	-			
Lilliefors (NDs = DL)			Data Not I	-			
Lilliefors (NDs = DL/2)			Data Not I				
Lilliefors (Lognormal ROS Estimates)			Data Not I				
				- 3			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Selenium (mw-61)							
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	9	9	50.00%	
Traw clarioned	10		10			00.0070	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	9	5.0000E-4		0.00283		0.00276	
Statistics (Non-Detects Only)	9	6.6000E-4		8.7778E-4			
Statistics (All: NDs treated as DL value)	18	5.0000E-4		0.00186			
Statistics (All: NDs treated as DL/2 value)	18	2.5000E-4			9.8000E-4		
Statistics (Normal ROS Imputed Data)	18	2.5390E-4		8.1823E-4			
Statistics (Gamma ROS Imputed Data)	18	6.6000E-4		0.00544		0.0047	
Statistics (Camima ROS Imputed Data)	18	4.5050E-4		8.2700E-4			
Otationics (Lognormal NOS imputed Data)	10	7.3030E-4	0.0010	U.Z/UUE-4	7.7930E-4	2.JJUJE-4	
	K hat	K Star	Theta hat	Log Mean	Loa Stdy	Log CV	
Statistics (Non-Detects Only)	13.35		6.5744E-5		0.275	-0.0388	
Statistics (NOs = DL)	1.706	1.459	0.00109		0.275	-0.0366	
Statistics (NDs = DL/2)	2.836		4.0455E-4		0.733	-0.111	
Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	0.93	0.812	0.00585	-5.841 -7.136	1.285 0.279	-0.22 -0.0391	
Granding (Logitornial ROS Estillates)				-7.130	0.279	-0.0391	
Ma	rmal COF	Test Resu	lto				
NC	illiai GOF	i esi kesu	IIO				
	No NDs	NDs = Di	NDe - DI "	lormal RO			
Correlation Coofficient D			0.693				
Correlation Coefficient R	0.838	0.713	0.693	0.949			
	Took	O-it (0.05)	^	ا - : المسام	4h Alet/0	OE)	
Chanina Wills (Data de C. L.)		Crit. (0.05)		nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)	0.722	0.829	Co Data Not I Data Not I	Normal	th Alpha(0	.05)	

			INESS OF		31100		
Shapiro-Wilk (NDs = DL/2)	0.516		Data Not N				
Shapiro-Wilk (Normal ROS Estimates)	0.925	0.897	Data Appe	ear Normal			
Lilliefors (Detects Only)	0.278	0.274	Data Not N	Normal			
Lilliefors (NDs = DL)	0.362	0.202	Data Not N	Normal			
Lilliefors (NDs = DL/2)	0.391	0.202	Data Not N	Normal			
Lilliefors (Normal ROS Estimates)	0.152	0.202	Data Appe	ear Normal			
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/2	iamma RO			
Correlation Coefficient R	0.889	0.854	0.807	0.721			
				'			
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.761	0.721					
Kolmogorov-Smirnov (Detects Only)	0.225	0.279	Detected I	Data appea	ır Approxin	nate Gamn	
Anderson-Darling (NDs = DL)	1.251	0.755		-			
Kolmogorov-Smirnov (NDs = DL)	0.25	0.207	Data Not 0	Gamma Dis	tributed		
Anderson-Darling (NDs = DL/2)	1.846	0.747					
Kolmogorov-Smirnov (NDs = DL/2)	0.343	0.205	Data Not 0	Gamma Dis	tributed		
nderson-Darling (Gamma ROS Estimates)	2.671	0.77					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.338	0.21	Data Not 0	Gamma Dis	tributed		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.899	0.932	0.883	0.971			
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.82		Data Not I				
Shapiro-Wilk (NDs = DL)	0.879		Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.82		Data Not I	-			
Shapiro-Wilk (Lognormal ROS Estimates)	0.961			ear Lognorr	nal		
Lilliefors (Detects Only)	0.21			ear Lognorr			
Lilliefors (NDs = DL)	0.184			ear Lognorr			
Lilliefors (NDs = DL/2)	0.299		Data Not I				
Lilliefors (Lognormal ROS Estimates)	0.133			ear Lognorr	nal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Selenium (mw-7)							
, ,							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
Tan claidile				• •	•	2.2070	
	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)	17	0.0026	0.015	0.00896	0.0098	0.00432	
Statistics (All: NDs treated as DL value)	18	0.0026	0.015	0.00902		0.0042	
Statistics (All: NDs treated as DL/2 value)	18	0.0026	0.015	0.00302	0.0033	0.00429	
Statistics (All. NDs treated as DL/2 value)  Statistics (Normal ROS Imputed Data)	18	0.0026	0.015	0.00874	0.0089	0.00425	
Statistics (Gamma ROS Imputed Data)	18	0.0026	0.015	0.0088	0.0089	0.0042	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	18	0.0026	0.015	0.00902		0.0042	
Glausiics (Lognormal NOS imputed Data)	10	0.0020	0.013	0.00675	0.0009	0.00428	
	V hat	V Ctor	Thata hat	Log Mas-	Log Ctd.	Log ()/	
	K hat	K Star	rneta nat	Log Mean	Log Stav	Log CV	

	014111100						
Statistics (Non-Detects Only)	3.729	3.11	0.0024	-4.855	0.584	-0.12	
Statistics (NDs = DL)	3.93	3.312	0.00229	-4.841	0.57	-0.118	
Statistics (NDs = DL/2)	3.735	3.15	0.00234	-4.88	0.576	-0.118	
Statistics (Gamma ROS Estimates)	3.93	3.312	0.00229	-4.841	0.57	-0.118	
Statistics (Lognormal ROS Estimates)				-4.877	0.574	-0.118	
No	rmal GOF	Test Resu	lts				 
	No NDs	NDs = DL	NDs = DL/2	Iormal RO			
Correlation Coefficient R	0.972	0.976	0.97	0.973			
	Test value	Crit. (0.05	Cor	nclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	0.922		Data Appe			· ·	
Shapiro-Wilk (NDs = DL)	0.931	0.897	Data Appe	ar Normal			
Shapiro-Wilk (NDs = DL/2)	0.919		Data Appe				
Shapiro-Wilk (Normal ROS Estimates)	0.926		Data Appe				
Lilliefors (Detects Only)	0.152		Data Appe				
Lilliefors (NDs = DL)	0.13		Data Appe				
Lilliefors (NDs = DL/2)	0.152		Data Appe				
Lilliefors (Normal ROS Estimates)	0.158		Data Appe				
	1						
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	0.938	0.941	0.945	0.941			
	Test value	Crit. (0.05	Cor	nclusion wi	th Alpha(0.	05)	
Anderson-Darling (Detects Only)	0.559	0.744				,	
Kolmogorov-Smirnov (Detects Only)	0.19	0.21	Detected [	Data Appea	ar Gamma l	Distributed	
Anderson-Darling (NDs = DL)	0.575	0.743		•			
Kolmogorov-Smirnov (NDs = DL)	0.187	0.205	Data Appe	ar Gamma	Distributed	t	
Anderson-Darling (NDs = DL/2)	0.542	0.743					
Kolmogorov-Smirnov (NDs = DL/2)	0.181	0.205	Data Appe	ar Gamma	Distributed	d	
nderson-Darling (Gamma ROS Estimates)	0.575	0.743					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.187	0.205	Data Appe	ar Gamma	Distributed	d	
	11	11	I.				
Logi	normal GO	F Test Res	sults				
	T	T	, ,				
			NDs = DL/2	·			
Correlation Coefficient R	0.957	0.955	0.964	0.964			
	<b>-</b>	0 1. 15 = 1	_			05)	
0		Crit. (0.05)			th Alpha(0.	U5)	
Shapiro-Wilk (Detects Only)	0.899		Data Appe		nai		
Shapiro-Wilk (NDs = DL)	0.897		Data Not L				
Shapiro-Wilk (NDs = DL/2)	0.911		Data Appe				
Shapiro-Wilk (Lognormal ROS Estimates)	0.913		Data Appe				
Lilliefors (Detects Only)	0.193	0.207	Data Appe		nal		
Lilliefors (NDs = DL)	0.203		Data Not L				
Lilliefors (NDs = DL/2)			Data Appe				
Lilliefors (Lognormal ROS Estimates)	0.183	0.202	Data Appe	ar Lognorr	nal		
N . O	B1 6	_					
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Selenium (mw-75)							

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	11	0	11	9	2	18.18%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	2	0.005	0.01	0.0075	0.0075	0.00354		_
Statistics (Non-Detects Only)	9	0.003	0.0026	0.0073		1.8333E-4		
Statistics (All: NDs treated as DL value)	-	0.0021	0.0020	0.00231		0.00238	i	-
Statistics (All: NDs treated as DL/2 value)	11	0.0021	0.005	0.00325		8.2352E-4	i	-
· · · · · · · · · · · · · · · · · · ·								_
Statistics (Normal ROS Imputed Data)	11	0.0021	0.0026	0.00231		1.6398E-4		
Statistics (Gamma ROS Imputed Data)		0.0021	0.01	0.00371	0.0023	0.00311		
Statistics (Lognormal ROS Imputed Data)	11	0.0021	0.0026	0.00231	0.0023	1.6400E-4		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	<u> </u>	
Statistics (Non-Detects Only)	181.2	120.9	1.2753E-5	-6.073	0.0786	-0.0129		
Statistics (NDs = DL)	3.698	2.75	8.8009E-4	-5.869	0.484	-0.0825		
Statistics (NDs = DL/2)	15.69	11.47	1.6394E-4	-5.995	0.243	-0.0405		1
Statistics (Gamma ROS Estimates)	2.547	1.913	0.00146	-5.806	0.598	-0.103		1
Statistics (Lognormal ROS Estimates)				-6.073	0.0703	-0.0116	·	
No	rmal GOF	Test Resu	lts					
	N ND	ND DI	lib Di (di	1.00				
0 1 0 1			NDs = DL/2					
Correlation Coefficient R	0.961	0.717	0.714	0.964				_
	Toet value	Crit. (0.05)	Cor	nclusion wi	th Alpha(A	05)	i	
Shapiro-Wilk (Detects Only)	0.904	` '			ui Aipiia(u	.03)		
Shapiro-Wilk (NDs = DL)			Data Not N				i	
Shapiro-Wilk (NDs = DL/2)			Data Not N				i	
Shapiro-Wilk (Normal ROS Estimates)			Data Appe				<u> </u>	
Lilliefors (Detects Only)							<u> </u>	
Lilliefors (NDs = DL)		0.251						_
Lilliefors (NDs = DL/2)		0.251						_
Lilliefors (Normal ROS Estimates)		0.251					I	
Limetota (Normal New Leatinates)	U.LL?	0.201	Data / tppo	ai i toimai				
Ga	mma GOF	Test Resu	ılts					
	T	1		-11				
	No NDs		NDs = DL/2				ļ	
Correlation Coefficient R	0.962	0.838	0.773	0.839				
	Toot value	C=+ (0.0E)	Com	aluaian wi	۱۵ ماماد ۱۸	OE)		_
Anderson Darling (Detects Only)		Crit. (0.05)	Coi	nclusion wi	ш Арпа(о	.03)	i	
Anderson-Darling (Detects Only)  Kolmogorov-Smirnov (Detects Only)	0.435 0.197	0.72 0.279	Detected 5	)ata Annos	ar Commo	Dietributed	ı	1
Anderson-Darling (NDs = DL)	2.02	0.279	Detected D	ata Appea	ai Gaillilla	טאוווטוופוע	i	-
Kolmogorov-Smirnov (NDs = DL)	0.413	0.733	Data Not G	Samma Dia	tributed		ı	-
Anderson-Darling (NDs = DL/2)	1.785	0.257	שמים ואטו כי	aanina Dis	ะเามนเฮน		1	+
Kolmogorov-Smirnov (NDs = DL/2)	0.359	0.729	Data Not G	Samma Dic	tributed			
derson-Darling (Gamma ROS Estimates)	2.43	0.235	שמום ואטו ל	aumina DIS	, i i i i i i i i i i i i i i i i i i i		1	+
Kolmogorov-Smirnov (Gamma ROS Est.)	0.443		Data Not G	amma Dis	stributed		<u> </u>	-
	0.170	0.200	22.011010					+
Logi	normal GO	F Test Res	sults					
		T						
	No NDs		NDs = DL/2	-				1
Correlation Coefficient R	0.964	0.789	0.776	0.965			<u>.                                    </u>	

						ı		
	Test value	Crit. (0.05)	Cor	nclusion wit	h Alpha(N	05)		
Shapiro-Wilk (Detects Only)	0.908	0.829		ar Lognorm		.00)		
Shapiro-Wilk (NDs = DL)	0.638	0.85	Data Not L	-	iui			
Shapiro-Wilk (NDs = DL/2)	0.631	0.85	Data Not L	-				
Shapiro-Wilk (Lognormal ROS Estimates)	0.031	0.85		ar Lognorm	val			
Lilliefors (Detects Only)	0.313							
` ,		0.274		ar Lognorm	iai			
Lilliefors (NDs = DL)	0.386	0.251	Data Not L	-				
Lilliefors (NDs = DL/2)		0.251	Data Not L					
Lilliefors (Lognormal ROS Estimates)	0.227	0.251	Data Appe	ar Lognorm	nai			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Selenium (mw-8)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	9	0	9	7	2	22.22%		
	I.						-	1
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	2	0.003	0.01	0.0065	0.0065	0.00495		
Statistics (Non-Detects Only)	7	8.4000E-4	0.013	0.00305	0.0015	0.0044		
Statistics (All: NDs treated as DL value)	9	8.4000E-4	0.013	0.00382	0.0016	0.00446		
Statistics (All: NDs treated as DL/2 value)	9	8.4000E-4	0.013	0.00309	0.0015	0.00391		
Statistics (Normal ROS Imputed Data)	9	8.4000E-4		0.00287	0.0016	0.00382		
Statistics (Gamma ROS Imputed Data)	9	8.4000E-4		0.00459	0.0016	0.00489		
Statistics (Lognormal ROS Imputed Data)	9	8.4000E-4		0.00272	0.00156			
Canonico (Lognorma Meo imparca Data)		0.10002	0.010	0.00272	0.00100	0.00000		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	1.168	0.763	0.00261	-6.279	0.883	-0.141		
Statistics (NDs = DL)	1.199	0.873	0.00318	-6.041	0.948	-0.157		
Statistics (NDs = DL/2)	1.344	0.97	0.0023	-6.195	0.839	-0.135		
Statistics (Gamma ROS Estimates)	1.091	0.802	0.00421	-5.907	1.063	-0.18		
Statistics (Lognormal ROS Estimates)				-6.32	0.769	-0.122		
Me	rmal COE	Test Resu	lto				-	
INC	illiai GOF	rest Resu	iis					
	No NDs	NDs = DL	NDs = DL/2	lormal RO				
Correlation Coefficient R	0.692	0.814	0.742	0.68				
	<u>I</u>	I.						
		Crit. (0.05)	Cor	nclusion wit	h Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.509		Data Not N					
Shapiro-Wilk (NDs = DL)	0.666							
Shapiro-Wilk (NDs = DL/2)	0.576	0.829	Data Not N	Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.495	0.829	Data Not N	Normal				
Lilliefors (Detects Only)	0.486	0.304	Data Not N	Normal				
Lilliefors (NDs = DL)	0.357	0.274	Data Not N	Normal				
Lilliefors (NDs = DL/2)	0.427	0.274	Data Not N	Normal				
Lilliefors (Normal ROS Estimates)	0.455	0.274	Data Not N	Normal				
Ga	mma GOF	Test Resu	ilts					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R	0.874	0.942	0.91	0.917				1
	ı	1						

				•			
		Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)		0.725					
Kolmogorov-Smirnov (Detects Only)		0.319	Data Not (	Gamma Dis	stributed		
Anderson-Darling (NDs = DL)		0.74					
Kolmogorov-Smirnov (NDs = DL)		0.286	Data Not 0	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)	1.428	0.737					
Kolmogorov-Smirnov (NDs = DL/2)	0.428	0.285	Data Not 0	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	1.239	0.742					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.391	0.286	Data Not (	Gamma Dis	stributed		
Log	normal GO	F Test Res	ults				
	No NDs	NDc - DI	NDs = DL/2	Log POS			
Correlation Coefficient R		0.903	0.861	0.753			
Correlation Coefficient R	0.0	0.903	0.001	0.755			
	Tootyolyo	C=:+ (0.0E)	Co		+h ∧ nha/∩	OE)	
Chanira Wills (Datasta Onto)		Crit. (0.05)		nclusion wi	пт Аірпа(О	.00)	
Shapiro-Wilk (Detects Only)			Data Not I				
Shapiro-Wilk (NDs = DL)			Data Not I	-			
Shapiro-Wilk (NDs = DL/2)				-			
Shapiro-Wilk (Lognormal ROS Estimates)			Data Not L	J			
Lilliefors (Detects Only)			Data Not I				
Lilliefors (NDs = DL)			Data Not I				
Lilliefors (NDs = DL/2)			Data Not I				
Lilliefors (Lognormal ROS Estimates)	0.45	0.274	Data Not I	_ognormal			
Thallium (background)	N Ob -	NI Min	NI \ / = 1; d	Datasta	NID-	0/ ND-	
Dow Ctatistics		Num Miss 1	27	Detects 16	NDs 11	% NDs 40.74%	
Raw Statistics	20	ı	21	10	11	40.74%	
	Number		Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	11	1.0000E-4	0.002	7.5455E-4	4.0000E-4	6.7729E-4	
Statistics (Non-Detects Only)	16	3.5000E-4	0.017	0.00234	0.0014	0.00392	
Statistics (All: NDs treated as DL value)	27	1.0000E-4	0.017	0.00169	0.0013	0.00311	
Statistics (All: NDs treated as DL/2 value)	27	5.0000E-5	0.017	0.00154	0.0013	0.00314	
Statistics (Normal ROS Imputed Data)	27	-0.00528	0.017	3.0388E-4	0.0013	0.00405	
Statistics (Gamma ROS Imputed Data)	27	3.5000E-4	0.017	0.00546	0.0015	0.00486	
Statistics (Lognormal ROS Imputed Data)	27	2.5581E-4	0.017	0.0016	0.0013	0.00312	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)		1.105	0.00179	-	0.741	-0.114	
Statistics (NDs = DL)	1.061	0.967	0.0016	-6.921	0.963	-0.139	
Statistics (NDs = DL/2)	0.814	0.748	0.00189		1.191	-0.165	
Statistics (Gamma ROS Estimates)	1.118	1.019	0.00488		1.097	-0.192	
Statistics (Lognormal ROS Estimates)				-6.963	0.853	-0.122	
No	ormal GOF	Test Resu	its				
	No NDs	NDs = DL	NDs = DL/2	Iormal RO			
Correlation Coefficient R	0.55	0.564	0.563	0.807			
Ì							
	Test value	Crit. (0.05)	Col	nclusion wi	th Alpha/∩	05)	

Shapiro-Wilk (Detects Only)	0.336	0.887	Data Not I	Normal			
Shapiro-Wilk (NDs = DL)		0.923	Data Not I	Normal			
Shapiro-Wilk (NDs = DL/2)	0.35	0.923	Data Not I	Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.684	0.923	Data Not I	Normal			
Lilliefors (Detects Only)	0.472	0.213	Data Not I	Normal			
Lilliefors (NDs = DL)	0.424	0.167	Data Not I	Normal			
Lilliefors (NDs = DL/2)	0.431	0.167	Data Not I	Normal			
Lilliefors (Normal ROS Estimates)	0.31	0.167	Data Not I	Normal			
Ga	mma GOF	Test Resu	lts				
	No NDs	NDs = DL	NDs = DL/	amma RO			
Correlation Coefficient R	0.737	0.743	0.759	0.862			
Correlation Coefficient IV	0.737	0.743	0.755	0.002			
	Toet value	Crit. (0.05)	Co	nclusion wi	ith Alpha(A	05)	
Andrews Dedice (Detects Only)	3.758		CO	ilciusion wi	itii Aipiia(u	.03)	
Anderson-Darling (Detects Only)		0.758	Det- No.	Oaw D'	atella : .t !		
Kolmogorov-Smirnov (Detects Only)	0.443	0.22	Data Not (	Gamma Dis	stributed		
Anderson-Darling (NDs = DL)		0.772					
Kolmogorov-Smirnov (NDs = DL)			Data Not	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)	1.997	0.781					
Kolmogorov-Smirnov (NDs = DL/2)			Data Not	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	3.301	0.771					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.303	0.173	Data Not	Gamma Dis	stributed		
Logi	normal GO	F Test Res	ults				
	No NDs	NDs = DL	NDs = DL/	Log ROS			
Correlation Coefficient R	0.742	0.917	0.929	0.903			
	Test value	Crit. (0.05)	Co	nclusion wi	ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.601			Lognormal	. ,	,	
Shapiro-Wilk (NDs = DL)	0.867			Lognormal			
Shapiro-Wilk (NDs = DL/2)	0.88			Lognormal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.834			Lognormal			
Lilliefors (Detects Only)	0.384			Lognormal			
Lilliefors (NDs = DL)							
	0.21		Data Not				
Lilliefors (NDs = DL/2)				Lognormal			
Lilliefors (Lognormal ROS Estimates)	0.221	0.167	Data Not I	Lognormal			
Nata Ochalis dan as district	DI 10						
Note: Substitution methods such as DL or	טט2 are n	ot recomm	enaea.				
The Way (var. Od)							
Thallium (mw-61)							
	T	T			T	T	
		Num Miss			NDs	% NDs	
Raw Statistics	18	0	18	10	8	44.44%	
	Number		Maximum		Median	SD	
Statistics (Non-Detects Only)	8	4.0000E-4	0.002	6.8750E-4	4.0000E-4	5.6930E-4	-
Statistics (Non-Detects Only)	10	1.1000E-4	1.8000E-4	1.4800E-4	1.5000E-4	1.9322E-5	
Statistics (All: NDs treated as DL value)	18	1.1000E-4	0.002	3.8778E-4	1.7000E-4	4.5798E-4	
Statistics (All: NDs treated as DL/2 value)	18	1.1000E-4	0.001	2.3500E-4	1.7000E-4	2.0876E-4	
Statistics (Normal ROS Imputed Data)	18	1.1000E-4		1.4800E-4			
Statistics (Gamma ROS Imputed Data)	18	1.1000E-4			1.7000E-4		
Statistics (Lognormal ROS Imputed Data)	18			1.4769E-4			
( ) impatou bata)							

	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		+
Statistics (Non-Detects Only)	61.84	43.35	2.3933E-6	-	0.136	-0.0154		
Statistics (NDs = DL)	1.485	1.274	2.6118E-4	-8.228	0.795	-0.0967		
Statistics (NDs = DL/2)	2.929		8.0243E-5		0.52	-0.0609		
Statistics (Gamma ROS Estimates)	0.42	0.387	0.0108	-6.95	2.161	-0.311		_
Statistics (Lognormal ROS Estimates)	-			-8.826	0.114	-0.013		+
No	rmal GOF	Test Resu	lts					
			NDs = DL/2					
Correlation Coefficient R	0.972	0.755	0.695	0.978				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	05)		
Shapiro-Wilk (Detects Only)	0.959		Data Appe		ui Aipiia(o.	00)		
Shapiro-Wilk (NDs = DL)	0.592		Data Not N					
Shapiro-Wilk (NDs = DL/2)	0.592		Data Not I					+
Shapiro-Wilk (Normal ROS Estimates)	0.968		Data Not I					+
Lilliefors (Detects Only)	0.968		Data Appe					+
Lilliefors (Detects Only)  Lilliefors (NDs = DL)	0.167		Data Not N					+
Lilliefors (NDs = DL/2)			Data Not I					_
Lilliefors (NDS = DL/2)  Lilliefors (Normal ROS Estimates)	0.4 0.167							
Lillielois (Normal ROS Estimates)	0.167	0.202	Data Appe	ear Normai				
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDc - DI	NDc - DL/	amma RO				
Correlation Coefficient R	0.967	0.911	0.825	0.673				
		I						
		Crit. (0.05)	Coi	nclusion wi	th Alpha(0.	05)		
Anderson-Darling (Detects Only)	0.335		D	- · ·		D:	ļ	
Kolmogorov-Smirnov (Detects Only)	0.159		Detected I	Data Appea	ar Gamma	Distributed	-	
Anderson-Darling (NDs = DL)	1.533	0.757	D. I. N. I.	D:			-	
Kolmogorov-Smirnov (NDs = DL)	0.261	0.207	Data Not (	Gamma Dis	stributea		-	
Anderson-Darling (NDs = DL/2)	2.393	0.746	D. I. N. I.	D:				
Kolmogorov-Smirnov (NDs = DL/2)	0.361	0.205	Data Not (	Gamma Dis	stributea		-	
derson-Darling (Gamma ROS Estimates)	3.008	0.817	Data Nat (	Commo Dio	stributad			
Kolmogorov-Smirnov (Gamma ROS Est.)	0.355	0.217	Data Not C	Gamma Dis	stributea			
Logr	normal GO	F Test Res	sults					
	NI. NID	ND 5:	lin- 5: "	1 500				
Correlation Coefficient R	No NDs 0.96	NDs = DL 0.919	NDs = DL/2 0.851	Log ROS 0.972				
23dialion 200moloni IV	0.00	3.010	3.001	5.072				
		Crit. (0.05)		nclusion wi		05)		
Shapiro-Wilk (Detects Only)	0.937			ear Lognorr	nal		<b> </b>	
Shapiro-Wilk (NDs = DL)	0.846		Data Not I				<u> </u>	
Shapiro-Wilk (NDs = DL/2)	0.744	0.897	Data Not L				ļ	
Shapiro-Wilk (Lognormal ROS Estimates)	0.957	0.897		ear Lognorr			<u> </u>	
Lilliefors (Detects Only)	0.164			ear Lognorr	nal			
Lilliefors (NDs = DL)	0.246		Data Not I					
Lilliefors (NDs = DL/2)	0.319		Data Not L				ļ	
Lilliefors (Lognormal ROS Estimates)	0.167	0.202	Data Appe	ear Lognorr	nal		<del>                                     </del>	
Note: Substitution methods such as DL or	DI /2 ere -	ot recemm	ended					
tote. Gubstitution methods such as DL of		or recomm	eriueu.				i	

Num Obs	Num Miss						
	Num Miss						$\overline{}$
	Num Miss						
18				NDs	% NDs		
1	0	18	11	7	38.89%		_
Number	Minimum	Maximum	Mean	Median	SD		
7	1.0000E-4	0.002	6.7143E-4	4.0000E-4	6.4476E-4		
11	9.3000E-5	5.3000E-4	1.7573E-4	1.5000E-4	1.2344E-4		1
18	9.3000E-5	0.002	3.6850E-4	1.6500E-4	4.6639E-4		1
18	5.0000E-5	0.001	2.3794E-4	1.6500E-4	2.2822E-4		
18	1.1296E-6	5.3000E-4	1.5708E-4	1.5000E-4	1.0794E-4		
18	9.3000E-5	0.01	0.004	1.9500E-4	0.00493		
18	6.9824E-5	5.3000E-4	1.5784E-4	1.4509E-4	1.0060E-4		
K hat	K Star		_	_	_		
				0.491	-0.0559		
1.275				0.873	-0.105		
1.981			-8.617	0.701	-0.0814		
0.402	0.372	0.00994	-7.159	2.129	-0.297		
			-8.867	0.443	-0.0499		
ormal GOF	Test Resu	lts					
No NDs	NDs = DL	NDs = DL/2	lormal RO				
0.77	0.764	0.794	0.842				
Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
	0.85	Data Not I	Normal				
	0.897	Data Not I	Normal				
	0.897	Data Not I	Normal				
		Data Not I	Normal				
	0.251	Data Not I	Normal				
	0.202	Data Not I	Normal				
0.272	0.202	Data Not I	Normal				
mma GOF	Test Resu	ılts					-
	T	T					
0.869	0.928	0.919	0.716				
Toet value	Crit (0.05)	0-	nolucion :::	th Alpha/A	05)		
		C0	iciusion Wi	пт Аірпа(0	.00)		
		Data Nat /	Camma Di	stributad			
		שמום ואטנ (	aaniiiid Dis	รเทมนเยน			+
		Data Not (	Samma Dir	stributed			-
		שמים ואטני (	Janina Di	รเกษนเซน			
		Data Not (	Samma Dir	stributed			
		שמנט ואטני	Janinia Di	Julioulea			
		Data Not (	Gamma Dis	stributed			+
1	I	I					
normal GO	F Test Res	ults					
	18	18   9.3000E-5     18   5.0000E-5     18   1.1296E-6     18   9.3000E-5     18   9.3000E-5     18   9.3000E-5     18   6.9824E-5     K hat	18	18	18	18	18

WOLT	OIVII I IOC	OL GOOD	NESS OF FIT STA	(1101100		
	No NDs	NDs = DL	NDs = DL/2 Log R0	OS		
Correlation Coefficient R	0.9	0.941	0.951 0.9	31		
			1			
	Test value	Crit. (0.05)	Conclusion	with Alpha(0	).05)	
Shapiro-Wilk (Detects Only)	0.825	0.85	Data Not Lognorn	nal		
Shapiro-Wilk (NDs = DL)	0.881	0.897	Data Not Lognorn	nal		
Shapiro-Wilk (NDs = DL/2)	0.917	0.897	Data Appear Logi	ormal		
Shapiro-Wilk (Lognormal ROS Estimates)	0.888	0.897	Data Not Lognorn	nal		
Lilliefors (Detects Only)	0.234	0.251	Data Appear Logi	ormal		
Lilliefors (NDs = DL)	0.204	0.202	Data Not Lognorn	nal		
Lilliefors (NDs = DL/2)	0.224	0.202	Data Not Lognorn	nal		
Lilliefors (Lognormal ROS Estimates)	0.169	0.202	Data Appear Logi	ormal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.			
Thallium (mw-75)						
	Num Obs	Num Miss	Num Valid Detec	ts NDs	% NDs	
Raw Statistics	11	0	11 2	9	81.82%	
04:1: (41. 5 : 6 : .	Number		Maximum Mea		SD	
Statistics (Non-Detects Only)	9	4.0000E-4		E-44.0000E-		
Statistics (Non-Detects Only)	2		1.8000E-41.7500			
Statistics (All: NDs treated as DL value)	11	1.7000E-4		E-44.0000E-		
Statistics (All: NDs treated as DL/2 value)	11	1.7000E-4		E-42.0000E-		
Statistics (Normal ROS Imputed Data)	11		1.8739E-41.7500			
Statistics (Gamma ROS Imputed Data)	11	N/A	N/A N/A	N/A	N/A	
Statistics (Lognormal ROS Imputed Data)	11		1.8777E-4 1.7506			
	K hat	K Star	Theta hat Log Me	_	_	
Statistics (Non-Detects Only)	N/A	N/A	N/A N/A	N/A	N/A	
Statistics (NDs = DL)	2.035	1.54	3.0157E-4 -7.66		-0.0955	
Statistics (NDs = DL/2)	2.788	2.088			-0.0708	
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A N/A	N/A	N/A	
Statistics (Lognormal ROS Estimates)			8.65	0.0405	-0.00468	
No	rmal GOF	Test Resu	lts			
Correlation Coefficient R	No NDs	NDs = DL 0.833	NDs = DL/alormal I 0.778 0.9			
CONSIGNATION COMMONTH		0.000	3.770 0.0	-		
		Crit. (0.05)	Conclusion	with Alpha(0	0.05)	
Shapiro-Wilk (NDs = DL)	0.713	0.85	Data Not Normal			
Shapiro-Wilk (NDs = DL/2)	0.622	0.85	Data Not Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.983	0.85	Data Appear Norr	nal		
Lilliefors (Detects Only)	N/A	N/A	_			
Lilliefors (NDs = DL)	0.382	0.251				
Lilliefors (NDs = DL/2)	0.411	0.251	Data Not Normal			
Lilliefors (Normal ROS Estimates)	0.123	0.251	Data Appear Norr	nal		
Ga	mma GOF	Test Resu	ılts			
	No NDs		NDs = DL/amma			 
Correlation Coefficient R	N/A	0.938	0.897 0.4	15		

	Test value	Crit. (0.05)	Cor	oclusion w	ith Alpha(0	05)	
Anderson-Darling (Detects Only)	N/A	N/A	, со	iciusion w		.00)	
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)	0.992	0.739					
Kolmogorov-Smirnov (NDs = DL)	0.355		Data Not C	Names Di	aterila uta al		
• • • • • • • • • • • • • • • • • • • •			Data NOLC	adillilla Di	siributeu		
Anderson-Darling (NDs = DL/2)	1.796	0.735	D N	D:			
Kolmogorov-Smirnov (NDs = DL/2)	0.43	0.257	Data Not C	amma Di	stributea		
derson-Darling (Gamma ROS Estimates)	N/A	0.726					
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.254					
Logr	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	1	0.929	0.832	N/A			
	Test value	Crit. (0.05)	Cor	nclusion w	th Alpha(0	.05)	
Shapiro-Wilk (NDs = DL)	0.869	0.85	Data Appe	ar Lognor	mal		
Shapiro-Wilk (NDs = DL/2)	0.698	0.85	Data Not L	.ognormal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.983	0.85	Data Appe		mal		
Lilliefors (Detects Only)	N/A	N/A					
Lilliefors (NDs = DL)	0.315	0.251	Data Not L	.ognormal			
Lilliefors (NDs = DL/2)	0.417	0.251		-			
,	0.123	0.251			mal		
		ot recomm					
Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Thallium (mw-8)	DL/2 are n			Detects	NDs	% NDs	
Note: Substitution methods such as DL or	DL/2 are n		ended.			% NDs 88.89%	
Note: Substitution methods such as DL or Fhallium (mw-8)	DL/2 are n	Num Miss 0	Num Valid	Detects 1	NDs 8	88.89%	
Note: Substitution methods such as DL or  Thallium (mw-8)  Raw Statistics  Varning: Only one distinct data value was	DL/2 are n  Num Obs  9  detected!	Num Miss 0 ProUCL (o	Num Valid 9	Detects 1 software)	NDs 8	88.89% be used or	
lote: Substitution methods such as DL or  Thallium (mw-8)  Raw Statistics  Varning: Only one distinct data value was	DL/2 are n  Num Obs  9  detected!	Num Miss 0 ProUCL (o	Num Valid 9	Detects 1 software)	NDs 8	88.89% be used or	
Note: Substitution methods such as DL or Thallium (mw-8)  Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values	Num Obs 9 detected!	Num Miss 0 ProUCL (o	Num Valid 9	Detects 1 software) n to estima	NDs 8 should notate environ	88.89% be used or	
Note: Substitution methods such as DL or Thallium (mw-8)  Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values	Num Obs 9 detected!	Num Miss 0 ProUCL (o	Num Valid 9 or any other	Detects 1 software) n to estima	NDs 8 should notate environ	88.89% be used or	
Note: Substitution methods such as DL or Thallium (mw-8)  Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values	Num Obs 9 detected!	Num Miss 0 ProUCL (o	Num Valid 9 or any other	Detects 1 software) n to estima	NDs 8 should notate environ	88.89% be used or	
lote: Substitution methods such as DL or  Thallium (mw-8)  Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness	Num Obs 9 detected! s determine	Num Miss 0  ProUCL (o ed by the P	Num Valid 9 or any other	Detects 1 software) n to estima	NDs 8 should not ate environ	88.89% be used or	
Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options	Num Obs 9 detected! s determine	Num Miss 0  ProUCL (or ed by the Proble Thalliung the Statistics	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estima	NDs 8 should not ate environ	88.89% be used or	
Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation ProUCL 5.	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Proble Thalliunt Statistics 8 12:03:55	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estimate was not produced by the software with No.	NDs 8 should not ate environ ocessed!	88.89% be used or	
Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation  From File MultiUnit_	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Proble Thalliunt Statistics 8 12:03:55	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estimate was not produced by the software with No.	NDs 8 should not ate environ ocessed!	88.89% be used or	
Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation  From File  MultiUnit  Full Precision  OFF	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Proble Thalliunt Statistics 8 12:03:55	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estimate was not produced by the software with No.	NDs 8 should not ate environ ocessed!	88.89% be used or	
Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation  From File MultiUnit_	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Proble Thalliunt Statistics 8 12:03:55	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estimate was not produced by the software with No.	NDs 8 should not ate environ ocessed!	88.89% be used or	
Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation From File MultiUnit Full Precision Confidence Coefficient  0.95	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Proble Thalliunt Statistics 8 12:03:55	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estimate was not produced by the software with No.	NDs 8 should not ate environ ocessed!	88.89% be used or	
Raw Statistics  Varning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation From File MultiUnit Full Precision Confidence Coefficient  0.95	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Proble Thalliung the Statistics 8 12:03:55	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estimate was not produced by the software with No.	NDs 8 should not ate environ ocessed!	88.89% be used or	
Raw Statistics  Warning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation From File MultiUnit Full Precision Confidence Coefficient  0.95	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Problem Thalling the Statistics 8 12:03:55  Assessn	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estima was not pro	NDs 8 should not ate environ ocessed!	88.89% be used or mental par	
Raw Statistics  Warning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation ProUCL 5. From File MultiUnit_ Full Precision OFF  Confidence Coefficient 0.95  Fluoride (background)	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Pable Thalliunt Statistics 8 12:03:55  _Assessn	Num Valid 9 or any other project Team of Data Se	Detects 1 software) n to estima was not pro ets with No	NDs 8 should notate environ ocessed! n-Detects	be used or mental par	
Raw Statistics  Warning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation From File MultiUnit Full Precision Confidence Coefficient  0.95	Num Obs 9 detected! s determine set for varia	Num Miss 0  ProUCL (or ed by the Problem Thalling the Statistics 8 12:03:55  Assessn	Num Valid 9 or any other Project Tean um (mw-8) v for Data Se	Detects 1 software) n to estima was not pro	NDs 8 should notate environ ocessed! n-Detects	88.89% be used or mental par	
Raw Statistics  Warning: Only one distinct data value was sted to use alternative site specific values  The data s  Goodness  User Selected Options  Date/Time of Computation ProUCL 5. From File MultiUnit_ Full Precision OFF  Confidence Coefficient 0.95  Fluoride (background)	Num Obs 9 detected! s determine set for varia	Num Miss  0  ProUCL (or ed by the Proble Thallium to Statistics 8 12:03:55  _Assessm  Num Miss 0	Num Valid 9 or any other project Team of Data Se	Detects 1 software) n to estima was not pro ets with No	NDs 8 should notate environ ocessed! n-Detects	be used or mental par	

	011111100	70L GOOD	11200 01	111 017111	31100			
Statistics (Non-Detects Only)	13	0.79	3.2	1.842	1.9	0.591	1	
Statistics (All: NDs treated as DL value)	28	0.08	5	2.18	2	1.353		
Statistics (All: NDs treated as DL/2 value)	28	0.04	3.2	1.518	1.9	0.802		
Statistics (Normal ROS Imputed Data)	28	0.336	3.2	1.46	1.586	0.662		
Statistics (Gamma ROS Imputed Data)	28	0.638	3.2	1.509	1.57	0.599		
Statistics (Lognormal ROS Imputed Data)	28	0.713	3.2	1.498	1.496	0.593		
							·	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	9.087	7.041	0.203	0.555	0.37	0.666		
Statistics (NDs = DL)	1.879	1.702	1.16	0.49	0.931	1.9		
Statistics (NDs = DL/2)	1.825	1.654	0.831	0.119	1.017	8.563		
Statistics (Gamma ROS Estimates)	6.495	5.823	0.232	0.332	0.412	1.241		
Statistics (Lognormal ROS Estimates)				0.328	0.401	1.22		
,								
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/	lormal RO				+
Correlation Coefficient R	0.908	0.955	0.941	0.968				+
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	05)		
Shapiro-Wilk (Detects Only)	0.849		Data Not I			/		
Shapiro-Wilk (NDs = DL)			Data Not					
Shapiro-Wilk (NDs = DL/2)	0.883		Data Not					
Shapiro-Wilk (Normal ROS Estimates)				ear Normal				
Lilliefors (Detects Only)			Data Not				T	
Lilliefors (NDs = DL)			Data Not I					
Lilliefors (NDs = DL/2)			Data Not I					
Lilliefors (Normal ROS Estimates)	0.139			ear Normal				
Limetors (Normal Noo Estimates)	0.100	0.104	Data App	our reorman				
Ga	mma GOF	Test Resu	ılte					
	IIIIIa aoi	100111000						-
	No NDs	NDs = DI	VDs = DL/	amma RO				
Correlation Coefficient R		0.934	0.856	0.969				
Correlation Coefficient 10	0.504	0.554	0.000	0.303				
	Toet value	Crit. (0.05)	Co	nclusion wi	th Alpha/A	05)		
Anderson-Darling (Detects Only)	1.209	0.734	Co	riciusion wi	ui Aipiia(u	.03)		
			Data Nat (	Commo Dio	tributad			-
Kolmogorov-Smirnov (Detects Only)  Anderson-Darling (NDs = DL)	0.273 1.109	0.237 0.759	Data NUL	Gamma Dis	si ibuteu			+
Kolmogorov-Smirnov (NDs = DL)	0.204	0.759	Data Nat	Gamma Dis	tributad			+
Anderson-Darling (NDs = DL/2)	2.559	0.168	שמום ואטני	aaniiid Dis	ะเกมนเษต			
			Doto Not	Commo Di-	tribute d			-
Kolmogorov-Smirnov (NDs = DL/2)	0.284	0.168	Data Not	Gamma Dis	uibutea			-
nderson-Darling (Gamma ROS Estimates)		0.748	Doto ot!	Data are:	Λ n n n - · · · ·	noto Carr		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.141	0.100	Defected	Data appea	ıı Approxin	iate Gamm		
1		E Tast D	lta					
Logi	iormai GO	F Test Res	บแร					
	No ND-	NDs = D'	1De - Di "	Loc DOC				<u> </u>
0	No NDs			Log ROS				
Correlation Coefficient R	0.884	0.912	0.851	0.969				
	- · ·	0 :	_			05)		
<u> </u>		Crit. (0.05)		nclusion wi	tn Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.8		Data Not					
Shapiro-Wilk (NDs = DL)	0.84	0.924		Lognormal				
Shapiro-Wilk (NDs = DL/2)	0.735	0.924	Data Not I	Lognormal				
Shapiro-Wilk (Lognormal ROS Estimates)	0.931	0.924	_	ear Lognorr				+

Lilliofora (Dotoota Only)	0.285	0.224	Data Nat	oanormol			
Lilliefors (Detects Only)  Lilliefors (NDs = DL)	0.243		Data Not				
· · · · · · · · · · · · · · · · · · ·	0.243		Data Not	-			
Lilliefors (NDs = DL/2)	0.278		Data Not	-			
Lilliefors (Lognormal ROS Estimates)	0.141	0.164	Data App	ear Lognor	mai		
Note: Substitution methods such as DL or I	DL/2 are no	ot recomm	ended.				
Fluoride (mw-61)							
i idolide (iliw-01)							
Raw Statistics							
Number of Valid Obs	servations	18					
Number of Distinct Obs		6					
	Minimum	0.91					
	Maximum	1.6					
Mean of	Raw Data	1.223					
Standard Deviation of	Raw Data	0.146					
2.22.22.22.2	Khat	74.49				1	
	Theta hat	0.0164				1	
	Kstar	62.11				1	
-	Theta star	0.0197					
Mean of Log Transfor		0.194				1	
Standard Deviation of Log Transfor		0.119					
Statistics 2 Stration of Log Handler	Data	5.110				1	
Normal GOF Test Result	ts						
Tromar der Toor Toor							
Correlation Co	efficient R	0.945					
Shapiro Wilk Tes		0.917					
Shapiro Wilk Critical (0.		0.897					
Approximate Shapiro Wil	-	0.0958					
Lilliefors Tes		0.188					
Lilliefors Critical (0.		0.202					
Data appear Normal at (0.05) Significance		0.202					
Tala appear remarks (cross) eig.misanes							
Gamma GOF Test Resul	ts						
Correlation Co	efficient R	0.952					
A-D Tes	st Statistic	0.676					
A-D Critical (0.	05) Value	0.738					
K-S Tes	st Statistic	0.173					
K-S Critical(0.0	*	0.203					
Data appear Gamma Distributed at (0.05)	Significanc	e Level					
Lognormal GOF Test Resi	ults						
	,						
Correlation Co		0.949					
Shapiro Wilk Tes		0.924					
Shapiro Wilk Critical (0.	,	0.897					
Approximate Shapiro Wil		0.125					
Lilliefors Tes		0.182					
Lilliefors Critical (0.	-	0.202					
Data appear Lognormal at (0.05) Significar	nce Level						
Fluoride (mw-7)							
		_	_				

Num Obs   Num Miss Num Valid   Detects   NDs   % NDs		N 0:			<b>5</b>	NE	0/ 1:5		T
Number   Number   Number   Minimum   Maximum						_			
Statistics (Non-Detects Only)   15	Raw Statistics	18	0	18	3	15	83.33%		
Statistics (Non-Detects Only)   15							0.0		
Statistics (Non-Detects Only)   3	0 (1 (1 (1								
Statistics (All: NDs treated as DL value)   18			-						
Statistics (All: NDs treated as DL/2 value)   18	,								
Statistics (Normal ROS Imputed Data)   18	` '								
Statistics (Gamma ROS Imputed Data)   18	` '								
Statistics (Lognormal ROS Imputed Data)   18									
Statistics (Non-Detects Only)   N/A   N/	,								
Statistics (Non-Detects Only)   N/A   N/A   N/A   N/A   N/A   N/A   N/A   N/A   N/A   Statistics (NDs = DL)   2.208   1.877   0.4   -0.367   0.634   -1.725	Statistics (Lognormal ROS Imputed Data)	18	0.326	0.4	0.358	0.357	0.0189		
Statistics (Non-Detects Only)   N/A   N/A   N/A   N/A   N/A   N/A   N/A   N/A   N/A   Statistics (NDs = DL)   2.208   1.877   0.4   -0.367   0.634   -1.725			ı						
Statistics (NDs = DL)   2.208   1.877   0.4   -0.367   0.634   -1.725		K hat	K Star	Theta hat	Log Mean	Log Stdv	_		
Statistics (NDs = DL/2)   2.725   2.308   0.173   -0.945   0.562   -0.595     Statistics (Gamma ROS Estimates)   367.7   306.4   9.7251E-4   -1.03   0.0535   -0.052     Statistics (Lognormal ROS Estimates)         -1.03   0.0523   -0.0508       Normal GOF Test Results   Normal GOF Test Results     No NDs   NDs = DL NDs = DL/‡ormal RO      Correlation Coefficient R   0.866   0.724   0.7   0.984     Test value Crit. (0.05)   Conclusion with Alpha(0.05)     Shapiro-Wilk (Detects Only)   0.75   0.767   Data Not Normal     Shapiro-Wilk (NDs = DL)   0.55   0.897   Data Not Normal     Shapiro-Wilk (NDs = DL/2)   0.518   0.897   Data Not Normal     Shapiro-Wilk (Normal ROS Estimates)   0.97   0.897   Data Appear Normal     Lilliefors (NDs = DL/2)   0.427   0.202   Data Not Normal     Lilliefors (NDs = DL/2)   0.427   0.202   Data Not Normal     Lilliefors (NDs = DL/2)   0.427   0.202   Data Not Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Not Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Not Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal     Correlation Coefficient R   N/A   0.854   0.82   0.985     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)   0.356   0.206   Data Not Gamma Distributed     Anderson-Darling (NDs = DL/2)   2.449   0.748	, , , , , , , , , , , , , , , , , , , ,	N/A	N/A	N/A	N/A				
Statistics (Gamma ROS Estimates)   367.7   306.4   9.7251E-4   -1.03   0.0535   -0.052	` '	2.208	1.877	0.4	-0.367	0.634	-1.725		
No NDs	,	2.725	2.308		-0.945	0.562			
No NDs   NDs = DL NDs = DL/Jormal RO	*	367.7	306.4	9.7251E-4	-1.03	0.0535			
No NDs   NDs = DL NDs = DL/Alormal RO	Statistics (Lognormal ROS Estimates)				-1.03	0.0523	-0.0508		
No NDs   NDs = DL NDs = DL/Alormal RO				'					
Test value   Crit. (0.05)   Conclusion with Alpha(0.05)	No	rmal GOF	Test Resu	lts					
Test value   Crit. (0.05)   Conclusion with Alpha(0.05)									
Test value   Crit. (0.05)   Conclusion with Alpha(0.05)     Shapiro-Wilk (Detects Only)   0.75   0.767   Data Not Normal     Shapiro-Wilk (NDs = DL)   0.55   0.897   Data Not Normal     Shapiro-Wilk (NDs = DL/2)   0.518   0.897   Data Not Normal     Shapiro-Wilk (Normal ROS Estimates)   0.97   0.897   Data Appear Normal     Lilliefors (Detects Only)   0.385   0.425   Data Appear Normal     Lilliefors (NDs = DL)   0.427   0.202   Data Not Normal     Lilliefors (NDs = DL/2)   0.457   0.202   Data Not Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal     Correlation Coefficient R   N/A   0.854   0.82   0.985     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)   1.941   0.751     Kolmogorov-Smirnov (NDs = DL)   0.356   0.206   Data Not Gamma Distributed     Anderson-Darling (NDs = DL/2)   2.449   0.748		No NDs	NDs = DL	NDs = DL/2	Iormal RO				
Shapiro-Wilk (Detects Only)   0.75   0.767   Data Not Normal	Correlation Coefficient R	0.866	0.724	0.7	0.984				
Shapiro-Wilk (Detects Only)   0.75   0.767   Data Not Normal									
Shapiro-Wilk (NDs = DL)   0.55   0.897   Data Not Normal     Shapiro-Wilk (NDs = DL/2)   0.518   0.897   Data Not Normal     Shapiro-Wilk (Normal ROS Estimates)   0.97   0.897   Data Appear Normal     Lilliefors (Detects Only)   0.385   0.425   Data Appear Normal     Lilliefors (NDs = DL)   0.427   0.202   Data Not Normal     Lilliefors (NDs = DL/2)   0.457   0.202   Data Not Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal     Correlation Coefficient R   N/A   0.854   0.82   0.985     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)   1.941   0.751     Kolmogorov-Smirnov (NDs = DL/2)   2.449   0.748		Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	05)		
Shapiro-Wilk (NDs = DL)   0.55   0.897   Data Not Normal     Shapiro-Wilk (NDs = DL/2)   0.518   0.897   Data Not Normal     Shapiro-Wilk (Normal ROS Estimates)   0.97   0.897   Data Appear Normal     Lilliefors (Detects Only)   0.385   0.425   Data Appear Normal     Lilliefors (NDs = DL)   0.427   0.202   Data Not Normal     Lilliefors (NDs = DL/2)   0.457   0.202   Data Not Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal     Correlation Coefficient R   N/A   0.854   0.82   0.985     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)   0.356   0.206   Data Not Gamma Distributed     Anderson-Darling (NDs = DL/2)   2.449   0.748							,		
Shapiro-Wilk (NDs = DL/2)   0.518   0.897   Data Not Normal	• • • • • • • • • • • • • • • • • • • •	0.55							
Shapiro-Wilk (Normal ROS Estimates)   0.97   0.897   Data Appear Normal									
Lilliefors (Detects Only)   0.385   0.425   Data Appear Normal	• • • • • • • • • • • • • • • • • • • •								
Lilliefors (NDs = DL)   0.427   0.202   Data Not Normal     Lilliefors (NDs = DL/2)   0.457   0.202   Data Not Normal     Lilliefors (Normal ROS Estimates)   0.155   0.202   Data Appear Normal	,								
Lilliefors (NDs = DL/2)         0.457         0.202         Data Not Normal           Lilliefors (Normal ROS Estimates)         0.155         0.202         Data Appear Normal           Gamma GOF Test Results           No NDs   NDs = DL   NDs = DL   Appear Normal           Correlation Coefficient R           No NDs   NDs = DL   NDs = DL   Appear Normal           Correlation Coefficient R           N/A   0.854   0.82   0.985           Test value Crit. (0.05)   Conclusion with Alpha(0.05)           Anderson-Darling (Detects Only)   N/A									
Lilliefors (Normal ROS Estimates) 0.155 0.202 Data Appear Normal  Gamma GOF Test Results    No NDs   NDs = DL NDs = DL/‡amma RO									
No NDs   NDs = DL NDs = DL/2 amma RO	` '								
No NDs   NDs = DL NDs = DL/2 amma RO	Lillielois (Normal NOS Estimates)	0.133	0.202	рата Арре	ai Noilliai				
No NDs   NDs = DL NDs = DL/2 amma RO		COE	Toot Door						
Test value   Crit. (0.05)   Conclusion with Alpha(0.05)	Ga	IIIIIa GOF	Test nest	IIIS					
Test value   Crit. (0.05)   Conclusion with Alpha(0.05)		No NDo	NDs - DI	UDa - DI /	DO				
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) 1.941 0.751  Kolmogorov-Smirnov (NDs = DL) 0.356 0.206 Data Not Gamma Distributed  Anderson-Darling (NDs = DL/2) 2.449 0.748	O-malatian O-afficiant D								
Anderson-Darling (Detects Only)  Kolmogorov-Smirnov (Detects Only)  N/A  N/A  Anderson-Darling (NDs = DL)  Kolmogorov-Smirnov (NDs = DL)  Anderson-Darling (NDs = DL)  O.356  Data Not Gamma Distributed  Anderson-Darling (NDs = DL/2)  2.449  0.748	Correlation Coefficient R	IN/A	0.854	0.62	0.965				
Anderson-Darling (Detects Only)         N/A         N/A           Kolmogorov-Smirnov (Detects Only)         N/A         N/A           Anderson-Darling (NDs = DL)         1.941         0.751           Kolmogorov-Smirnov (NDs = DL)         0.356         0.206         Data Not Gamma Distributed           Anderson-Darling (NDs = DL/2)         2.449         0.748		T4 · l · -	O.:. (0.0E)	0		41- A11/O	05)		
Kolmogorov-Smirnov (Detects Only) N/A N/A  Anderson-Darling (NDs = DL) 1.941 0.751  Kolmogorov-Smirnov (NDs = DL) 0.356 0.206 Data Not Gamma Distributed  Anderson-Darling (NDs = DL/2) 2.449 0.748				Cor	iciusion wi	ırı Aipna(0.	UD)		
Anderson-Darling (NDs = DL) 1.941 0.751  Kolmogorov-Smirnov (NDs = DL) 0.356 0.206 Data Not Gamma Distributed  Anderson-Darling (NDs = DL/2) 2.449 0.748	3 (								
Kolmogorov-Smirnov (NDs = DL) 0.356 0.206 Data Not Gamma Distributed  Anderson-Darling (NDs = DL/2) 2.449 0.748	• • • • • • • • • • • • • • • • • • • •								
Anderson-Darling (NDs = DL/2) 2.449 0.748									
	• • • • • • • • • • • • • • • • • • • •			Data Not C	3amma Dis	stributed			
Kolmogorov-Smirnov (NDs = DL/2) 0.413 0.205 Data Not Gamma Distributed									
				Data Not C	Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates) 0.274 0.737	= -	0.274	0.737						
Kolmogorov-Smirnov (Gamma ROS Est.) 0.153 0.203 Data Appear Gamma Distributed	Kolmogorov-Smirnov (Gamma ROS Est.)	0.153	0.203	Data Appe	ar Gamma	Distribute	d		
								-	
Lognormal GOF Test Results	Logr	normal GO	F Test Res	sults					
No NDs   NDs = DL/2 Log ROS		No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R 0.866 0.885 0.854 0.984	Correlation Coefficient R	0.866	0.885	0.854	0.984				
			1	1					

		T					 
		Crit. (0.05)		nclusion wit	th Alpha(0.	.05)	
Shapiro-Wilk (Detects Only)	0.75	0.767		-			
Shapiro-Wilk (NDs = DL)		0.897		-			
Shapiro-Wilk (NDs = DL/2)		0.897		-			
Shapiro-Wilk (Lognormal ROS Estimates)		0.897		_			
Lilliefors (Detects Only)			Data Appe	_	nal		
Lilliefors (NDs = DL)		0.202	Data Not L	-			
Lilliefors (NDs = DL/2)		0.202					
Lilliefors (Lognormal ROS Estimates)	0.155	0.202	Data Appe	ar Lognorn	nal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Fluoride (mw-75)							
	Num Ohe	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	11	0	11	3	8	72.73%	
Raw Statistics	1.1	U	11	3	0	12.13%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	8	2	2	2	2	0	
Statistics (Non-Detects Only)	3	1.2	1.7	1.433	1.4	0.252	
Statistics (All: NDs treated as DL value)	11	1.2	2	1.845	2	0.288	
Statistics (All: NDs treated as DL/2 value)	11	1	1.7	1.118	1	0.232	
Statistics (Normal ROS Imputed Data)	11	0.981	1.886	1.433	1.4	0.274	
Statistics (Gamma ROS Imputed Data)	11	1.001	1.908	1.437	1.4	0.275	
Statistics (Lognormal ROS Imputed Data)	11	1.035	1.944	1.442	1.4	0.276	
	K hat	K Star		Log Mean	-	Log CV	
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A	
Statistics (NDs = DL)	38	27.69	0.0486	0.6	0.178	0.298	
Statistics (NDs = DL/2)	30.84	22.49	0.0363	0.0954	0.181	1.898	
Statistics (Gamma ROS Estimates)	29.62	21.6	0.0485	0.345	0.194	0.563	
Statistics (Lognormal ROS Estimates)				0.35	0.191	0.546	
No.	rmal GOF	Test Resu	lte				
, and the same of	illiai GOI	rest nesu	113				
	No NDs	NDs = DL	NDs = DL/2	lormal RO			
Correlation Coefficient R	0.993	0.784	0.771	0.995			
	Test value	Crit. (0.05)	Cor	nclusion wit	th Alpha(0.	.05)	
Shapiro-Wilk (Detects Only)	0.987	0.767	Data Appe	ar Normal			
Shapiro-Wilk (NDs = DL)	0.618	0.85	Data Not N	Normal			
Shapiro-Wilk (NDs = DL/2)		0.85	Data Not N	Vormal			
Shapiro-Wilk (Normal ROS Estimates)	0.983	0.85	Data Appe	ar Normal			
Lilliefors (Detects Only)	0.219	0.425	Data Appe				
Lilliefors (NDs = DL)		0.251	Data Not N				
Lilliefors (NDs = DL/2)		0.251	Data Not N				
Lilliefors (Normal ROS Estimates)		0.251	Data Appe	ar Normal			
Ga	mma GOF	Test Resu	ılts				
	No NDs		NDs = DL/2				
Correlation Coefficient R	N/A	0.746	0.815	0.994			
	Test value	Crit. (0.05)	Cor	nclusion wit	h Alpha(N	05)	
	. Cot value	J. 11. (0.00)	501	ISIUSIOII WII	/ upiia(0.	.00,	

Anderson-Darling (Detects Only)	N/A	N/A					
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)	2.153	0.729					
Kolmogorov-Smirnov (NDs = DL)	0.438	0.255	Data Not 0	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)	2.107	0.729					
Kolmogorov-Smirnov (NDs = DL/2)	0.436	0.255	Data Not 0	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	0.144	0.729					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.115		Data Appe	ar Gamma	Distribute	d	
l							
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Loa ROS			
Correlation Coefficient R	0.998	0.778	0.781	0.996			
Correlation Coemicient 1	0.000	0.770	0.701	0.550			
	Test value	Crit. (0.05)	Col	nclusion wi	th Alnha(0	05)	
Shanira Wills (Datasta Oaks)	0.996		Data Appe			.50,	
Shapiro-Wilk (Detects Only)	0.996				ııdı		
Shapiro-Wilk (NDs = DL)		0.85	Data Not L				
Shapiro-Wilk (NDs = DL/2)	0.617	0.85	Data Not L				
Shapiro-Wilk (Lognormal ROS Estimates)	0.985	0.85	Data Appe				
Lilliefors (Detects Only)	0.197		Data Appe	-	nal		
Lilliefors (NDs = DL)	0.427		Data Not L	-			
Lilliefors (NDs = DL/2)	0.428		Data Not L	-			
Lilliefors (Lognormal ROS Estimates)	0.101	0.251	Data Appe	ar Lognorr	nal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Fluoride (mw-8)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	9	0	9	3	6	66.67%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	6	0.4	5	1.767	1.4	1.745	
Statistics (Non-Detects Only)	3	0.68	1.1	0.897	0.91	0.21	
Statistics (All: NDs treated as DL value)	9	0.4	5	1.477			
Statistics (All: NDs treated as DL/2 value)	9	0.4	5			1 451	
,		0.2	2.5		0.91	1.451	
Estatistics (Normal BOS Imputed Data)		0.2	2.5	0.888	0.91	0.698	
Statistics (Normal ROS Imputed Data)	9	0.218	1.1	0.888 0.627	0.91 0.622	0.698 0.275	
Statistics (Gamma ROS Imputed Data)	9	0.218 0.281	1.1	0.888 0.627 0.643	0.91 0.622 0.628	0.698 0.275 0.256	
, , , , , , , , , , , , , , , , , , , ,	9	0.218	1.1	0.888 0.627	0.91 0.622	0.698 0.275	
Statistics (Gamma ROS Imputed Data)	9 9 9	0.218 0.281 0.402	1.1 1.1 1.1	0.888 0.627 0.643 0.675	0.91 0.622 0.628 0.641	0.698 0.275 0.256 0.222	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	9 9 9 K hat	0.218 0.281 0.402	1.1 1.1 1.1 Theta hat	0.888 0.627 0.643 0.675	0.91 0.622 0.628 0.641 Log Stdv	0.698 0.275 0.256 0.222 Log CV	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only)	9 9 9 K hat	0.218 0.281 0.402 K Star N/A	1.1 1.1 1.1 Theta hat N/A	0.888 0.627 0.643 0.675 Log Mean N/A	0.91 0.622 0.628 0.641 Log Stdv N/A	0.698 0.275 0.256 0.222 Log CV N/A	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDS = DL)	9 9 9 K hat N/A 1.671	0.218 0.281 0.402 K Star N/A 1.188	1.1 1.1 1.1 Theta hat N/A 0.884	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823	0.698 0.275 0.256 0.222 Log CV N/A 13.33	
Statistics (Gamma ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only)  Statistics (NDs = DL)  Statistics (NDs = DL/2)	9 9 9 K hat N/A 1.671 1.927	0.218 0.281 0.402 K Star N/A 1.188 1.359	1.1 1.1 1.1 Theta hat N/A	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDS = DL)	9 9 9 K hat N/A 1.671	0.218 0.281 0.402 K Star N/A 1.188	1.1 1.1 1.1 Theta hat N/A 0.884	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823	0.698 0.275 0.256 0.222 Log CV N/A 13.33	
Statistics (Gamma ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only)  Statistics (NDs = DL)  Statistics (NDs = DL/2)	9 9 9 K hat N/A 1.671 1.927	0.218 0.281 0.402 K Star N/A 1.188 1.359	1.1 1.1 1.1 Theta hat N/A 0.884 0.461	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates)	9 9 9 K hat N/A 1.671 1.927 6.896	0.218 0.281 0.402 K Star N/A 1.188 1.359 4.672	1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4 -0.516	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	9 9 9 K hat N/A 1.671 1.927 6.896	0.218 0.281 0.402 K Star N/A 1.188 1.359 4.672	1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4 -0.516	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	9 9 9 K hat N/A 1.671 1.927 6.896	0.218 0.281 0.402 K Star N/A 1.188 1.359 4.672	1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4 -0.516	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	9 9 9 K hat N/A 1.671 1.927 6.896	0.218 0.281 0.402  K Star N/A 1.188 1.359 4.672	1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4 -0.516 -0.439	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	9 9 9 K hat N/A 1.671 1.927 6.896	0.218 0.281 0.402  K Star N/A 1.188 1.359 4.672	1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4 -0.516 -0.439	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)  No	9 9 9 K hat N/A 1.671 1.927 6.896 	0.218 0.281 0.402  K Star N/A 1.188 1.359 4.672  Test Resu	1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933 	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4 -0.516 -0.439	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)  No	9 9 9 K hat N/A 1.671 1.927 6.896 ormal GOF No NDs 0.998	0.218 0.281 0.402  K Star N/A 1.188 1.359 4.672  Test Resu  NDs = DL 0.847	1.1 1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933 Its	0.888 0.627 0.643 0.675 Log Mean N/A 0.0617 -0.4 -0.516 -0.439	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418 0.317	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087 -0.81	
Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)  No	9 9 9 K hat N/A 1.671 1.927 6.896 ormal GOF No NDs 0.998	0.218 0.281 0.402  K Star N/A 1.188 1.359 4.672  Test Resu  NDs = DL 0.847	1.1 1.1 1.1 1.1 Theta hat N/A 0.884 0.461 0.0933 Its	0.888 0.627 0.643 0.675  Log Mean N/A 0.0617 -0.4 -0.516 -0.439  Normal RO	0.91 0.622 0.628 0.641 Log Stdv N/A 0.823 0.835 0.418 0.317	0.698 0.275 0.256 0.222 Log CV N/A 13.33 -2.087 -0.81	

Shapiro-Wilk (I									
Shapiro-Wilk (NE		0.827	0.829						
Shapiro-Wilk (Normal ROS I	,	0.974		Data Appe					
Lilliefors (Det		0.192		Data Appe					
Lilliefors (I	,	0.269		Data Appe					
Lilliefors (NI	Ds = DL/2	0.269	0.274	Data Appe	ar Normal				
Lilliefors (Normal ROS I	Estimates)	0.178	0.274	Data Appe	ar Normal				
	Ga	mma GOF	Test Resu	ılts					
		No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Co	efficient R	N/A	0.959	0.958	0.993				
				'					
		Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0	.05)		
Anderson-Darling (Det	ects Only)	N/A	N/A						
Kolmogorov-Smirnov (Det	ects Only)	N/A	N/A						
Anderson-Darling (I	NDs = DL)	0.445	0.733						
Kolmogorov-Smirnov (I	-	0.205	0.283	Data Appe	ar Gamma	a Distribute	ed		
Anderson-Darling (NE	-	0.389	0.73						
Kolmogorov-Smirnov (NE	,	0.181	0.283	Data Appe	ar Gamma	a Distribute	ed		
nderson-Darling (Gamma ROS I	-	0.185	0.722						
Kolmogorov-Smirnov (Gamma		0.172	0.28	Data Appe	ar Gamma	a Distribute	ed		
,	,								
	Logr	normal GO	F Test Res	sults					
		No NDs	NDs = DI	NDs = DL/2	Log ROS				
Correlation Co	efficient R	0.993	0.971	0.958	0.987				
30.10.0.0.0.0		0.000	0.07.	0.000	0.007				
		Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0	05)		
Shapiro-Wilk (Det		0.985		Data Appe			.00)		
Shapiro-Wilk (I		0.937		Data Appe	-				
Shapiro-Wilk (NI		0.913		Data Appe	-				
Shapiro-Wilk (Lognormal ROS I		0.972		Data Appe	-				
Lilliefors (Det		0.222		Data Appe					
Lilliefors (I		0.15		Data Appe					
Lilliefors (N	,	0.199		Data Appe					
Lilliefors (Lognormal ROS I		0.178		Data Appe					
Emiciolo (Edgiloliniai 1100 i	_oumatoo)	0.170	0.271	Data / tppo	ar Logitor				
Note: Substitution methods suc	h as DL or	DL/2 are n	ot recomm	ended					
Gaboutation motilogo suoi	40 51 01								
	Goodness	-of-Fit Tee	t Statistics	for Data Se	ets with No	n-Detects		1	1
User Selected Options	200011033	J. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		.5. 544 56		50000			
•	ProLICL 5	19/18/201	8 10:06:49	PM					
· ·				Assessme	ntMont S	ant2019 vi	<u> </u>		
Full Precision	OFF	COMBINE	חטוטואי	_~>>6551116	uviUIIL_S	σριΖυ 10.ΧΙ	3		
Connidence Coefficient	0.95								
Ossekland Badhoo Asseks	٠.								
Combined_Radium (background	a)								
			I	I					
				Num Valid	Detects	NDs	% NDs		
Raw	Statistics	29	0	29	23	6	20.69%		
			ı			T	1		
		Number	Minimum	Maximum	Mean	Median	SD		

Statistics (Non-Detects Only)	6	0.6	0.9	0.717	0.7	0.117		
Statistics (Non-Detects Only)	23	0.7	3.5	1.986	2	0.698		
Statistics (All: NDs treated as DL value)	29	0.6	3.5	1.723	1.7	0.812	1	
Statistics (All: NDs treated as DL/2 value)	29	0.3	3.5	1.649	1.7	0.913	<u> </u>	
Statistics (Normal ROS Imputed Data)	29	0.169	3.5	1.659	1.7	0.901		
Statistics (Gamma ROS Imputed Data)	29	0.548	3.5	1.719	1.7	0.818		
Statistics (Lognormal ROS Imputed Data)	29	0.7	3.5	1.742	1.7	0.788		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	7.738	6.758	0.257	0.62	0.388	0.626		+
Statistics (NDs = DL)	4.205	3.793	0.41	0.421	0.53	1.26		
Statistics (NDs = DL/2)	2.395	2.17	0.688	0.277	0.768	2.771		
Statistics (Gamma ROS Estimates)	4.075	3.676	0.422	0.414	0.541	1.307		+
Statistics (Lognormal ROS Estimates)				0.446	0.49	1.096		+
otationes (20g. io. in a. i to 0 20 iii a. io. o				00	00			
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Jormal RO				
Correlation Coefficient R	0.988	0.978	0.979	0.986				+
	<u> </u>							
	Test value	Crit. (0.05)	Co	nclusion wit	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.975	0.914	Data Appe	ear Normal				
Shapiro-Wilk (NDs = DL)	0.944	0.926	Data Appe	ear Normal			i	
Shapiro-Wilk (NDs = DL/2)	0.944	0.926	Data Appe	ear Normal			i	
Shapiro-Wilk (Normal ROS Estimates)	0.96	0.926	Data Appe	ear Normal				
Lilliefors (Detects Only)	0.0872	0.18	Data Appe	ear Normal			<del></del>	
Lilliefors (NDs = DL)	0.12	0.161	Data Appe	ear Normal			<del></del>	
Lilliefors (NDs = DL/2)	0.112	0.161	Data Appe	ear Normal			·	+
Lilliefors (Normal ROS Estimates)	0.0982	0.161	Data Appe	ear Normal				
Ga	mma GOE	Test Resu	ılte					
	IIIIIa GOI	restriest	iito					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R	0.988	0.979	0.95	0.978				
	Test value	Crit. (0.05)	Co	nclusion wit	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.231	0.745						
Kolmogorov-Smirnov (Detects Only)	0.0929	0.182	Detected I	Data Appea	r Gamma	Distributed		1
Anderson-Darling (NDs = DL)	0.607	0.75		-			·	1
Kolmogorov-Smirnov (NDs = DL)	0.125	0.163	Data Appe	ear Gamma	Distribute	d		1
Anderson-Darling (NDs = DL/2)	1.187	0.755						1
Kolmogorov-Smirnov (NDs = DL/2)	0.185	0.164	Data Not (	Gamma Dis	tributed			1
nderson-Darling (Gamma ROS Estimates)	0.62	0.75						1
Kolmogorov-Smirnov (Gamma ROS Est.)	0.133		Data Appe	ear Gamma	Distribute	d	·	
Logi	normal GO	F Test Res	sults					
	Ne ND	ND D'	UDa - Di "	Lac DOO				
Correlation Coefficient R	No NDs 0.976	0.969	NDs = DL/2 0.931	0.971				+
Softelation Coefficient N	0.370	0.303	0.331	0.371				
	Test value	Crit. (0.05)	Co	nclusion wit	th Alpha(0.	.05)		+
Shapiro-Wilk (Detects Only)	0.955			ear Lognorn		,		+
Shapiro-Wilk (NDs = DL)	0.922	0.926		_				+
Shapiro-Wilk (NDs = DL/2)	0.852		Data Not I					+
p ( ( 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2				3				

01 : W(11 (1 1500 5 (1 1 1	0.004	0.000	D . N . I				
Shapiro-Wilk (Lognormal ROS Estimates)	0.924		Data Not I			-	
Lilliefors (Detects Only)	0.116	0.18		ear Lognorr			<del> </del>
Lilliefors (NDs = DL)	0.144	0.161		ear Lognorr	naı		
Lilliefors (NDs = DL/2)	0.222	0.161		-	1		-
Lilliefors (Lognormal ROS Estimates)	0.146	0.161	рата Арре	ear Lognorr	naı		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Combined_Radium (mw-61)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	10	8	44.44%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	8	0.6	0.9	0.7	0.7	0.107	<del> </del>
Statistics (Non-Detects Only)	10	0.5	2.2	1.269	1.295	0.107	-
Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	18	0.5	2.2	1.209	0.7	0.537	
	18	0.5	2.2		0.7		1
Statistics (All: NDs treated as DL/2 value)				0.861		0.649	1
Statistics (Normal ROS Imputed Data)	18	-0.229	2.2	0.792	0.6	0.731	1
Statistics (Gamma ROS Imputed Data)	18	0.0401	2.2	0.844	0.6	0.673	
Statistics (Lognormal ROS Imputed Data)	18	0.307	2.2	0.908	0.626	0.613	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	4.439	3.174	0.286	0.121	0.524	4.321	1
Statistics (NDs = DL)	4.649	3.911	0.219	-0.0954	0.466	-4.88	
Statistics (NDs = DL/2)	2.126	1.808	0.405	-0.403	0.721	-1.786	
Statistics (Gamma ROS Estimates)	1.296	1.117	0.651	-0.603	1.149	-1.905	1
Statistics (Lognormal ROS Estimates)				-0.293	0.631	-2.155	
No	rmai GOF	Test Resu	ITS				
	No NDs	NDs = DL	NDs = DL/2	lormal RO			
Correlation Coefficient R	0.96	0.893	0.908	0.965			
							1
	Test value	Crit. (0.05)	Со	nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.902	0.842	Data Appe	ear Normal			
Shapiro-Wilk (NDs = DL)	0.79	0.897	Data Not I	Normal	-	-	
Shapiro-Wilk (NDs = DL/2)	0.81	0.897	Data Not I	Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.922	0.897	Data Appe	ear Normal			
Lilliefors (Detects Only)	0.223	0.262	Data Appe	ear Normal			
Lilliefors (NDs = DL)	0.278	0.202	Data Not I	Normal			
Lilliefors (NDs = DL/2)	0.264	0.202	Data Not I	Normal			
Lilliefors (Normal ROS Estimates)	0.217	0.202	Data Not I	Normal			
	mma COE	Test Resu	ılte				
Ga	mina GOF	rest Nest	nio				
	No NDs	NDs = DL	NDs = DL/	amma RO			1
Correlation Coefficient R	0.957	0.948	0.963	0.964			
	Test value	Crit. (0.05)	C-	nclusion wi	th Alpha/A	05)	-
Anderson-Darling (Detects Only)	0.498	0.729	C0	i iciusiuli Wl	uı ∕ıhııg(0	.00)	1
<b>3</b> ( ),	0.498	0.729	Detected	Data Annas	r Camma	Dietributed	+
Kolmogorov-Smirnov (Detects Only)  Anderson-Darling (NDs = DL)	1.353	0.268	Derected	Data Appea	ai Gaiiiiia	יייייייייטווויפוע eo	1
·			Doto Not (	Comma D:-	tributa d		
Kolmogorov-Smirnov (NDs = DL)	0.28	0.204	Data Not (	Gamma Dis	uibutea		

	014111100	OCE GOOD	INESS OF I	III OIAIR	31100			
Anderson-Darling (NDs = DL/2)	1.007	0.752						
Kolmogorov-Smirnov (NDs = DL/2)	0.189		Detected D	Data appea	nate Gamm			
nderson-Darling (Gamma ROS Estimates)	0.468	0.76						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.146	0.208	Data Appe	ar Gamma	d			
Logi	normal GO	F Test Res	sults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.959	0.934	0.948	0.963				
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	05)		
Shapiro-Wilk (Detects Only)	0.902	` '	Data Appe			.00)		
Shapiro-Wilk (NDs = DL)	0.861		Data Not L					
Shapiro-Wilk (NDs = DL/2)	0.877		Data Not L					+
Shapiro-Wilk (Lognormal ROS Estimates)	0.911		Data Appe		mal			+
Lilliefors (Detects Only)	0.219		Data Appe					+
Lilliefors (NDs = DL)	0.268		Data Not L	-				+
Lilliefors (NDs = DL/2)	0.156		Data Appe	•	mal			+
Lilliefors (Lognormal ROS Estimates)	0.207		Data Not L	_				
		I	I					
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Combined_Radium (mw-7)								
Num Obs Num Miss Num Valid Detects NDs % NDs								<del>                                     </del>
Raw Statistics	18	0	18	15	3	16.67%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	3	0.6	0.9	0.7	0.6	0.173		
Statistics (Non-Detects Only)	15	0.7	3.3	1.74	1.5	0.785		
Statistics (All: NDs treated as DL value)	18	0.6	3.3	1.567	1.3	0.819		
Statistics (All: NDs treated as DL/2 value)	18	0.3	3.3	1.508	1.3	0.891		
Statistics (Normal ROS Imputed Data)	18	-0.27	3.3	1.451	1.3	0.978		
Statistics (Gamma ROS Imputed Data)	18	0.176	3.3	1.506	1.3	0.895		
Statistics (Lognormal ROS Imputed Data)	18	0.512	3.3	1.55	1.3	0.836		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	5.796	4.681	0.3	0.465	0.433	0.932		+
Statistics (NDs = DL)	4.194	3.532	0.374	0.325	0.515	1.584		+
Statistics (NDs = DL/2)	2.636	2.234	0.572	0.209	0.712	3.399		+
Statistics (Gamma ROS Estimates)	2.462	2.088	0.612	0.193	0.759	3.945		
Statistics (Lognormal ROS Estimates)				0.302	0.546	1.808		
No.	rmal GOF	Test Resu	Its					1
	No NDs	NDs = DI	NDs = DL/2	lormal R∩				-
Correlation Coefficient R	0.938	0.945	0.965	0.977				
			_					
		Crit. (0.05)			th Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)	0.875		Data Not N					1
Shapiro-Wilk (NDs = DL)	0.885		Data Not N					
Shapiro-Wilk (NDs = DL/2)	0.922		397 Data Appear Normal 397 Data Appear Normal					1
Shapiro-Wilk (Normal ROS Estimates)	0.952	ı U.89/	ivala ADDe	ar inormal			1	
Lilliefors (Detects Only)	0.219		Data Appe					+

			I=-					
Lilliefors (NDs = DL)								
Lilliefors (NDs = DL/2)		0.202						
Lilliefors (Normal ROS Estimates)	0.156	0.202	Data Appe	ar Normal				
Ge	mma GOF	Teet Dee	ılte					
	illilla GOI	rest nest	1113					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R	0.967	0.976	0.974	0.973				
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.464	0.738						
Kolmogorov-Smirnov (Detects Only)		0.222	Detected [	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	0.338	0.743						
Kolmogorov-Smirnov (NDs = DL)		0.205	Data Appe	ar Gamma	Distribute	d		
Anderson-Darling (NDs = DL/2)		0.748						
Kolmogorov-Smirnov (NDs = DL/2)			Data Appe	ar Gamma	Distribute	d		
nderson-Darling (Gamma ROS Estimates)		0.749						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.172	0.206	Data Appe	ar Gamma	Distribute	d		
Lon	normal GO	E Tost Bos	sulte.					
Log	nomial GO	. IGSLNES	Julio					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R		0.984	0.959	0.984				
	1							
	Test value	Crit. (0.05	Cor	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)			Data Appe			,		
Shapiro-Wilk (NDs = DL)			Data Appe					
Shapiro-Wilk (NDs = DL/2)		0.897		_				
Shapiro-Wilk (Lognormal ROS Estimates)	0.958	0.897	Data Appe	ar Lognori	mal			
Lilliefors (Detects Only)	0.147	0.22	Data Appe	ar Lognori	mal			
Lilliefors (NDs = DL)	0.113	0.202	Data Appe	ar Lognori	mal			
Lilliefors (NDs = DL/2)	0.207	0.202	Data Not L	ognormal				
Lilliefors (Lognormal ROS Estimates)	0.135	0.202	Data Appe	ar Lognor	mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Combined Dedium (my 75)								
Combined_Radium (mw-75)								
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics		0	11	7	4	36.36%		
a Sadono	1			*	-	22.20,0		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)		0.6	0.8	0.7	0.7	0.0816		
Statistics (Non-Detects Only)		0.4	1.6	0.986	0.9	0.402		
Statistics (All: NDs treated as DL value)		0.4	1.6	0.882	0.8	0.346		
Statistics (All: NDs treated as DL/2 value)		0.3	1.6	0.755	0.8	0.447		
Statistics (Normal ROS Imputed Data)		0.154	1.6	0.738	0.8	0.468		
Statistics (Gamma ROS Imputed Data)	11	0.244	1.6	0.756	0.8	0.448		
Statistics (Lognormal ROS Imputed Data)	11	0.351	1.6	0.78	0.8	0.424		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)		3.755	0.154	-0.0945	0.451	-4.776		
Statistics (NDs = DL)	7.746	5.694	0.114	-0.192	0.38	-1.983	-	
Statistics (NDs = DL/2)	3.241	2.418	0.233	-0.444	0.601	-1.354		

MIGET	UNIT PIOC	JCL GOOD	NESS OF	rii Siaii	31103			
Statistics (Gamma ROS Estimates)	3.144	2.347	0.24	-0.448	0.618	-1.381		
Statistics (Lognormal ROS Estimates)		-		-0.379	0.532	-1.405		
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Normal RO				
Correlation Coefficient R	0.971	0.94	0.942	0.966				
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)			Data Appe	ar Normal		-		
Shapiro-Wilk (NDs = DL)	0.893	0.85	Data Appe	ar Normal				
Shapiro-Wilk (NDs = DL/2)	0.873	0.85	Data Appe	ar Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.924	0.85	Data Appe	ar Normal				
Lilliefors (Detects Only)	0.2	0.304	Data Appe	ar Normal				
Lilliefors (NDs = DL)	0.23	0.251	Data Appe	ar Normal				
Lilliefors (NDs = DL/2)	0.24	0.251	Data Appe	ar Normal				
Lilliefors (Normal ROS Estimates)	0.192	0.251	Data Appe	ar Normal				
Ga	mma GOF	Test Resu	ilts					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R	0.972	0.968	0.974	0.981				
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.296	0.709						
Kolmogorov-Smirnov (Detects Only)	0.211	0.313	Detected [	Data Appea	ar Gamma	Distributed	1	
Anderson-Darling (NDs = DL)	0.403	0.73						
Kolmogorov-Smirnov (NDs = DL)	0.194	0.256	Data Appe	ar Gamma	Distribute	d		
Anderson-Darling (NDs = DL/2)	0.561	0.733						
Kolmogorov-Smirnov (NDs = DL/2)	0.254	0.257	Data Appe	ar Gamma	Distribute	d		
derson-Darling (Gamma ROS Estimates)	0.376	0.733						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.191	0.257	Data Appe	ar Gamma	Distribute	d		
Log	normal GO	F Test Res	ults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.957	0.97	0.957	0.964				
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.928	0.803	Data Appe	ar Lognori	mal			
Shapiro-Wilk (NDs = DL)	0.953	0.85	Data Appe	ar Lognori	mal			
Shapiro-Wilk (NDs = DL/2)	0.896	0.85	Data Appe	ar Lognori	mal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.91	0.85	Data Appe	ar Lognori	mal			
Lilliefors (Detects Only)	0.245	0.304	Data Appe	ar Lognori	mal			
Lilliefors (NDs = DL)		0.251	Data Appe	ar Lognori	mal			
Lilliefors (NDs = DL/2)	0.239	0.251	Data Appe	ar Lognori	mal			
Lilliefors (Lognormal ROS Estimates)	0.194	0.251	Data Appe	ar Lognori	mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
							<u> </u>	
Combined_Radium (mw-8)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	9	0	9	8	1	11.11%		

	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	1	0.7	0.7	0.7	0.7	N/A		
Statistics (Non-Detects Only)		1	4.66	1.745	1.3	1.206		
Statistics (All: NDs treated as DL value)		0.7	4.66	1.629	1.3	1.181		
Statistics (All: NDs treated as DL/2 value)		0.35	4.66	1.59	1.3	1.22		
Statistics (Normal ROS Imputed Data)	9	-0.607	4.66	1.484	1.3	1.374		_
Statistics (Gamma ROS Imputed Data)	9	0.01	4.66	1.552	1.3	1.268		
Statistics (Lognormal ROS Imputed Data)	9	0.535	4.66	1.611	1.3	1.198		
Ctationics (Logiterman New Impared Data)	ŭ	0.000	1.00	1.011	1.0	1.100		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	3.978	2.57	0.439	0.426	0.485	1.139		
Statistics (NDs = DL)	3.514	2.416	0.464	0.339	0.523	1.544		-
Statistics (NDs = DL/2)	2.632	1.829	0.604	0.262	0.669	2.555		-
Statistics (Gamma ROS Estimates)	1.007	0.745	1.542	-0.133	1.737	-13.05		
Statistics (Lognormal ROS Estimates)	1.007	0.740	1.042	0.309	0.573	1.855		
Statistics (Edgitornial NOS Estimates)				0.503	0.373	1.000		
No		Test Resu						
Correlation Coefficient R	No NDs 0.756	NDs = DL 0.78	NDs = DL/2 0.812	lormal RO				-
Conclusion Coefficient N	0.750	0.70	0.012	0.00				-
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	05)		-
Shapiro-Wilk (Detects Only)			Data Not N			,		
Shapiro-Wilk (NDs = DL)			Data Not N					
Shapiro-Wilk (NDs = DL/2)		0.829						
Shapiro-Wilk (Normal ROS Estimates)		0.829						
Lilliefors (Detects Only)			Data Not N					
Lilliefors (NDs = DL)			Data Not N					
Lilliefors (NDs = DL/2)			Data Not N					
Lilliefors (Normal ROS Estimates)			Data Not N					
	0.002	0.27	Data Hot.					
Ga	mma GOF	Test Resu	ilts					
	I	T	I				ļ	
	No NDs		NDs = DL/2				<u> </u>	
Correlation Coefficient R	0.862	0.879	0.903	0.929			<u> </u>	
	L						<b></b>	
<u> </u>		Crit. (0.05)	Cor	nclusion wi	tn Alpha(0	.05)	<b> </b>	1
Anderson-Darling (Detects Only)	1.198	0.719					<b> </b>	_
Kolmogorov-Smirnov (Detects Only)	0.35	0.295	Data Not C	amma Dis	stributed			
Anderson-Darling (NDs = DL)		0.726						
Kolmogorov-Smirnov (NDs = DL)		0.281	Data Not C	amma Dis	stributed			
Anderson-Darling (NDs = DL/2)		0.728					<u> </u>	
Kolmogorov-Smirnov (NDs = DL/2)		0.282	Detected [	Data appea	ır Approxin	nate Gamm		
derson-Darling (Gamma ROS Estimates)		0.743						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.363	0.287	Data Not C	Samma Dis	stributed		<u> </u>	
Log	normal GO	F Test Res	ults					
	N N'=	ND 5:	lib =: ·	. 500				
<u> </u>	No NDs		NDs = DL/2				<del>                                     </del>	1
Correlation Coefficient R	0.846	0.904	0.913	0.918				-
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha/A	05)		1
Shapiro-Wilk (Detects Only)			Data Not L		ııı ∨ıhııa(∩	.00)		1
Griapino-vviik (Detects Offly)	0.739	0.010	Data NULL	.ognomal			1	

Shapiro-Wilk (NDs = DL)	0.847	0.829	Data Appear Lognormal	
Shapiro-Wilk (NDs = DL/2)	0.875	0.829	Data Appear Lognormal	
Shapiro-Wilk (Lognormal ROS Estimates)	0.879	0.829	Data Appear Lognormal	
Lilliefors (Detects Only)	0.323	0.283	Data Not Lognormal	
Lilliefors (NDs = DL)	0.28		Data Not Lognormal	
Lilliefors (NDs = DL/2)	0.237	0.274	Data Appear Lognormal	
Lilliefors (Lognormal ROS Estimates)	0.259	0.274	Data Appear Lognormal	
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.	

	Outlier Tests for			nondetects		
User Selected Options						
· ·	5.110/9/2018 5:21:					
From File	Table1_Appendix	xA_Multiunit_A	ppendixIV_Pr	oUCLUpload_S	ept2018.xls	
Full Precision	OFF					
Dixon's Outlier Test for Antimony (back	ground)					
Total N = 26						
Number NDs = 22						
Number Detects = 4						
10% critical value: 0.679						
5% critical value: 0.765						
1% critical value: 0.889						
Note: NDs excluded from Outlier Test						
1. Data Value 0.00048 is a Potential Outl	ier (Upper 1					
Test Statistic: 0.867						
For 10% significance level, 0.00048 is an						
For 5% significance level, 0.00048 is an o						
For 1% significance level, 0.00048 is not a	an outlier.					
2. Data Value 0.00033 is a Potential Outli	er (Lower T					
Took Chakishin, 0.122						
Test Statistic: 0.133						
For 10% significance level, 0.00033 is not	an outlier.					
For 5% significance level, 0.00033 is not a	an outlier.					
For 1% significance level, 0.00033 is not a	an outlier.					
Discole Outline Transfer Autlineau (co.	04\					
Dixon's Outlier Test for Antimony (my	W-01)					
Total N = 17						
Number NDs = 14						
Number Detects = 3						
10% critical value: 0.886						
5% critical value: 0.941						
1% critical value: 0.988						
Note: NDs excluded from Outlier Test						
Data Value 0.00029 is a Potential Outl	ier (Upper 1					
Test Statistic: 1.000						
For 10% significance level, 0.00029 is an	outlier.					
For 5% significance level, 0.00029 is an o	utlier.					
For 1% significance level, 0.00029 is an o						
2. Data Value 0.00023 is a Potential Outli	er (I ower T					

	 OUTLIER			
Test Statistic: 0.000				
E 100/ : : :				
For 10% significance level, 0.00023 is not an outlier.				
For 5% significance level, 0.00023 is not an outlier.				
For 1% significance level, 0.00023 is not an outlier.				
Dixon's Outlier Test for Antimony (mw-7)				
T. IN 47				
Total N = 17				
Number NDs = 13				
Number Detects = 4				
10% critical value: 0.679				
5% critical value: 0.765				
1% critical value: 0.889				
Note: NDs excluded from Outlier Test				
Data Value 0.001 is a Potential Outlier (Upper Tai				
1. Data value 0.001 is a Potential Outlier (Opper Fal				
Test Statistic: 0.821				
Test Statistic. 0.02 i				
For 10% significance level, 0.001 is an outlier.				
For 5% significance level, 0.001 is an outlier.				
For 1% significance level, 0.001 is not an outlier.				
1 of 1 % significance level, 0.001 is not an outlier.				
2. Data Value 0.00016 is a Potential Outlier (Lower T				
21. Data value electrica i electrical electrici (2000) i				
Test Statistic: 0.131				
For 10% significance level, 0.00016 is not an outlier.				
For 5% significance level, 0.00016 is not an outlier.				
For 1% significance level, 0.00016 is not an outlier.				
No Outlier Test for Antimony (mw-75)				
Dixon's Outlier Test for Antimony (mw-8)				
Total N = 8				
Number NDs = 5				
Number Detects = 3				
10% critical value: 0.886	 			
5% critical value: 0.941	 			
1% critical value: 0.988				
Note: NDs excluded from Outlier Test				
Data Value 0.0014 is a Potential Outlier (Upper Ta				
Test Statistic: 0.935				
For 10% significance level, 0.0014 is an outlier.				
For 5% significance level, 0.0014 is not an outlier.				
For 1% significance level, 0.0014 is not an outlier.				

MOETION	 00.11.1.			
2. Data Value 0.00048 is a Potential Outlier (Lower T				
Test Statistic: 0.065				
For 10% significance level, 0.00048 is not an outlier.				
For 5% significance level, 0.00048 is not an outlier.				
For 1% significance level, 0.00048 is not an outlier.				
FOI 1% Significance level, 0.00046 is not an outlier.				
Dixon's Outlier Test for Arsenic (background)				
Total N = 28				
Number NDs = 12				
Number Detects = 16				
10% critical value: 0.454				
5% critical value: 0.507				
1% critical value: 0.595				
Note: NDs excluded from Outlier Test				
1. Data Value 0.0045 is a Potential Outlier (Upper Ta				
Test Statistic: 0.294				
For 10% significance level, 0.0045 is not an outlier.				
For 5% significance level, 0.0045 is not an outlier.				
For 1% significance level, 0.0045 is not an outlier.				
2. Data Value 0.00088 is a Potential Outlier (Lower T				
Test Statistic: 0.084				
For 10% significance level, 0.00088 is not an outlier.				
For 5% significance level, 0.00088 is not an outlier.				
For 1% significance level, 0.00088 is not an outlier.				
-				
Dixon's Outlier Test for Arsenic (mw-61)				
Total N = 18				
Number NDs = 13				
Number Detects = 5				
10% critical value: 0.557				
5% critical value: 0.642				
1% critical value: 0.78				
Note: NDs excluded from Outlier Test				
Data Value 0.00063 is a Potential Outlier (Upper 1)				
Test Statistic: 0.238				
For 10% significance level, 0.00063 is not an outlier.				
For 5% significance level, 0.00063 is not an outlier.				
For 1% significance level, 0.00063 is not an outlier.				

	 OUTLIER			
2. Data Value 0.00042 is a Potential Outlier (Lower T				
Test Statistic: 0.381				
For 10% significance level, 0.00042 is not an outlier.				
For 5% significance level, 0.00042 is not an outlier.				
For 1% significance level, 0.00042 is not an outlier.				
Dixon's Outlier Test for Arsenic (mw-7)				
T-1-1 N = 10				
Total N = 18 Number NDs = 7				
Number NDS = 7 Number Detects = 11				
10% critical value: 0.517				
5% critical value: 0.576				
1% critical value: 0.679				
Note: NDs excluded from Outlier Test				
1. Data Value 0.0021 is a Potential Outlier (Upper Ta				
Test Statistic: 0.844				
For 10% significance level, 0.0021 is an outlier.				
For 5% significance level, 0.0021 is an outlier.				
For 1% significance level, 0.0021 is an outlier.				
2. Data Value 0.00033 is a Potential Outlier (Lower T				
Test Statistic: 0.478				
For 10% significance level, 0.00033 is not an outlier.				
For 5% significance level, 0.00033 is not an outlier.				
For 1% significance level, 0.00033 is not an outlier.				
No Outlier Test for Arsenic (mw-75)				
Dixon's Outlier Test for Arsenic (mw-8)				
Total N = 9				
Number NDs = 5				
Number Detects = 4				
10% critical value: 0.679 5% critical value: 0.765				
5% critical value: 0.765 1% critical value: 0.889				
Note: NDs excluded from Outlier Test				
14016. 1403 GAGIAGEA ITOTA OULIIET 1651				
1. Data Value 0.0091 is a Potential Outlier (Upper Ta				
Test Statistic: 0.980				
For 10% significance level, 0.0091 is an outlier.				
For 5% significance level, 0.0091 is an outlier.				
1 37 370 digrilliourioù level, 0.000 i 13 dil oddici.				

For 1% sig	nificance le	evel, 0.009	1 is an outl	ier.						
2. Data Va	lue 0.0005	3 is a Pote	ential Outlie	r (Lower T						
Test Statis	tic: 0.006									
			053 is not a							
_			)53 is not ar							
For 1% sig	nificance le	evel, 0.000	)53 is not ar	n outlier.						
	Rosner's	Outlier Te	st for 1 Out	liers in Baı	rium (back	ground)				
						ı				
			Ī							
		Total N	28							
		nber NDs	0							
		er Detects	28							
		of Detects	0.0225							
	SD	of Detects	0.00537							
		er of data	28							
	f suspecte		1							
s not includ	ded in the f	ollowing:								
			Potential	Obs.	Test					
#	Mean	sd	outlier	Number			/alue (1%)			
1	0.0225	0.00527	0.042	1	3.704	2.88	3.2			
_			e is 1 Poter							
Therefore,	Observation	on 0.042 is	a Potentia	l Statistica	I Outlier		1	1	1	1
For 1% Sig	gnificance l	Level, there	e is 1 Poter	itial Outlie	r		T	1	1	T
Dixo	n's Outlier	Test for Ba	arium (mw-6	51)						
Total N = 1										
Number NI										
Number De										
10% critica										
5% critical										
1% critical			<u> </u>							
Note: NDs	excluded f	rom Outlie	er Lest							
4.5.17	1 0040									
1. Data Va	alue 0.016	is a Potent	tial Outlier (	Upper I ai						
T . O:	.: 0.007									
Test Statis	tic: 0.667									
E 400/			10:							
			6 is an outl							-
_			is an outlie							
⊢or 1% sig	Initicance le	evei, 0.016	is an outlie	er.						
0.5 : ::	L	5 : .								
2. Data Va	iue 0.013 i	s a Potenti	ial Outlier (l	_ower Tail						
Test Statis	tic: 0.000							1	1	

For 10% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barlum (mw-7)  Total N = 18  Number NDs = 0  Number Detects = 18  10% critical value: 0.424 9% critical value: 0.424 9% critical value: 0.451 Note: NDs excluded from Outlier Test  1. Data Value 0.017 is a Potential Outlier (Upper Tai  Test Statistic: 0.000  For 10% significance level, 0.017 is not an outlier. For 5% significance level, 0.017 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 5% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barlum (mw-75)  Total N = 11  Number NDs = 0  Number 0.57  Number 0.59					
For 5% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barlum (mw-7)  Total N = 18  Number NDs = 0  Number Detects = 18  10% critical value: 0.424  5% critical value: 0.455  1% critical value: 0.451  1% critical value: 0.511  Test Statistic: 0.000  For 10% significance level, 0.017 is not an outlier. For 1% significance level, 0.017 is not an outlier. For 1% significance level, 0.017 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier.  Dixor's Outlier Test for Barlum (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  1% significance level, 0.078 1% critical value: 0.579 1% critical value: 0.579 1% critical value: 0.579 1% critical value: 0.579 1% critical value: 0.579 1% critical value: 0.579 1% critical value: 0.579 1% critical value: 0.50 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier.	E 400/ : 'C         0.040				
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For 1% significance level, 0.017 is not an outlier.  2. Data Value 0.013 is a Potential Outlier (Lower Tail  Test Statistic: 0.250  For 10% significance level, 0.013 is not an outlier.  For 5% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barium (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	For 10% significance level, 0.017 is not an outlier.				
2. Data Value 0.013 is a Potential Outlier (Lower Tail)  Test Statistic: 0.250  For 10% significance level, 0.013 is not an outlier.  For 5% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barium (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	For 5% significance level, 0.017 is not an outlier.				
Test Statistic: 0.250  For 10% significance level, 0.013 is not an outlier. For 5% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barlum (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11 10% critical value: 0.517 5% critical value: 0.576 1% critical value: 0.576 1% critical value: 0.579 Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier. For 5% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	For 1% significance level, 0.017 is not an outlier.				
Test Statistic: 0.250  For 10% significance level, 0.013 is not an outlier. For 5% significance level, 0.013 is not an outlier. For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barlum (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11 10% critical value: 0.517 5% critical value: 0.576 1% critical value: 0.576 1% critical value: 0.579 Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier. For 5% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
For 10% significance level, 0.013 is not an outlier.  For 5% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barium (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	2. Data Value 0.013 is a Potential Outlier (Lower Tail				
For 10% significance level, 0.013 is not an outlier.  For 5% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barium (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
For 5% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barium (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	Test Statistic: 0.250				
For 5% significance level, 0.013 is not an outlier.  For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barium (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
For 1% significance level, 0.013 is not an outlier.  Dixon's Outlier Test for Barium (mw-75)  Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	=				
Dixon's Outlier Test for Barium (mw-75)  Total N = 11 Number NDs = 0 Number Detects = 11 10% critical value: 0.517 5% critical value: 0.576 1% critical value: 0.679 Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier. For 5% significance level, 0.02 is not an outlier. For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.					
Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	For 1% significance level, 0.013 is not an outlier.				
Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
Total N = 11  Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	Dixon's Outlier Test for Barium (mw-75)				
Number NDs = 0  Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)	T-1-1 N = 44				
Number Detects = 11  10% critical value: 0.517  5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
10% critical value: 0.576  5% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
5% critical value: 0.576  1% critical value: 0.679  Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
1% critical value: 0.679 Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
Note: NDs excluded from Outlier Test  1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
1. Data Value 0.02 is a Potential Outlier (Upper Tail)  Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail)					
Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail					
Test Statistic: 0.000  For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail	1. Data Value 0.02 is a Potential Outlier (Upper Tail)				
For 10% significance level, 0.02 is not an outlier.  For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail					
For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail	Test Statistic: 0.000				
For 5% significance level, 0.02 is not an outlier.  For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail					
For 1% significance level, 0.02 is not an outlier.  2. Data Value 0.017 is a Potential Outlier (Lower Tail	For 10% significance level, 0.02 is not an outlier.				
2. Data Value 0.017 is a Potential Outlier (Lower Tail	For 5% significance level, 0.02 is not an outlier.				
	For 1% significance level, 0.02 is not an outlier.				
Test Statistic: 0.333	2. Data Value 0.017 is a Potential Outlier (Lower Tail	 			
Test Statistic: 0.333					
	Test Statistic: 0.333				

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E 400/ : : :					
For 10% significance level, 0.017 is not an outlier.					
For 5% significance level, 0.017 is not an outlier.					
For 1% significance level, 0.017 is not an outlier.					
Diversity Outsides Test for Position (may 9)					
Dixon's Outlier Test for Barium (mw-8)					
Total N = 9					
Number NDs = 0					
Number Nos = 0 Number Detects = 9					
10% critical value: 0.441					
5% critical value: 0.512					
1% critical value: 0.635					
Note: NDs excluded from Outlier Test					
The state of the s					
Data Value 0.15 is a Potential Outlier (Upper Tail)					
(Opps: 141)					
Test Statistic: 0.812					
For 10% significance level, 0.15 is an outlier.					
For 5% significance level, 0.15 is an outlier.					
For 1% significance level, 0.15 is an outlier.					
2. Data Value 0.011 is a Potential Outlier (Lower Tail					
Test Statistic: 0.037					
For 10% significance level, 0.011 is not an outlier.					
For 5% significance level, 0.011 is not an outlier.					
For 1% significance level, 0.011 is not an outlier.					
No Outlier Test for Beryllium (background)					
N 0 11 T 16 D 111 ( 04)					
No Outlier Test for Beryllium (mw-61)					
No Outlier Took for Dondling (my 7)					
No Outlier Test for Beryllium (mw-7)					
No Outlier Test for Beryllium (mw-75)					
No Oddier Test for Beryllidin (IIIW-75)					
No Outlier Test for Beryllium (mw-8)					
140 Outlief Test for Delyman (IIIW-0)					
Dixon's Outlier Test for Cadmium (background)					
Total N = 28					
Number NDs = 20					
Number Detects = 8					
10% critical value: 0.479					
5% critical value: 0.554					
1% critical value: 0.683					
Note: NDs excluded from Outlier Test					
1. Data Value 0.00031 is a Potential Outlier (Upper 7					
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Test Statistic: 0.077				
For 10% significance level, 0.00031 is not an outlier.				
For 5% significance level, 0.00031 is not an outlier.				
For 1% significance level, 0.00031 is not an outlier.				
2. Data Value 0.00012 is a Potential Outlier (Lower T				
Test Statistic: 0.333				
For 10% significance level, 0.00012 is not an outlier.				
For 5% significance level, 0.00012 is not an outlier.				
For 1% significance level, 0.00012 is not an outlier.				
Dixon's Outlier Test for Cadmium (mw-61)				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.577				
Note: NDs excluded from Outlier Test				
1. Data Value 0.0011 is a Potential Outlier (Upper Ta				
Test Statistic: 0.435				
For 10% significance level, 0.0011 is not an outlier.				
For 5% significance level, 0.0011 is not an outlier.				
For 1% significance level, 0.0011 is not an outlier.				
1 01 176 Significance level, 0.0011 is not an outlier.				
2. Data Value 0.00082 is a Potential Outlier (Lower T				
Test Statistic: 0.278				
For 10% significance level, 0.00082 is not an outlier.				
For 5% significance level, 0.00082 is not an outlier.				
For 1% significance level, 0.00082 is not an outlier.				
Dixon's Outlier Test for Cadmium (mw-7)				
Total N = 18				
Number NDs = 15				
Number Detects = 3				
10% critical value: 0.886				
5% critical value: 0.941				
1% critical value: 0.988				
Note: NDs excluded from Outlier Test				
1. Data Value 0.0014 is a Potential Outlier (Upper Ta				

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Took Statistics 0.060				
Test Statistic: 0.969				
For 10% significance level, 0.0014 is an outlier.				
For 5% significance level, 0.0014 is an outlier.				
For 1% significance level, 0.0014 is not an outlier.				
2. Data Value 0.0001 is a Potential Outlier (Lower Ta				
Test Statistic: 0.031				
For 10% significance level, 0.0001 is not an outlier.				
For 5% significance level, 0.0001 is not an outlier.				
For 1% significance level, 0.0001 is not an outlier.				
Dixon's Outlier Test for Cadmium (mw-75)				
Total N = 11		 		
Number NDs = 0		 		
Number Detects = 11				
10% critical value: 0.517				
5% critical value: 0.576				
1% critical value: 0.679				
Note: NDs excluded from Outlier Test				
1. Data Value 0.0024 is a Potential Outlier (Upper Ta				
Test Statistic: 0.200				
For 10% significance level, 0.0024 is not an outlier.				
For 5% significance level, 0.0024 is not an outlier.				
For 1% significance level, 0.0024 is not an outlier.				
2. Data Value 0.0019 is a Potential Outlier (Lower Ta				
Test Statistic: 0.200				
For 10% significance level, 0.0019 is not an outlier.				
For 5% significance level, 0.0019 is not an outlier.				
For 1% significance level, 0.0019 is not an outlier.				
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Dixon's Outlier Test for Cadmium (mw-8)				
, ,				
Total N = 9				
Number NDs = 1				
Number Detects = 8				
10% critical value: 0.479				
5% critical value: 0.554				
1% critical value: 0.683				
Note: NDs excluded from Outlier Test				
3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				
1. Data Value 0.00096 is a Potential Outlier (Upper 7				
Sam raido otosobo is a i otosidal Oddiei (Opper I				

Took Statistics 0.26F				
Test Statistic: 0.265				
For 10% significance level, 0.00096 is not an outlier.				
For 5% significance level, 0.00096 is not an outlier.				
For 1% significance level, 0.00096 is not an outlier.				
2. Data Value 0.00011 is a Potential Outlier (Lower T				
,				
Test Statistic: 0.032				
For 10% significance level, 0.00011 is not an outlier.				
For 5% significance level, 0.00011 is not an outlier.				
For 1% significance level, 0.00011 is not an outlier.				
Dixon's Outlier Test for Chromium (background)				
, ,				
Total N = 26				
Number NDs = 18				
Number Detects = 8				
10% critical value: 0.479				
5% critical value: 0.554				
1% critical value: 0.683				
Note: NDs excluded from Outlier Test				
1. Data Value 0.0035 is a Potential Outlier (Upper Ta				
Test Statistic: 0.320				
For 10% significance level, 0.0035 is not an outlier.				
For 5% significance level, 0.0035 is not an outlier.				
For 1% significance level, 0.0035 is not an outlier.				
2. Data Value 0.00065 is a Potential Outlier (Lower T				
Test Statistic: 0.021				
For 10% significance level, 0.00065 is not an outlier.				
For 5% significance level, 0.00065 is not an outlier.				
For 1% significance level, 0.00065 is not an outlier.				
Bissels Osalisa T. 14 Ol. 14 (1921)				
Dixon's Outlier Test for Chromium (mw-61)				
Total N = 17				
Total N = 17				
Number NDs = 13				
Number Detects = 4				
10% critical value: 0.679				
5% critical value: 0.765				
1% critical value: 0.889				
Note: NDs excluded from Outlier Test				
Data Value 0.00075 is a Potential Outlier (Upper 1)				

Test Statistic: 0.565							
For 10% significance level, 0.00075 is not an outlier.							
For 5% significance level, 0.00075 is not an outlier.							
For 1% significance level, 0.00075 is not an outlier.							
1 of 170 significance level, 0.00075 is not an outlier.							
2. Data Value 0.00052 is a Potential Outlier (Lower T							
Test Statistic: 0.000							
For 10% significance level, 0.00052 is not an outlier.							
For 5% significance level, 0.00052 is not an outlier.							
For 1% significance level, 0.00052 is not an outlier.							
1 of 170 dignificance level, 0.00002 to flot all outlier.							
D. 10 W = 11 C: 1 C: 1							
Dixon's Outlier Test for Chromium (mw-7)							
Total N = 17	-						
Number NDs = 9							
Number Detects = 8							
10% critical value: 0.479							
5% critical value: 0.554							
1% critical value: 0.683							
Note: NDs excluded from Outlier Test							
1. Data Value 0.0047 is a Potential Outlier (Upper Ta							
Test Statistic: 0.584							
For 10% significance level, 0.0047 is an outlier.							
For 5% significance level, 0.0047 is an outlier.							
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For 1% significance level, 0.0047 is not an outlier.							
2. Data Value 0.00041 is a Potential Outlier (Lower T							
Test Statistic: 0.249							
For 10% significance level, 0.00041 is not an outlier.							
For 5% significance level, 0.00041 is not an outlier.							
For 1% significance level, 0.00041 is not an outlier.							
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No Outlier Test for Chromium (mw-75)	-			-			
Dixon's Outlier Test for Chromium (mw-8)							
, -,							
Total N = 8							
Number NDs = 2							
Number Detects = 6							
10% critical value: 0.482							
5% critical value: 0.56	·		-				
1% critical value: 0.698							
Note: NDs excluded from Outlier Test							
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OCTOBER 2018

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Data Value 0.02 is a Potential Outlier (Upper Tail)					
Test Statistic: 0.948					
For 10% significance level, 0.02 is an outlier.					
For 5% significance level, 0.02 is an outlier.					
For 1% significance level, 0.02 is an outlier.					
2. Data Value 0.0006 is a Potential Outlier (Lower Ta					
Test Statistic: 0.008					
For 10% significance level, 0.0006 is not an outlier.					
For 5% significance level, 0.0006 is not an outlier.					
For 1% significance level, 0.0006 is not an outlier.					
Dixon's Outlier Test for Cobalt (background)					
, ,					
Total N = 28					
Number NDs = 14					
Number Detects = 14					
10% critical value: 0.492					
5% critical value: 0.546					
1% critical value: 0.641					
Note: NDs excluded from Outlier Test					
1. Data Value 0.0045 is a Potential Outlier (Upper Ta					
Серги					
Test Statistic: 0.261					
For 10% significance level, 0.0045 is not an outlier.					
For 5% significance level, 0.0045 is not an outlier.					
For 1% significance level, 0.0045 is not an outlier.					
1 of 170 significance level, 0.0040 is not an outlier.					
2. Data Value 0.00064 is a Potential Outlier (Lower T					
2. Bata value 0.00004 to a 1 otoritari Gatior (2000)					
Test Statistic: 0.479					
. 551 515410410. 51.175					
For 10% significance level, 0.00064 is not an outlier.					
For 5% significance level, 0.00064 is not an outlier.					
For 1% significance level, 0.00064 is not an outlier.					
1 or 170 digninicarios ievel, 0.00004 is not an outlier.					
Dixon's Outlier Test for Cobalt (mw-61)					
SACITO GUILOI TOSCIOI GODGIE (IIIM-01)					
Total N = 18					
Number NDs = 0					
Number NDs = 0 Number Detects = 18					
10% critical value: 0.424					
5% critical value: 0.424					
1% critical value: 0.475					
Note: NDs excluded from Outlier Test					

Data Value 0.017 is a Potential Outlier (Upper Tai				
Test Statistic: 0.200				
For 10% significance level, 0.017 is not an outlier.				
For 5% significance level, 0.017 is not an outlier.				
For 1% significance level, 0.017 is not an outlier.				
1 of 170 significance level, 0.017 is not an outlier.				
2. Data Value 0.01 is a Potential Outlier (Lower Tail)?				
Test Statistic: 0.333				
For 10% significance level, 0.01 is not an outlier.				
For 5% significance level, 0.01 is not an outlier.				
For 1% significance level, 0.01 is not an outlier.				
Dixon's Outlier Test for Cobalt (mw-7)				
Total N = 18				
Number NDs = 11				
Number Detects = 7				
10% critical value: 0.434				
5% critical value: 0.507				
1% critical value: 0.637				
Note: NDs excluded from Outlier Test				
Note. NDS excluded from Outlier Test				
Data Value 0.0028 is a Potential Outlier (Upper Ta				
Test Statistic: 0.372				
For 10% significance level, 0.0028 is not an outlier.				
For 5% significance level, 0.0028 is not an outlier.				
-				
For 1% significance level, 0.0028 is not an outlier.				
2. Data Value 0.00065 is a Potential Outlier (Lower T				
Test Statistic: 0.084				
For 10% significance level, 0.00065 is not an outlier.				
For 5% significance level, 0.00065 is not an outlier.				
For 1% significance level, 0.00065 is not an outlier.				
Dixon's Outlier Test for Cobalt (mw-75)				
Total N = 11				
Total N = 11				
Number NDs = 0				
Number Detects = 11				
10% critical value: 0.517				
5% critical value: 0.576				
1% critical value: 0.679				
Note: NDs excluded from Outlier Test				

Data Value 0.049 is a Potential Outlier (Upper Tai				
Test Statistic: 0.143				
For 10% significance level, 0.049 is not an outlier.				
For 5% significance level, 0.049 is not an outlier.				
For 1% significance level, 0.049 is not an outlier.				
2. Data Value 0.039 is a Potential Outlier (Lower Tail				
Test Statistic: 0.444				
For 100/ significance level 0.000 is not an exting				
For 10% significance level, 0.039 is not an outlier. For 5% significance level, 0.039 is not an outlier.				
I -				
For 1% significance level, 0.039 is not an outlier.				
Discords Outlier Teet for Oak alt (				
Dixon's Outlier Test for Cobalt (mw-8)				
Total N = 9				
Number NDs = 3				
Number Detects = 6				
10% critical value: 0.482				
5% critical value: 0.56				
1% critical value: 0.698				
Note: NDs excluded from Outlier Test				
Data Value 0.019 is a Potential Outlier (Upper Tai				
(-FF				
Test Statistic: 0.904				
For 10% significance level, 0.019 is an outlier.				
For 5% significance level, 0.019 is an outlier.				
For 1% significance level, 0.019 is an outlier.				
2. Data Value 0.00053 is a Potential Outlier (Lower T				
·				
Test Statistic: 0.022				
For 10% significance level, 0.00053 is not an outlier.				
For 5% significance level, 0.00053 is not an outlier.				
For 1% significance level, 0.00053 is not an outlier.				
No Outlier Test for Lead (background)				
Dixon's Outlier Test for Lead (mw-61)				
Total N = 18				
Number NDs = 7				
Number Detects = 11				
10% critical value: 0.517				
5% critical value: 0.576				
			I	

1% critical value: 0.679					
Note: NDs excluded from Outlier Test		<u> </u>			
Note. NDS excluded from Outlier Lest		· · · · · · · · · · · · · · · · · · ·			
4 Date Value 0 004 is a B to 11 10 11 11 11 1					
Data Value 0.001 is a Potential Outlier (Upper Tai					
Total Obstice: O FO		· · · · · · · · · · · · · · · · · · ·			
Test Statistic: 0.524		· · · · · · · · · · · · · · · · · · ·			
F 100/ -: -: -: -:					
For 10% significance level, 0.001 is an outlier.		! 			
For 5% significance level, 0.001 is not an outlier.					
For 1% significance level, 0.001 is not an outlier.				1	<u> </u>
2. Data Value 0.00078 is a Potential Outlier (Lower T					
Test Statistic: 0.143				1	
1.000 010110110. 0.110		<u> </u>			
For 10% significance level, 0.00078 is not an outlier.					
For 5% significance level, 0.00078 is not an outlier.		<u> </u>		1	
For 1% significance level, 0.00078 is not an outlier.	-	<u> </u>			
James 1976, 0.00070 is not an outlet.		<u>I</u>		1	
<u> </u>		<u> </u>			
No Outlier Test for Lead (mw-7)		<u> </u>			
		<u> </u>			
Dixon's Outlier Test for Lead (mw-75)		<u> </u>		1	
, , , , , , , , , , , , , , , , , , ,		<u> </u>		1	
Total N = 11		<u> </u>		1	
Number NDs = 3		<u> </u>		1	
Number Detects = 8					
10% critical value: 0.479				1	
5% critical value: 0.554					
1% critical value: 0.683		<u> </u>			
Note: NDs excluded from Outlier Test		<u> </u>			
1. Data Value 0.0041 is a Potential Outlier (Upper Ta		<del></del>			
		<del></del>			
Test Statistic: 0.818					
		<del></del>			
For 10% significance level, 0.0041 is an outlier.		<del></del>			
For 5% significance level, 0.0041 is an outlier.		<del></del>			
For 1% significance level, 0.0041 is an outlier.					
2. Data Value 0.0028 is a Potential Outlier (Lower Ta					
	_	_		L	
Test Statistic: 0.500		<del></del>			
		ı <del></del>			
For 10% significance level, 0.0028 is an outlier.					
For 5% significance level, 0.0028 is not an outlier.					
For 1% significance level, 0.0028 is not an outlier.					
Dixon's Outlier Test for Lead (mw-8)					
Total N = 9					
Number NDs = 6					
Number Detects = 3					

	.,	.02		OUTLIER				
10% critical value: 0.886								
5% critical value: 0.941	<del></del>			<del></del>		<del></del>		
1% critical value: 0.988	critical value: 0.988 e: NDs excluded from Outlier Test							
Note: NDs excluded from Outlie	r Test							
1. Data Value 0.033 is a Potent	ial Outlier (L	Jpper Tai						
	<u> </u>							
Test Statistic: 0.972								
For 10% significance level, 0.03	3 is an outlie	ar .						
For 5% significance level, 0.033								
For 1% significance level, 0.033								
For 1 % significance level, 0.033	15 1101 all 00	iuiei.						
2. Data Value 0.0005 is a Batan	Aint Outline /	T-						
2. Data Value 0.0005 is a Poten	tiai Outiler (i	Loweria						
Test Statistic: 0.028								
For 10% significance level, 0.00								
For 5% significance level, 0.000								
For 1% significance level, 0.000	5 is not an c	utlier.						
			-	-		-		
		,						
Rosner's Outlier Tes	st for 1 Outlie	ers in Lith	ium (backo	ground)				
Total N	28							
Number NDs	0							
Number Detects	28							
Mean of Detects	0.852							
SD of Detects	0.393							
Number of data	28							
Number of suspected outliers	1							
s not included in the following:								
s not included in the following.								
	D	01	<b>-</b> .	0 ::: 1	0 ::: 1			
	Potential	Obs.	Test	Critical	Critical			
# Mean sd	outlier	Number			value (1%)			
1 0.852 0.386	1.8	3	2.455	2.88	3.2			
For 5% Significance Level, there	e is no Poter	ntial Outlie	er		ı		1	1
For 1% Significance Level, there	e is no Poter	ntial Outlie	er					
Dixon's Outlier Test for Lit	hium (mw-6	1)				-		
Total N = 18								
lumber NDs = 0								
Number Detects = 18								
10% critical value: 0.424								
5% critical value: 0.475								
1% critical value: 0.561								
Note: NDs excluded from Outlie								
TIDO ONOIGUOU ITOTIT OUUIC								
Data Value 0.44 is a Potentia	al Outlier // In	nor Toil						
i. Data value 0.44 IS a Potentia	ai Outlier (U	hai igii)						

		r	T	I.	
Test Statistic: 0.500					
For 10% significance level, 0.44 is an outlier.					
For 5% significance level, 0.44 is an outlier.					
For 1% significance level, 0.44 is not an outlier.					
2. Data Value 0.35 is a Potential Outlier (Lower Tail)?					
Test Statistic: 0.200					
For 10% significance level, 0.35 is not an outlier.					
For 5% significance level, 0.35 is not an outlier.					
For 1% significance level, 0.35 is not an outlier.					
Dixon's Outlier Test for Lithium (mw-7)					
Total N = 18					
Number NDs = 0					
Number Detects = 18					
10% critical value: 0.424					
5% critical value: 0.475					
1% critical value: 0.561					
Note: NDs excluded from Outlier Test					
1. Data Value 1.2 is a Potential Outlier (Upper Tail)?					
, , , , , , , , , , , , , , , , , , ,					
Test Statistic: 0.615					
For 10% significance level, 1.2 is an outlier.					
For 5% significance level, 1.2 is an outlier.					
For 1% significance level, 1.2 is an outlier.					
2. Data Value 0.75 is a Potential Outlier (Lower Tail)?					
, ,					
Test Statistic: 0.286					
For 10% significance level, 0.75 is not an outlier.					
For 5% significance level, 0.75 is not an outlier.					
For 1% significance level, 0.75 is not an outlier.					
-					
Dixon's Outlier Test for Lithium (mw-75)					
, ,					
Total N = 11					
Number NDs = 0					
Number Detects = 11					
10% critical value: 0.517					
5% critical value: 0.576					
1% critical value: 0.679					
Note: NDs excluded from Outlier Test					
1. Data Value 0.48 is a Potential Outlier (Upper Tail)					
(			1	l	l

Took Statistics 0 571					
Test Statistic: 0.571					
For 10% significance level, 0.48 is an outlier.					
For 5% significance level, 0.48 is not an outlier.					
For 1% significance level, 0.48 is not an outlier.					
2. Data Value 0.4 is a Potential Outlier (Lower Tail)?					
Test Statistic: 0.400					
For 10% significance level, 0.4 is not an outlier.					
For 5% significance level, 0.4 is not an outlier.					
For 1% significance level, 0.4 is not an outlier.					
Dixon's Outlier Test for Lithium (mw-8)					
, ,					
Total N = 9					
Number NDs = 0					
Number Detects = 9					
10% critical value: 0.441					
5% critical value: 0.512					
1% critical value: 0.635					
Note: NDs excluded from Outlier Test					
1. Data Value 1.5 is a Potential Outlier (Upper Tail)?					
1. Data value 1.0 to a 1 otombar outlier (oppor run).					
Test Statistic: 0.750					
1001 0101010. 0.700					
For 10% significance level, 1.5 is an outlier.					
For 5% significance level, 1.5 is an outlier.					
For 1% significance level, 1.5 is an outlier.					
1 of 170 significance level, 1.5 is an outlier.					
2. Data Value 1.1 is a Potential Outlier (Lower Tail)?					
2. Data value 1.1 is a roteriual Oddier (Lower Fail):					
Test Statistic: 0.000					
rest Statistic. 0.000					
For 10% significance level, 1.1 is not an outlier.					
For 5% significance level, 1.1 is not an outlier.					
· · · · · · · · · · · · · · · · · · ·					
For 1% significance level, 1.1 is not an outlier.					
No Ocalica Total for Maria					
No Outlier Test for Mercury (background)					
N 0 111 - 12 12					
No Outlier Test for Mercury (mw-61)					
No Outlier Test for Mercury (mw-7)					
No Outlier Test for Mercury (mw-75)					
No Outlier Test for Mercury (mw-8)					
Rosner's Outlier Test for 1 Outliers in Molybo	denum (ba	ckground)			
•	•		i		

	•		1 PIOUCL		12011110	I	I	_
		T.	T.					
T-4-1 N	00							
Total N								
Number NDs								
Number Detects								
Mean of Detects								
SD of Detects								
Number of data								
Number of suspected outliers	1							
s not included in the following:								
		01	<b>-</b> .1	0 ::: 1	0 ::: 1			
"	Potential	Obs.	Test	Critical				
# Mean so		Number			/alue (1%)			
1 0.031 0.0187	0.096	1	3.475	2.88	3.2			
5 50/ O: :f:		10						
For 5% Significance Level, the								
Therefore, Observation 0.096 i	s a Potentia	Statistical	Outlier					
F 40/ O: 'f'								
For 1% Significance Level, the	re is 1 Poter	ıtıaı Outlier	-					I
		Г	Г					
Discoult County T of the	d-d /	04)						
Dixon's Outlier Test for Moly	/bdenum (m	w-61)						
T . IN . 40								
Total N = 18								
Number NDs = 0								
Number Detects = 18								
10% critical value: 0.424								
5% critical value: 0.475								
1% critical value: 0.561								
Note: NDs excluded from Outli	er Test							
4 5								
1. Data Value 0.085 is a Poter	ntial Outlier (	Upper I ai						
T . O: .: 0.000								
Test Statistic: 0.333								
- 100/ 1 10								
For 10% significance level, 0.0								
For 5% significance level, 0.08								
For 1% significance level, 0.08	5 is not an o	utlier.						
0 D-t- V-t - 0 000 ! - 7 :	#-10 · "   "							
2. Data Value 0.069 is a Poten	tiai Outlier (l	.ower Tail						
T+ 0+-+:-/: 0 001								
Test Statistic: 0.091								
E 400/ : : ::		.1:						
For 10% significance level, 0.0								
For 5% significance level, 0.06								
For 1% significance level, 0.06	9 is not an o	utlier.						
<b>B.</b> 1 <b>B B</b>								
Dixon's Outlier Test for Mol	ybdenum (m	ıw-7)						
Total N = 18								
Number NDs = 2								
Number Detects = 16								
10% critical value: 0.454						 		

MIDETION	 OOTELEIN	12011110	,			
5% critical value: 0.507	 					
1% critical value: 0.595	 					
Note: NDs excluded from Outlier Test						
Data Value 0.041 is a Potential Outlier (Upper Tai						
Test Statistic: 0.660						
For 10% significance level, 0.041 is an outlier.						
For 5% significance level, 0.041 is an outlier.						
For 1% significance level, 0.041 is an outlier.						
2. Data Value 0.0022 is a Patential Outlier / Javan Ta						
Data Value 0.0022 is a Potential Outlier (Lower Ta						
Test Statistic: 0.065						
For 10% significance level, 0.0022 is not an outlier.						
For 5% significance level, 0.0022 is not an outlier.						
For 1% significance level, 0.0022 is not an outlier.						
3 , , , , , , , , , , , , , , , , , , ,						
Dixon's Outlier Test for Molybdenum (mw-75)						
Total N = 11						
Number NDs = 0						
Number Detects = 11						
10% critical value: 0.517						
5% critical value: 0.576						
1% critical value: 0.679						
Note: NDs excluded from Outlier Test						
Data Value 0.18 is a Potential Outlier (Upper Tail)						
Test Statistic: 0.000						
For 10% significance level, 0.18 is not an outlier.						
For 5% significance level, 0.18 is not an outlier.						
For 1% significance level, 0.18 is not an outlier.						
O Day Vol. 10 40 in Day with O 18 of the Table						
2. Data Value 0.16 is a Potential Outlier (Lower Tail)1						
Test Statistic: 0.000						
rest Statistic. 0.000						
For 10% significance level, 0.16 is not an outlier.						
For 5% significance level, 0.16 is not an outlier.						
For 1% significance level, 0.16 is not an outlier.						
Dixon's Outlier Test for Molybdenum (mw-8)						
Discord Gallion Foot for Molybusham (IIIW-0)						
Total N = 9						
Number NDs = 0						
Number Detects = 9						
10% critical value: 0.441						
		1	1	1	1	l .

5% critical value: 0.512	1			
1% critical value: 0.512				
Note: NDs excluded from Outlier Test				
1 Date Value 0.040 is a Date with Coulling (1)				
Data Value 0.049 is a Potential Outlier (Upper Tail				
Test Statistic: 0.143				
Test Statistic: 0.143				
For 100/ circuitionnes level 0.040 is not an autiliar				
For 10% significance level, 0.049 is not an outlier.				
For 5% significance level, 0.049 is not an outlier.				
For 1% significance level, 0.049 is not an outlier.				
2. Data Value 0.011 is a Potential Outlier (Lower Tail				
2. Data value 0.011 is a Potential Oddier (Lower Tail)				
Test Statistic: 0.091				
rest otalistic. 0.001				
For 10% significance level, 0.011 is not an outlier.				
For 5% significance level, 0.011 is not an outlier.				
For 1% significance level, 0.011 is not an outlier.				
or the digital carried level, 0.011 is not an outlier.				
Dixon's Outlier Test for Selenium (background)				
Total N = 28				
Number NDs = 10				
Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.561				
Note: NDs excluded from Outlier Test				
1. Data Value 0.092 is a Potential Outlier (Upper Tai				
,				
Test Statistic: 0.033				
For 10% significance level, 0.092 is not an outlier.				
For 5% significance level, 0.092 is not an outlier.				
For 1% significance level, 0.092 is not an outlier.				
2. Data Value 0.0017 is a Potential Outlier (Lower Ta				
Test Statistic: 0.001				-
For 10% significance level, 0.0017 is not an outlier.				
For 5% significance level, 0.0017 is not an outlier.				
For 1% significance level, 0.0017 is not an outlier.				
Dixon's Outlier Test for Selenium (mw-61)				
Total N = 18				
Number NDs = 9				
Number Detects = 9				
10% critical value: 0.441				

5% critical value: 0.512	1			
1% critical value: 0.635				
Note: NDs excluded from Outlier Test				
Note. NDs excluded from Outlier Test				
Data Value 0.0016 is a Potential Outlier (Upper Ta				
1. Data value 0.0010 is a 1 otential Outlier (Opper 16				
Test Statistic: 0.688				
Test Statistic. 0.000				
For 10% significance level, 0.0016 is an outlier.				
For 5% significance level, 0.0016 is an outlier.				
For 1% significance level, 0.0016 is an outlier.				
,				
2. Data Value 0.00066 is a Potential Outlier (Lower T				
Test Statistic: 0.033				
For 10% significance level, 0.00066 is not an outlier.				
For 5% significance level, 0.00066 is not an outlier.				
For 1% significance level, 0.00066 is not an outlier.				
Dixon's Outlier Test for Selenium (mw-7)				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.577				
Note: NDs excluded from Outlier Test				
4. Data Value 0.045 in a Data with Continue (House Tail				
Data Value 0.015 is a Potential Outlier (Upper Tai				
Test Statistic: 0.089				
Test Statistic. 0.003				
For 10% significance level, 0.015 is not an outlier.				
For 5% significance level, 0.015 is not an outlier.				
For 1% significance level, 0.015 is not an outlier.				
1 of 17% digitillouried fevel, elected to the art equiler.				
2. Data Value 0.0026 is a Potential Outlier (Lower Ta				
`				
Test Statistic: 0.105				
For 10% significance level, 0.0026 is not an outlier.				
For 5% significance level, 0.0026 is not an outlier.				
For 1% significance level, 0.0026 is not an outlier.				
Dixon's Outlier Test for Selenium (mw-75)				
Total N = 11				
Number NDs = 2				
Number Detects = 9				
10% critical value: 0.441				

MOETIONI	1110002	OOTELEIN	12011110				
5% critical value: 0.512							
1% critical value: 0.635							
Note: NDs excluded from Outlier Test							
1. Data Value 0.0026 is a Potential Outlier (Upper Ta							
Test Statistic: 0.200							
For 10% significance level, 0.0026 is not an outlier.							
For 5% significance level, 0.0026 is not an outlier.							
For 1% significance level, 0.0026 is not an outlier.							
2. Data Value 0.0021 is a Data stick Outlier (Lauren Te							
2. Data Value 0.0021 is a Potential Outlier (Lower Ta							
Test Statistic: 0.000							
rest Statistic. 0.000							
For 10% significance level, 0.0021 is not an outlier.							
For 5% significance level, 0.0021 is not an outlier.							
For 1% significance level, 0.0021 is not an outlier.							
Dixon's Outlier Test for Selenium (mw-8)							
, ,							
Total N = 9							
Number NDs = 2							
Number Detects = 7							
10% critical value: 0.434							
5% critical value: 0.507							
1% critical value: 0.637							
Note: NDs excluded from Outlier Test							
1. Data Value 0.013 is a Potential Outlier (Upper Tai							
Test Statistic: 0.938							
For 10% significance level, 0.013 is an outlier.							
For 5% significance level, 0.013 is an outlier.							
For 1% significance level, 0.013 is an outlier.							
2. Data Value 0.00084 is a Potential Outlier (Lower T							
T + 0+ 15 15 0 000							
Test Statistic: 0.038							
For 10% significance level, 0.00084 is not an outlier.							
For 5% significance level, 0.00084 is not an outlier.							
For 1% significance level, 0.00084 is not an outlier.							
or the digital control (0.00004 to flot all outlier.							
Dixon's Outlier Test for Thallium (background)							
(sangealla)							
Total N = 27							
Number NDs = 11							
Number Detects = 16							
10% critical value: 0.454							
			1	1	1	1	1

E9/ pritical value: 0 E07						
5% critical value: 0.507						
1% critical value: 0.595		<u> </u>				
Note: NDs excluded from Outlier Test		<u> </u>				
1 Date Value 0.017 is a Detential Quality (University)						
Data Value 0.017 is a Potential Outlier (Upper Tai		· · · · · · · · · · · · · · · · · · ·				
Test Statistic: 0.987		l .				
rest Otatiotic. U.307		!				
For 10% significance level, 0.017 is an outlier.		<u> </u>				
For 5% significance level, 0.017 is an outlier.		<u> </u>				
For 1% significance level, 0.017 is an outlier.		Ī		1	1	
g		<u> </u>				
2. Data Value 0.00035 is a Potential Outlier (Lower T		<u> </u>				
1		<u> </u>				
Test Statistic: 0.826		<u> </u>				
		<u> </u>				
For 10% significance level, 0.00035 is an outlier.						
For 5% significance level, 0.00035 is an outlier.		<del></del>				
For 1% significance level, 0.00035 is an outlier.		<del></del>				
	_	_				
Dixon's Outlier Test for Thallium (mw-61)						
Total N = 18		' <u></u>	 			
Number NDs = 8		·				
Number Detects = 10						
10% critical value: 0.409			 			
5% critical value: 0.477						
1% critical value: 0.597						
Note: NDs excluded from Outlier Test						
1 Date Velice 0 000101 Date of 10 miles		l 				
Data Value 0.00018 is a Potential Outlier (Upper 1		! 				
Toot Statistics 0.400						
Test Statistic: 0.400						
For 10% significance level, 0.00018 is not an outlier.		<u> </u>				
For 5% significance level, 0.00018 is not an outlier.						
For 1% significance level, 0.00018 is not an outlier.						
. 5. 176 Significance level, 0.000 to 15 flot diff outlief.		<u> </u>				
2. Data Value 0.00011 is a Potential Outlier (Lower T		<u> </u>				
Table 1		<u> </u>				
Test Statistic: 0.400		<u> </u>				
For 10% significance level, 0.00011 is not an outlier.		<u> </u>				
For 5% significance level, 0.00011 is not an outlier.						
For 1% significance level, 0.00011 is not an outlier.		<del></del>				
		<del></del>				
Dixon's Outlier Test for Thallium (mw-7)		_				
	_	_				
Total N = 18						
Number NDs = 7						
Number Detects = 11						
10% critical value: 0.517						

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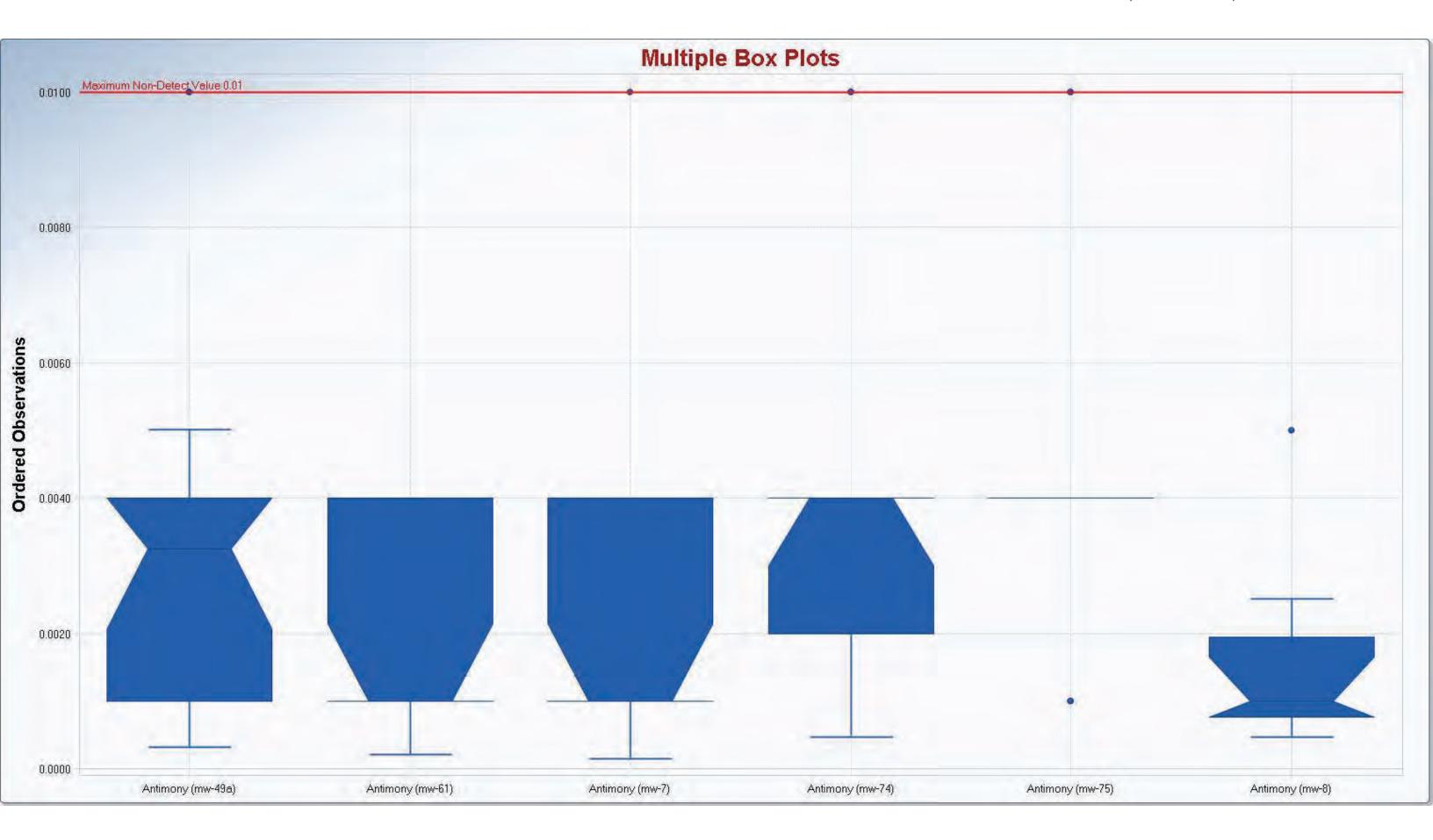
	II PIOUCL	 		
1% critical value: 0.561				
Observation Value 1.6 is a Potential Outlier (Upper				
Test Statistic: 0.600				
For 10% significance level, 1.6 is an outlier.				
For 5% significance level, 1.6 is an outlier.				
For 1% significance level, 1.6 is an outlier.				
Observation Value 0.91 is a Potential Outlier (Low				
Test Statistic: 0.487				
16St Glatistic. 0.407				
For 10% significance level, 0.91 is an outlier.				
For 5% significance level, 0.91 is an outlier.				
For 1% significance level, 0.91 is not an outlier.				
		 _		
Dixon's Outlier Test for Fluoride (mw-7)				
Number of Observations = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.475				
Observation Value 4 is a Potential Outlier (Upper)				
Test Statistic: 0.889				
For 10% significance level, 4 is an outlier.				
For 5% significance level, 4 is an outlier. For 1% significance level, 4 is an outlier.				
For 1% significance level, 4 is an outlier.				
Observation Value 0.35 is a Potential Outlier (Lower Lo				
Test Statistic: 0.111				
For 10% significance level, 0.35 is not an outlier.				
For 5% significance level, 0.35 is not an outlier.				
For 1% significance level, 0.35 is not an outlier.				
Dixon's Outlier Test for Fluoride (mw-75)				
DIAGITS Cutilet Test for Fluoride (IIIW-73)				
Number of Observations = 11				
10% critical value: 0.517				
5% critical value: 0.576				
1% critical value: 0.679				
Observation Value 2 is a Potential Outlier (Upper)				
T + 0+ 1: 1: 0 000				
Test Statistic: 0.000				

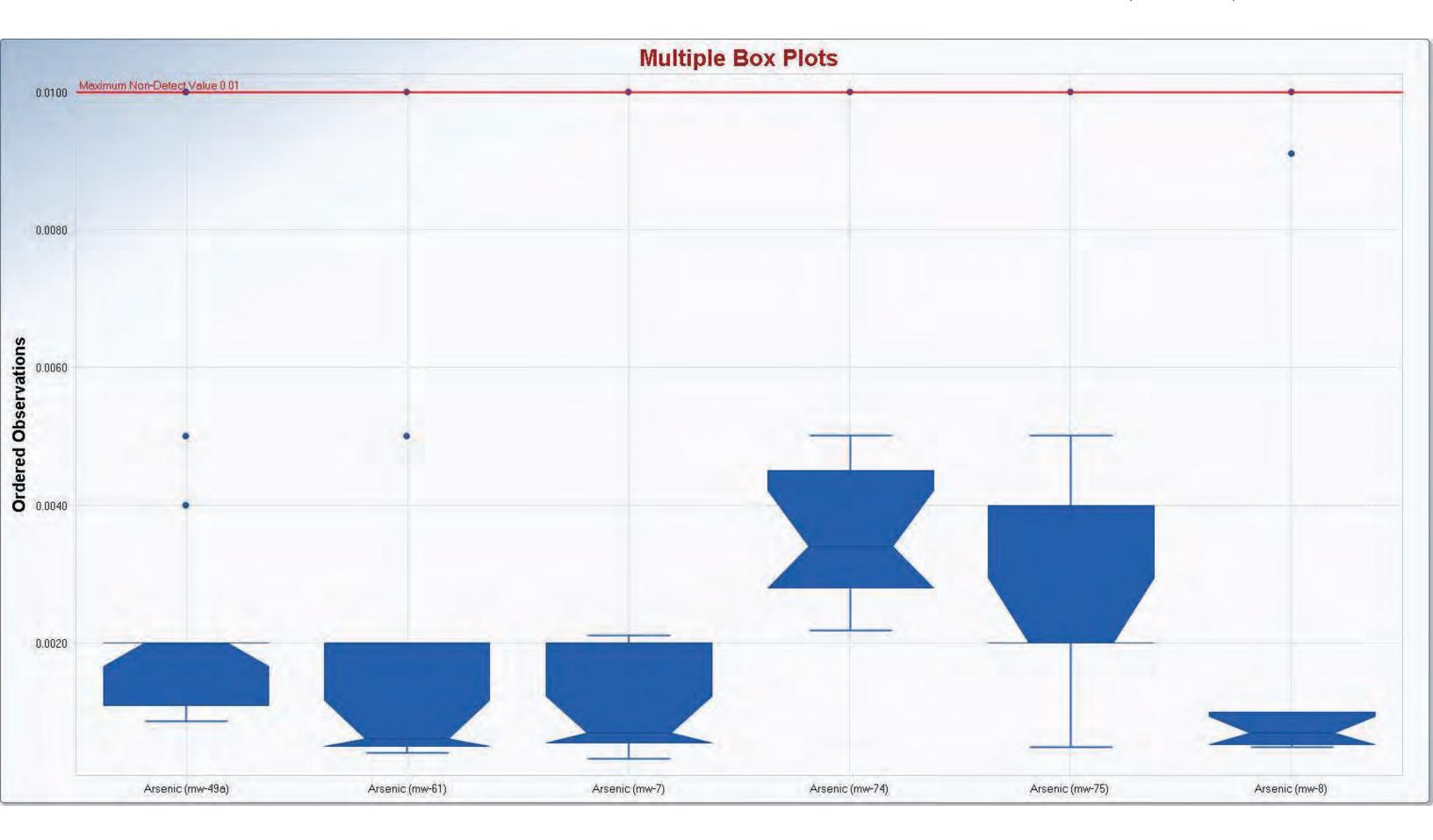
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For 10% significance level, 2 is not an outlier.								
For 5% significance level, 2 is not an outlier.								
For 1% significance level, 2 is not an outlier.								
2. Observation Value 1.2 is a Potential Outlier	(Lowe							
Test Statistic: 0.625								
For 10% significance level, 1.2 is an outlier.								
For 5% significance level, 1.2 is an outlier.								
For 1% significance level, 1.2 is not an outlier.								
Dixon's Outlier Test for Fluoride (mw-8)								
, ,								
Number of Observations = 9								
10% critical value: 0.441								
5% critical value: 0.512								
1% critical value: 0.635								
1. Observation Value 5 is a Potential Outlier (	(Upper							
`								
Test Statistic: 0.652								
For 10% significance level, 5 is an outlier.								
For 5% significance level, 5 is an outlier.								
For 1% significance level, 5 is an outlier.								
and the digital control of the different contr								
2. Observation Value 0.4 is a Potential Outlier	· (Lowe							
	(							
Test Statistic: 0.000								
- Con Chambrid Control								
For 10% significance level, 0.4 is not an outlie	r							
For 5% significance level, 0.4 is not an outlier.								
For 1% significance level, 0.4 is not an outlier.								
1 of 170 significance level, 0.4 is not an outlier.	•							
Out	tlier Te	sts for Sele	cted Varia	bles exclud	ding nonde	tects		
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kon's Outlier Test for Combined_Radium (back	caround							
Control rest for Combined_Itadiam (Dack	.ground							
Total N = 29								
Number NDs = 6								
Number Detects = 23								
10% critical value: 0.374								
5% critical value: 0.421								
1% critical value: 0.505								
Note: NDs excluded from Outlier Test								
145to. 14D3 excluded from Outlier Test								

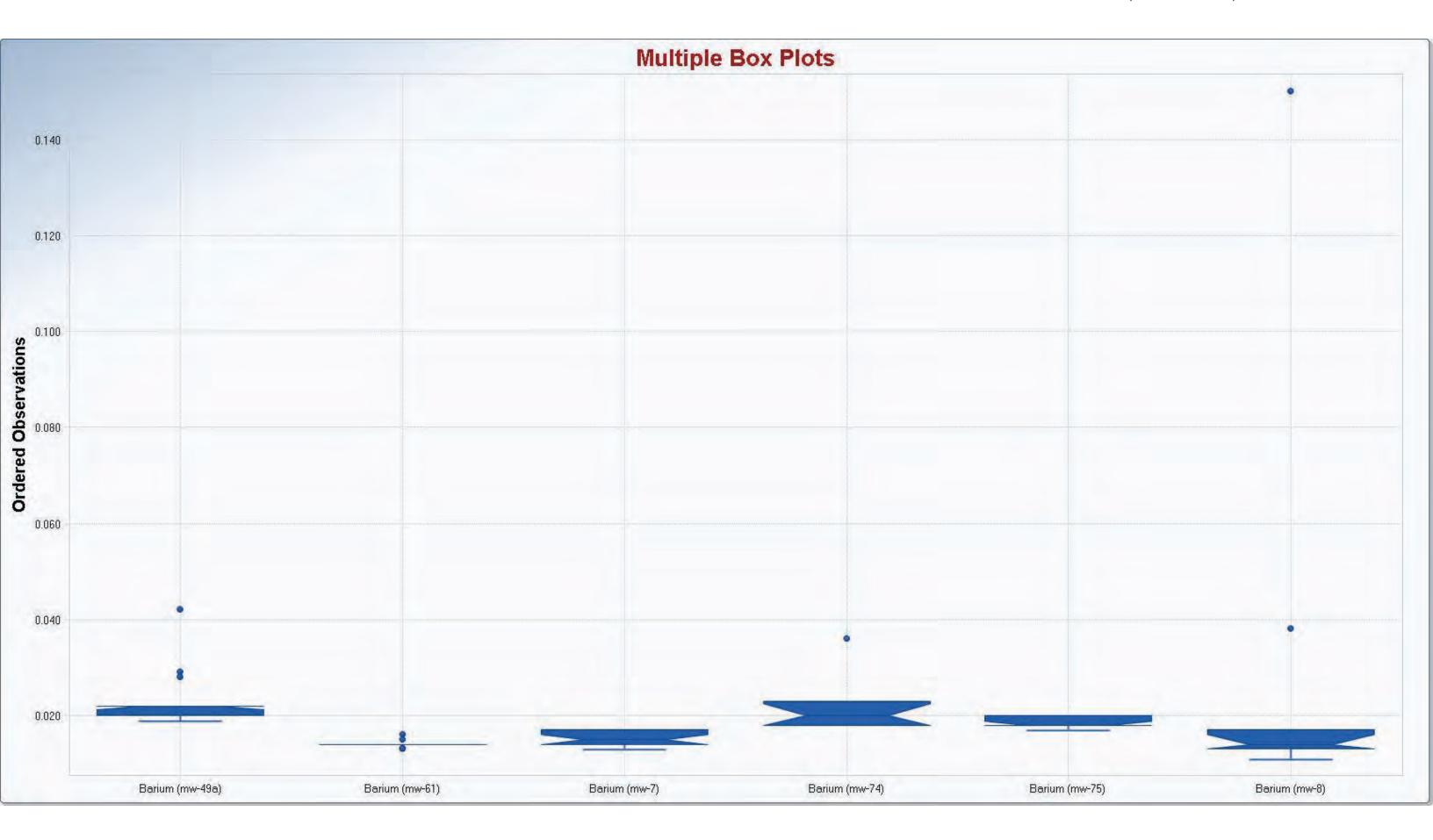
MOLITONI	1110002	OOTELEIN	1LOTING			
Data Value 3.5 is a Potential Outlier (Upper Tail)?						
Test Statistic: 0.333						
For 10% significance level, 3.5 is not an outlier.						
For 5% significance level, 3.5 is not an outlier.						
For 1% significance level, 3.5 is not an outlier.						
1 or 176 significance level, 3.3 is not an outlier.						
Data Value 0.7 is a Potential Outlier (Lower Tail)?						
Test Statistic: 0.200						
Test statistic. 0.200						
F 100/ -i:fi   0.7						
For 10% significance level, 0.7 is not an outlier.						
For 5% significance level, 0.7 is not an outlier.						
For 1% significance level, 0.7 is not an outlier.						
Discoule Outlier Took for Coast-in ad Badissa (co. 24)						
Dixon's Outlier Test for Combined_Radium (mw-61)						
Total N = 18						
Number NDs = 8						
Number Detects = 10						
10% critical value: 0.409						
5% critical value: 0.477						
1% critical value: 0.597						
Note: NDs excluded from Outlier Test						
Note: NDS excluded from Outlier Test						
Data Value 2.2 is a Potential Outlier (Upper Tail)?						
VIII.						
Test Statistic: 0.133						
For 10% significance level, 2.2 is not an outlier.						
For 5% significance level, 2.2 is not an outlier.						
For 1% significance level, 2.2 is not an outlier.						
1 of 170 significance level, 2.2 is not an outlet.						
2. Data Value 0.5 is a Potential Outlier (Lower Tail)?						
Test Statistic: 0.133						
Test Statistic: U. 155						
For 10% significance level, 0.5 is not an outlier.						
For 5% significance level, 0.5 is not an outlier.				<u></u>		
For 1% significance level, 0.5 is not an outlier.						
Dixon's Outlier Test for Combined_Radium (mw-7)						
_ ` ,						
Total N = 18						
Number NDs = 3						
Number Number 15						
10% critical value: 0.472						
5% critical value: 0.525						
1% critical value: 0.616		·				
Note: NDs excluded from Outlier Test						
					1	1

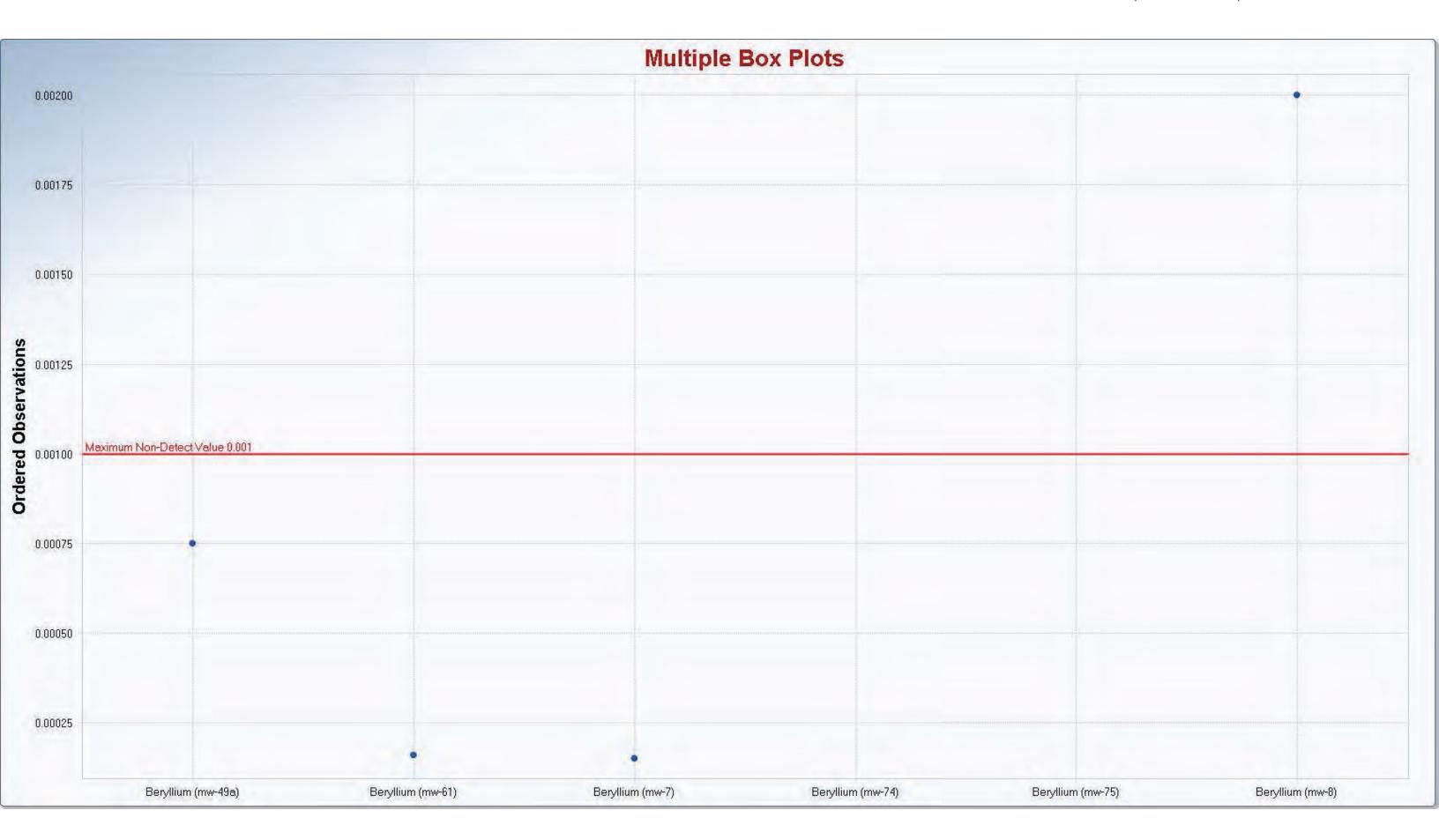
MOLITONI	1110002	OOTLILIT	TEOTING			
Data Value 3.3 is a Potential Outlier (Upper Tail)?						
Test Statistic: 0.333						
For 10% significance level, 3.3 is not an outlier.						
For 5% significance level, 3.3 is not an outlier.						
For 1% significance level, 3.3 is not an outlier.						
1 or 170 significance level, 3.3 is not an outlier.						
Data Value 0.7 is a Potential Outlier (Lower Tail)?						
Test Statistic: 0.263						
Test Statistic. 0.203						
For 10% significance level, 0.7 is not an outlier.						
For 5% significance level, 0.7 is not an outlier.						
For 1% significance level, 0.7 is not an outlier.						
Dixon's Outlier Test for Combined_Radium (mw-75)						
- ',						
Total N = 11						
Number NDs = 4						
Number Detects = 7						
10% critical value: 0.434						
5% critical value: 0.507						
1% critical value: 0.637						
Note: NDs excluded from Outlier Test						
Data Value 1.6 is a Potential Outlier (Upper Tail)?						
Test Statistic: 0.167						
For 10% significance level, 1.6 is not an outlier.						
For 5% significance level, 1.6 is not an outlier.						
For 1% significance level, 1.6 is not an outlier.						
1 of 170 significance level, 1.0 is not an outlier.						
Data Value 0.4 is a Potential Outlier (Lower Tail)?						
Test Statistic: 0.333						
Test Stallslic. U.333						
5 400/ 1 15 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
For 10% significance level, 0.4 is not an outlier.						
For 5% significance level, 0.4 is not an outlier.						
For 1% significance level, 0.4 is not an outlier.						
Dixon's Outlier Test for Combined_Radium (mw-8)		·				 
Total N = 9						
Number NDs = 1						
Number Detects = 8						
10% critical value: 0.479						
			i	l	1	
5% critical value: 0.554						
1% critical value: 0.683						
1% critical value: 0.683						

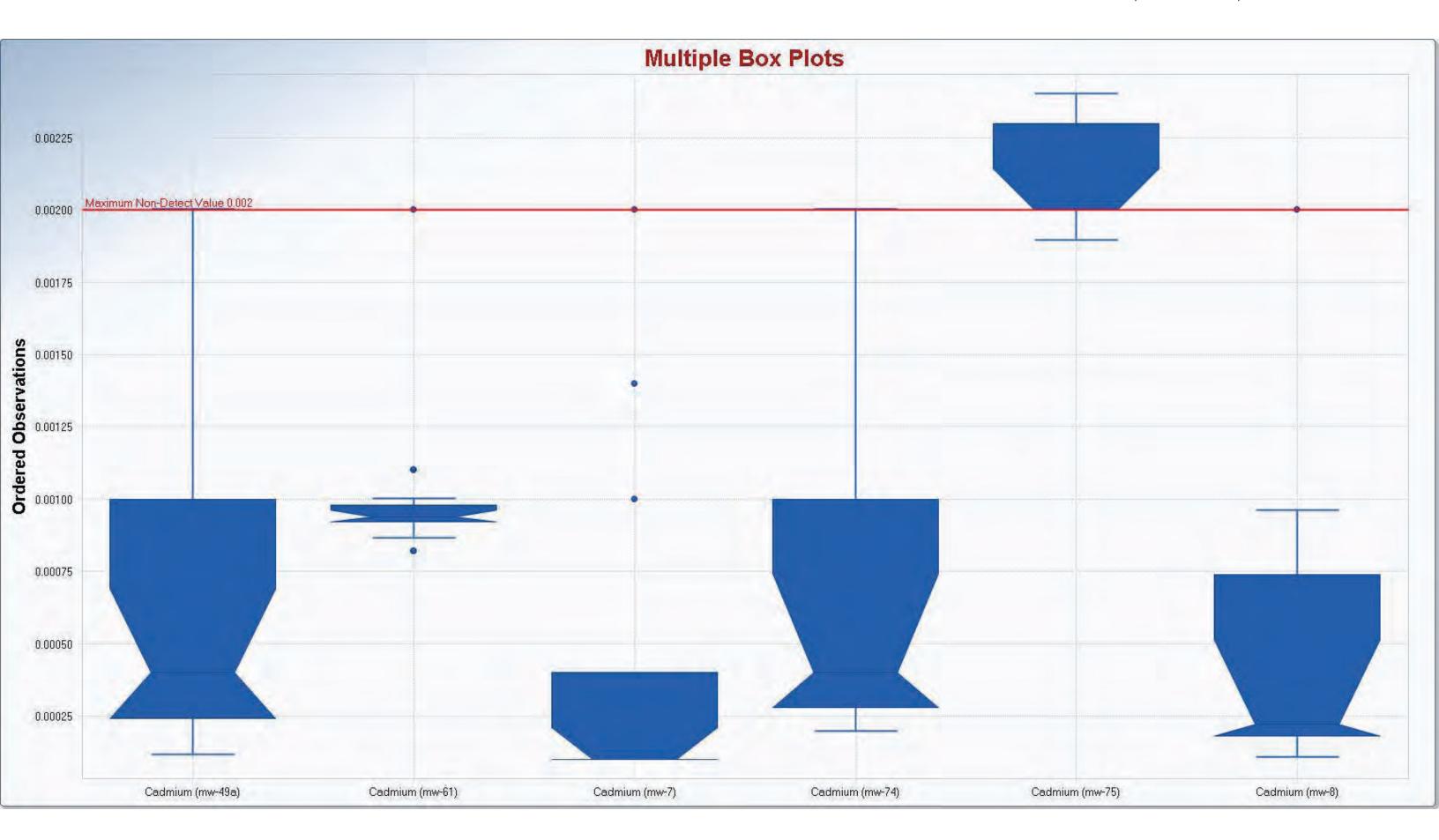
Data Value 4.66 is a Potential Outlier (Upper Tail)				
Test Statistic: 0.798				
For 10% significance level, 4.66 is an outlier.				
For 5% significance level, 4.66 is an outlier.				
For 1% significance level, 4.66 is an outlier.				
2. Data Value 1 is a Potential Outlier (Lower Tail)?				
Test Statistic: 0.222				
For 10% significance level, 1 is not an outlier.				
For 5% significance level, 1 is not an outlier.				
For 1% significance level, 1 is not an outlier.				

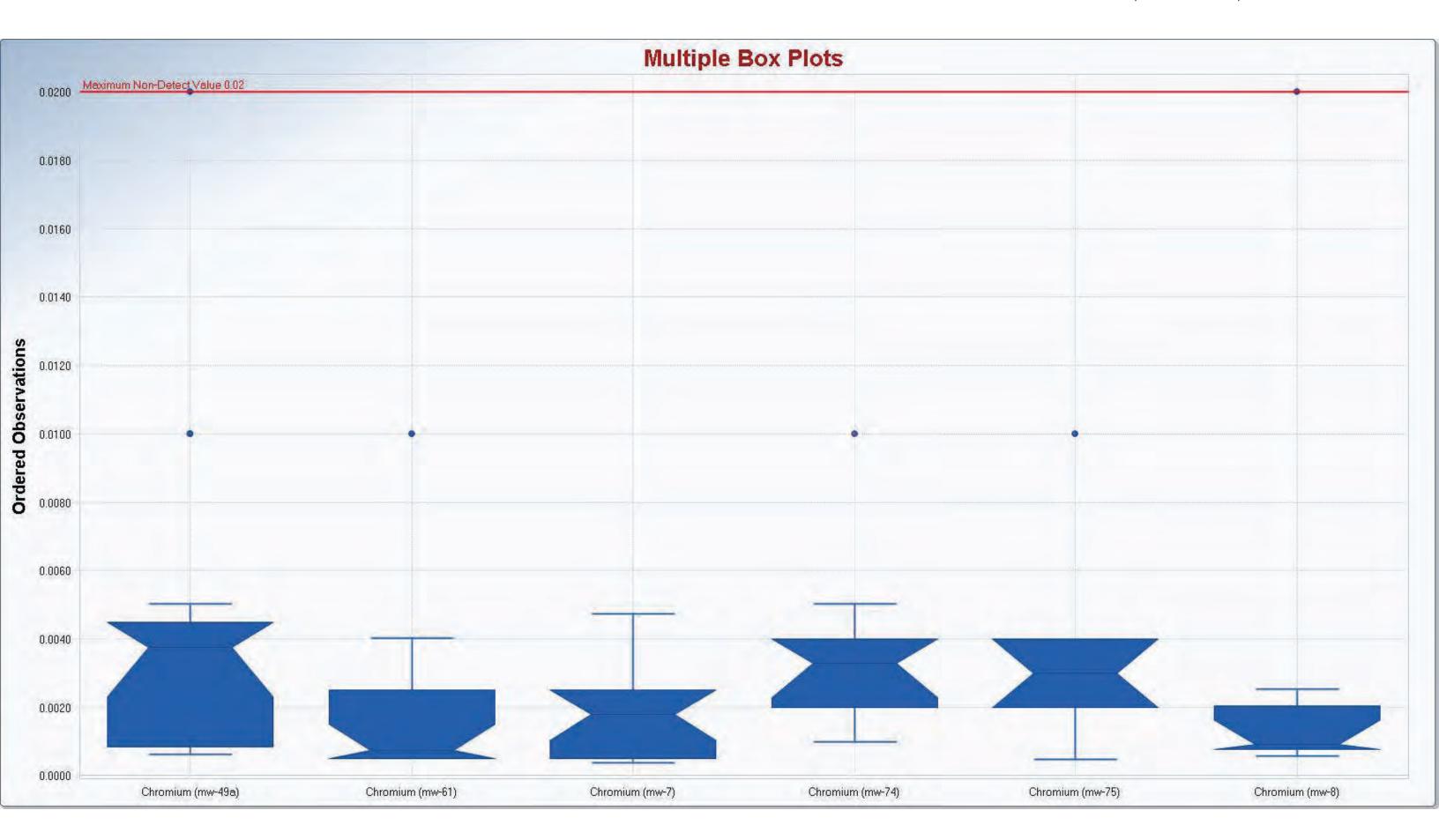


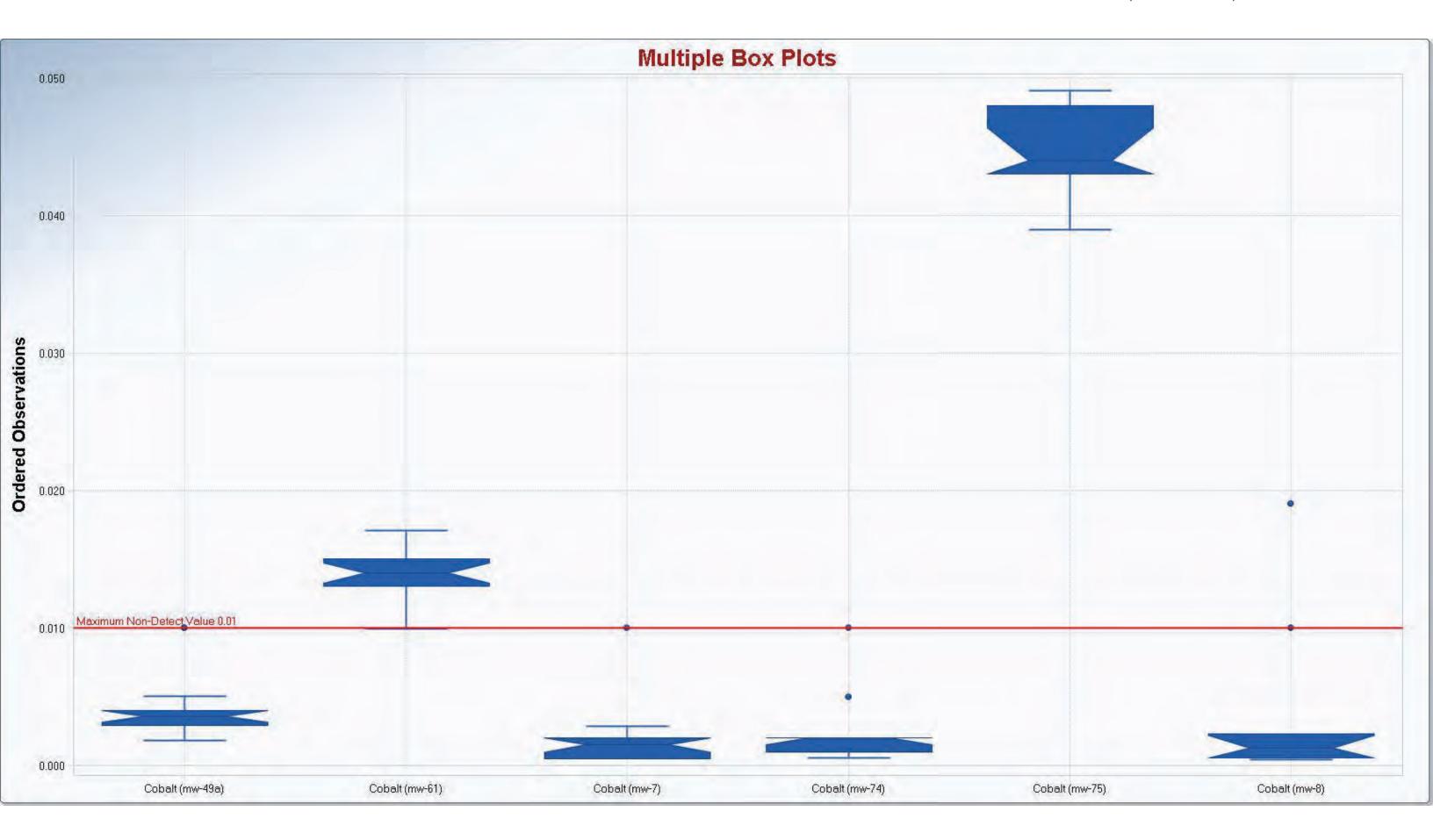


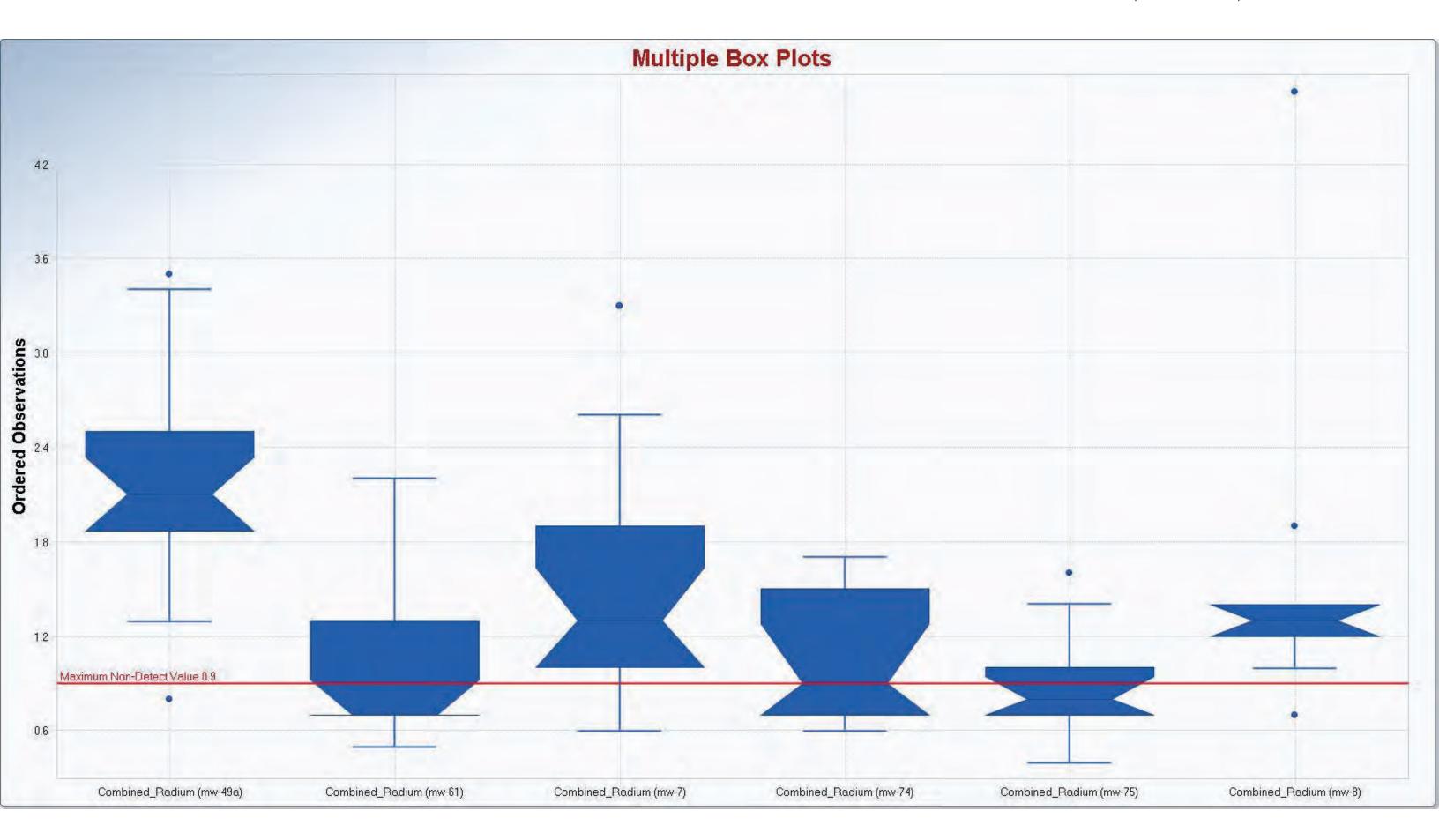


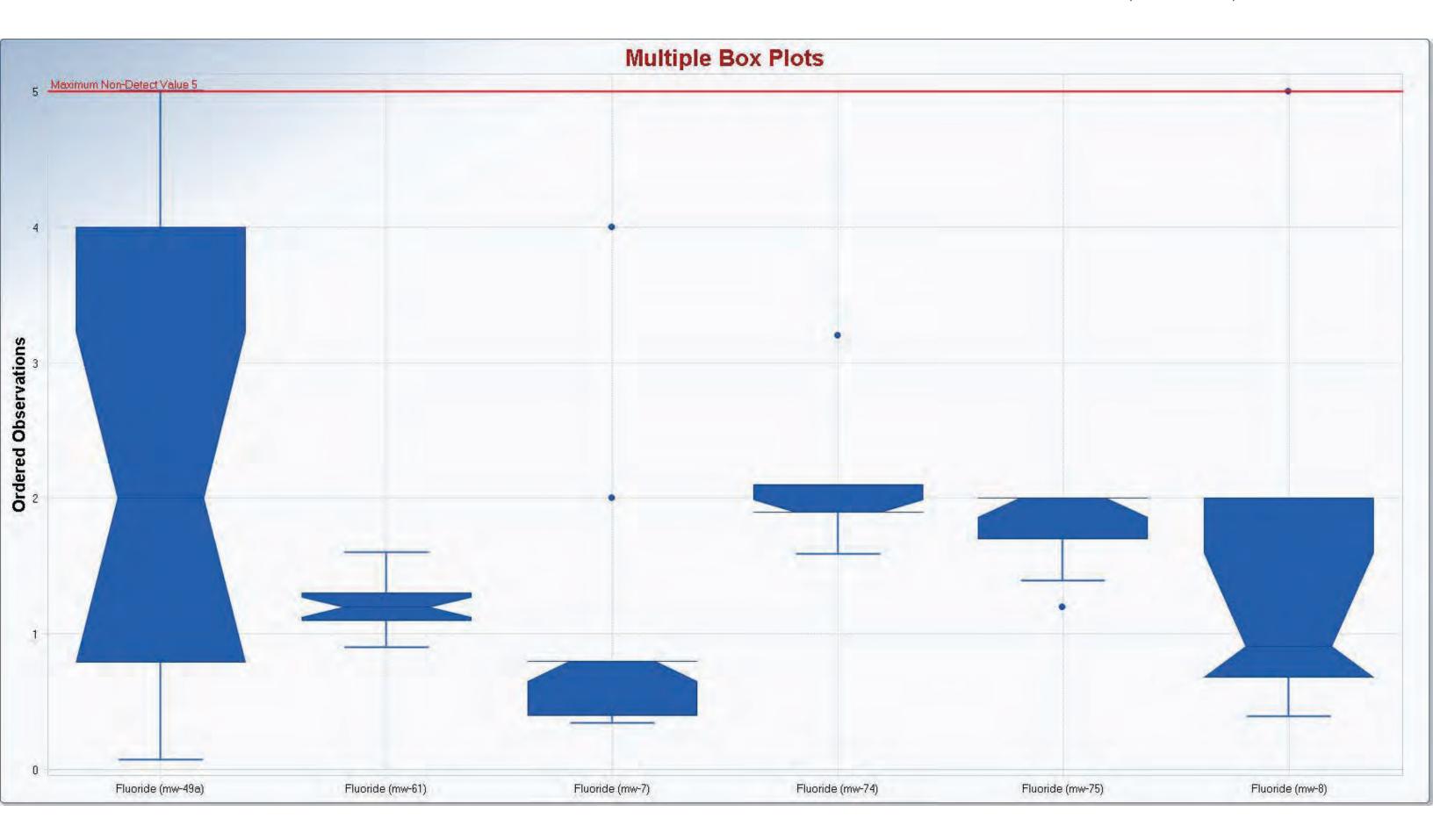


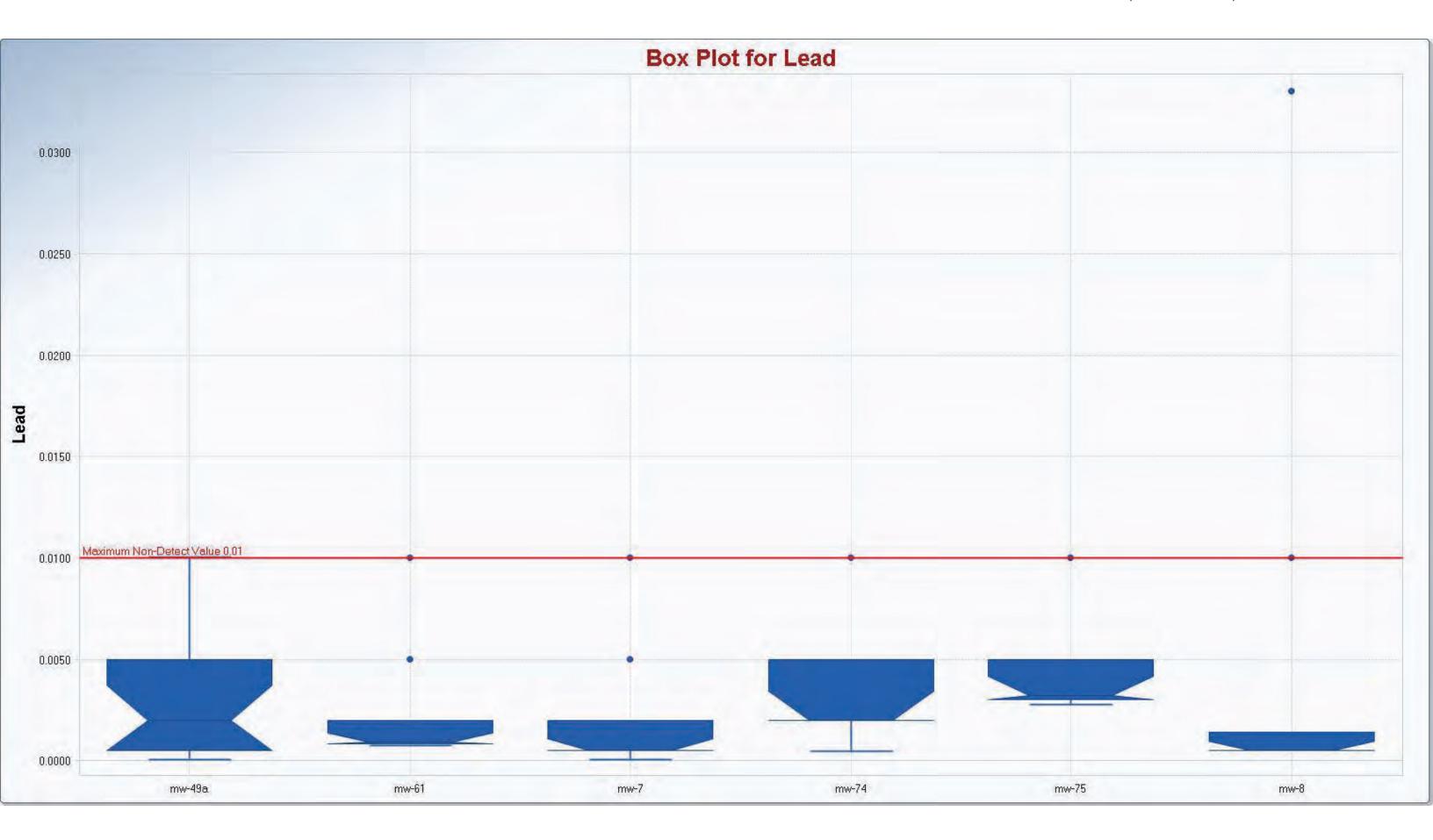


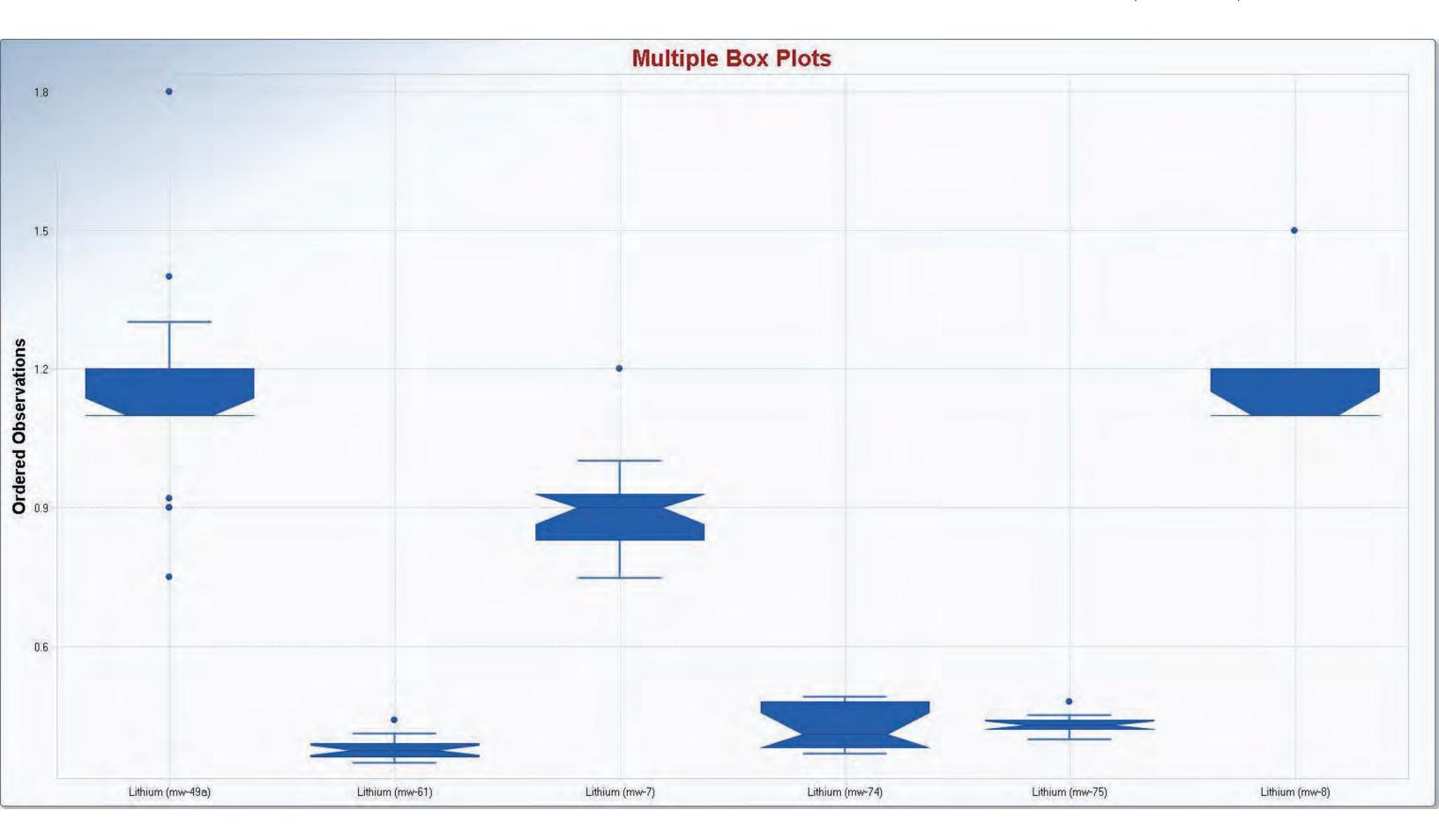


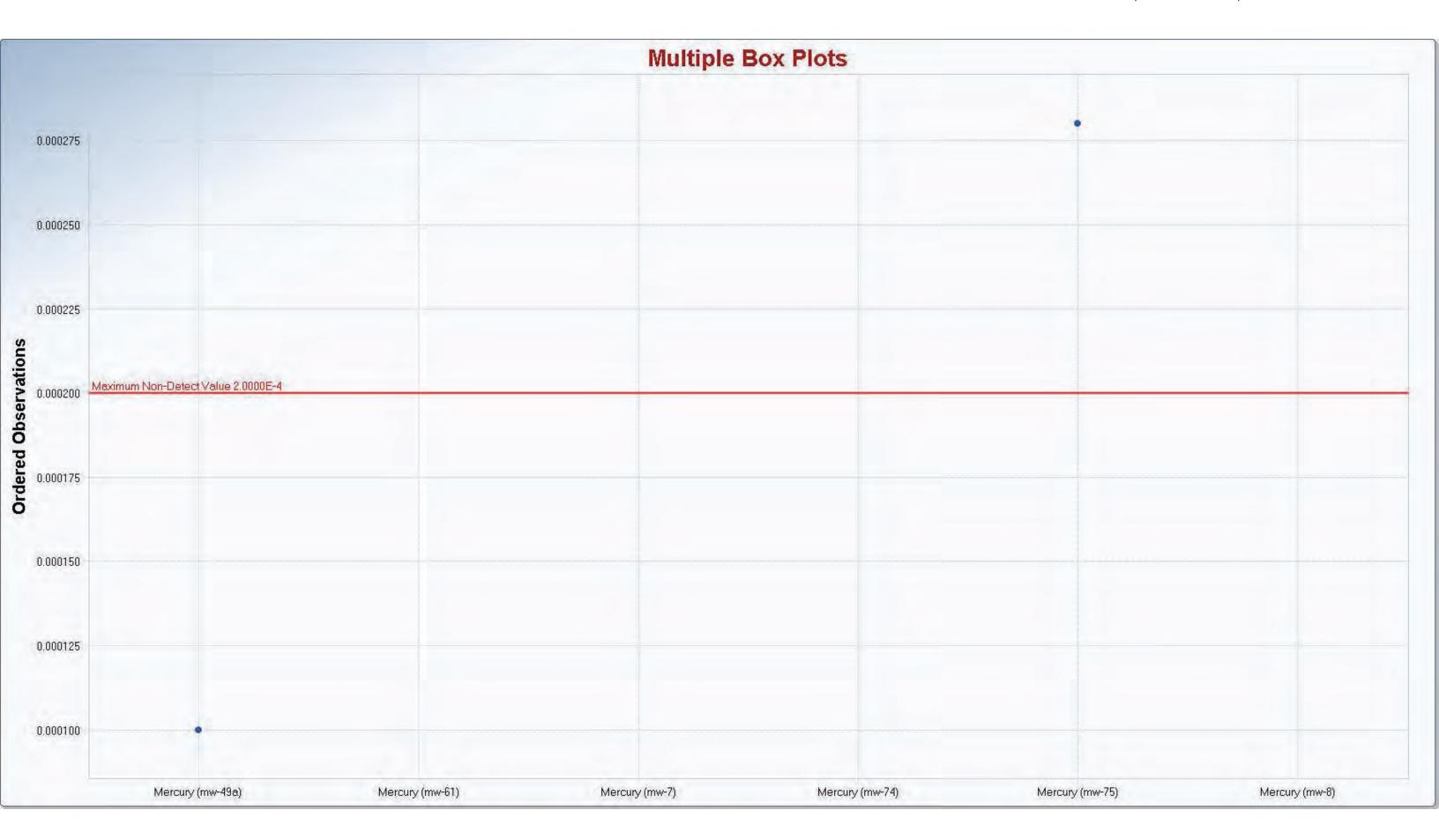


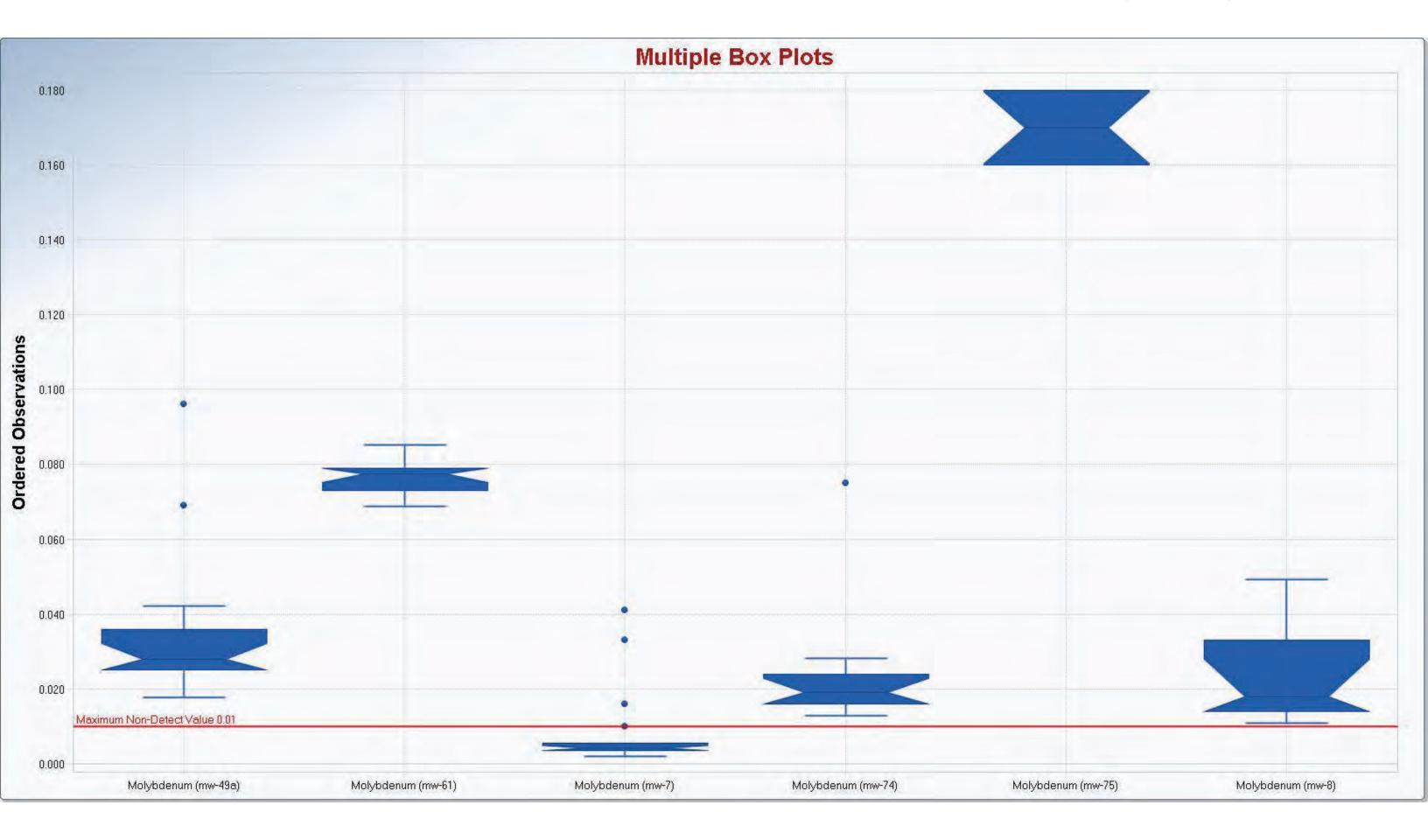


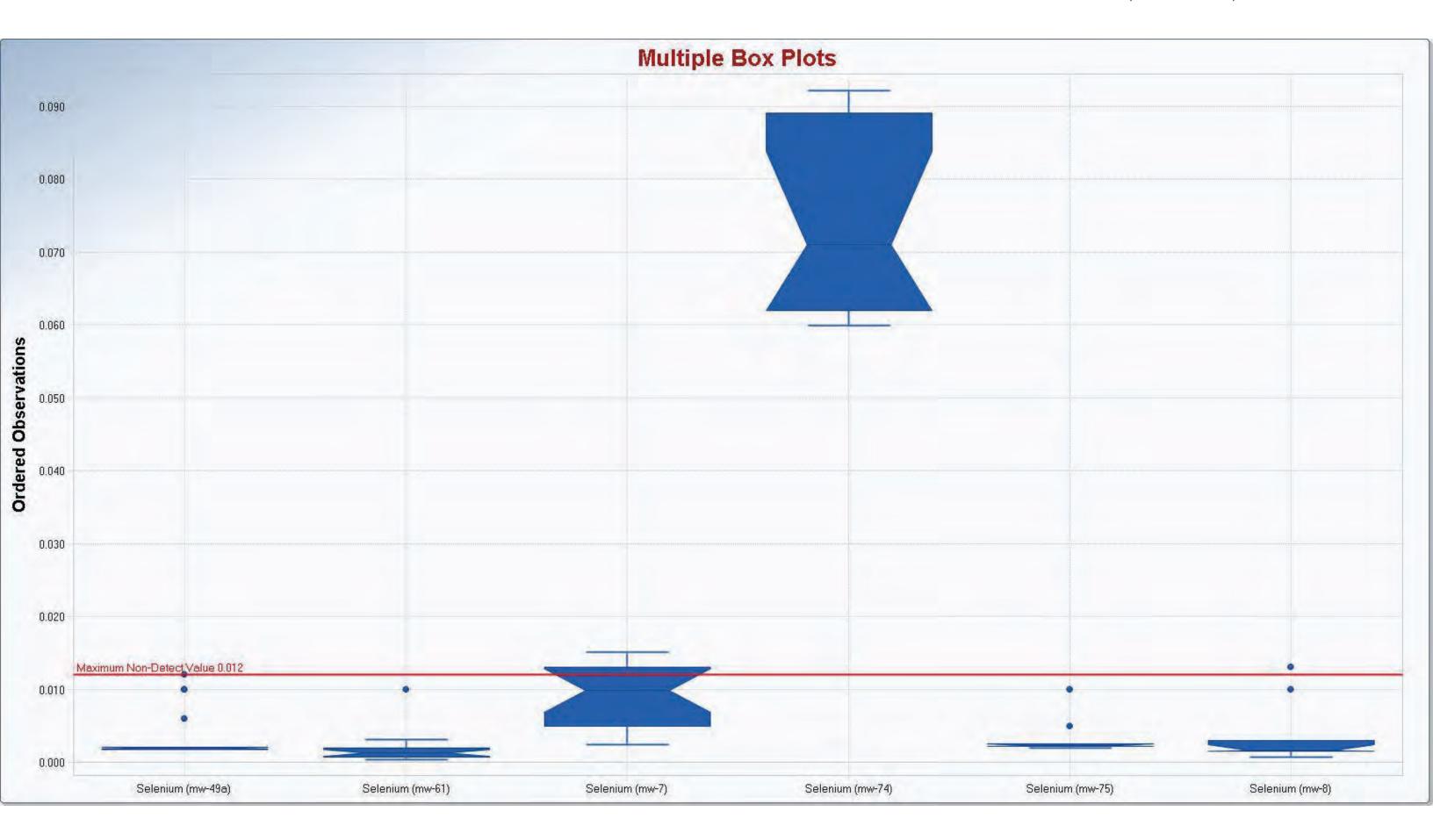


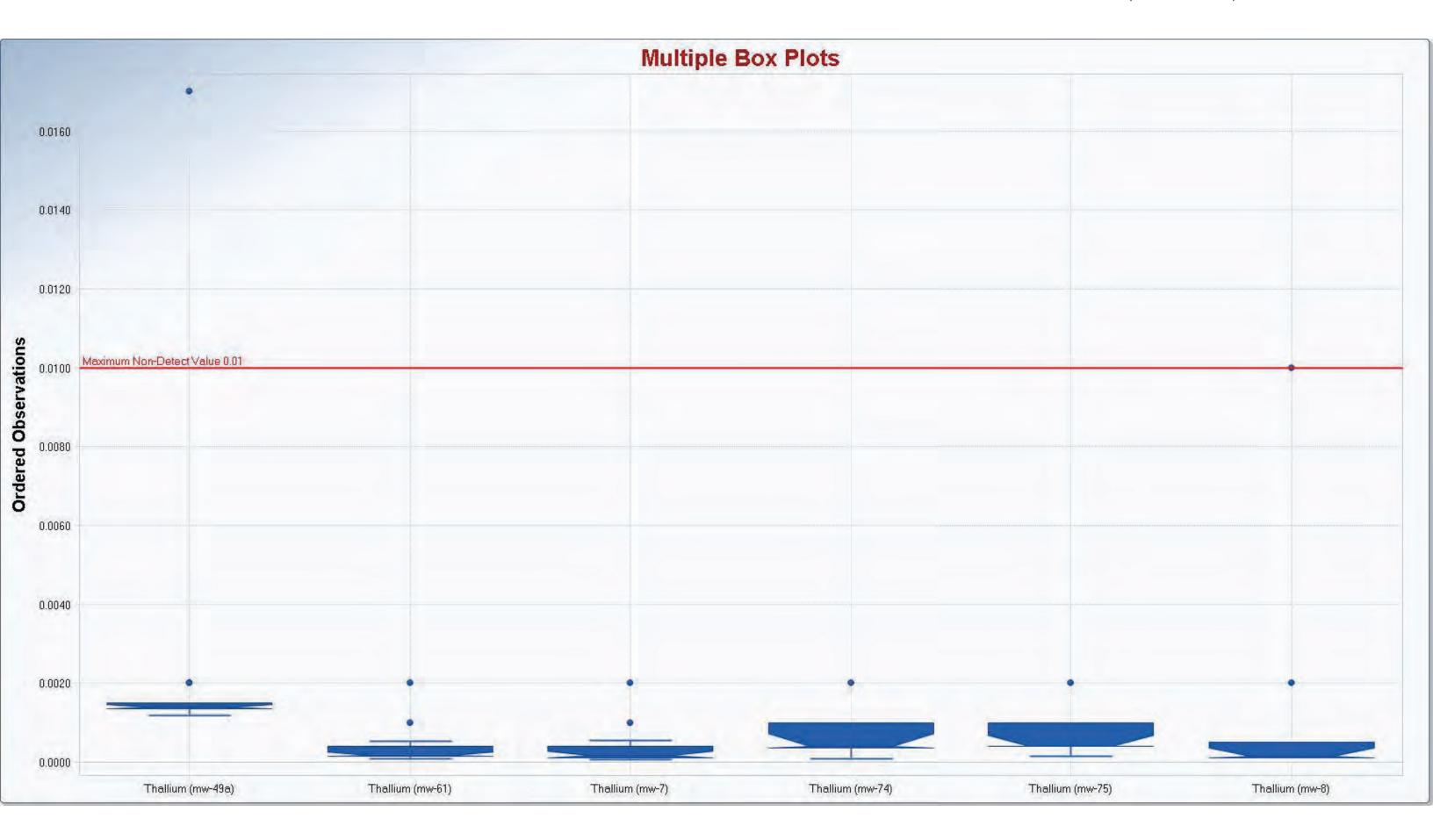














# **APPENDIX J**

WOOD TECHNICAL MEMORANDUM DOCUMENTING THE STATISTICAL ANALYSIS
OF INITIAL ASSESSMENT MONITORING APPENDIX IV CONSTITUENT DATA
COLLECTED FROM THE URS



# **Technical Memorandum**

To: Michele Robertson, RG File No: 1420162024.4.4

Pamela Norris

From: Natalie Chrisman Lazarr, PE cc: File

Carla Landrum, PhD

**Date:** October 15, 2018

Subject: CCR GROUNDWATER ASSESSMENT MONITORING

STATISTICAL ANALYSIS AND RESULTS FOR THE UPPER RETENTION SUMP Arizona Public Service Four Corners Power Plant – Fruitland, New Mexico

#### 1.0 INTRODUCTION

This Technical Memorandum (Tech Memo) documents the initial statistical evaluation of assessment monitoring (i.e., Appendix IV constituent) groundwater data at the Upper Retention Sump (URS) located at the Arizona Public Service (APS) Four Corners Power Plant (FCPP) in Fruitland, New Mexico. The statistical methods and analysis include the determination of groundwater protection standards (GWPSs) for Appendix IV constituents using statistically-driven background threshold values (BTVs), the applicable U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) promulgated under the Safe Drinking Water Act, or alternative risk-based GWPSs established in the statute, whichever is higher (40 Code of Federal Regulations [CFR] Section [§] 257.95(h)). The statistical method selection process for evaluating assessment monitoring data was selected pursuant to the Coal Combustion Residuals (CCR) Rule (40 CFR § 257.93(f)(3)) and the analysis approach documented in the FCPP Statistical Data Analysis Work Plan (Wood, 2018).

The following sections detail data inputs, statistical evaluations, results and recommendations for the subject analysis.

#### 2.0 DATA INPUTS

#### 2.1 Appendix IV Constituent Data

The URS groundwater monitoring well network consists of three background monitoring wells (MW-71, MW-72 and MW-73) and five compliance (i.e., downgradient), monitoring wells (MW-66, MW-67, MW-68, MW-69 and MW-70) with usable data for statistical analysis.

The period of evaluation for the URS Appendix IV constituent statistical analysis ranges from November 2015 through June 2018 and includes site data collected during a minimum of eight initial rounds of detection monitoring (for both Appendix III and IV constituents) and two rounds of assessment monitoring (for Appendix IV constituents). The duration is shorter (i.e. February 2017 through June 2018) for MW-73, which was installed in January 2017.

Due principally to the addition of wells to the monitoring program in 2016 and 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).



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Assessment monitoring was performed on a quarterly basis and the first round of assessment monitoring at the URS was conducted in March 2018; all Appendix IV constituents were evaluated in collected samples during this monitoring event. During the second round of assessment monitoring conducted in June 2018, only detected Appendix IV constituents from the first round of assessment monitoring were evaluated in collected samples as prescribed by the CCR Rule. Based on these frequencies of sample collection for Appendix IV constituents, the minimum sample numbers used in the statistical evaluation of available data were 16 and 24 for compliance monitoring wells and pooled background monitoring wells, respectively

Appendix A contains the contents of the ProUCL data upload tables for the subject analysis. 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 the analyte's reporting limit value for the corresponding sample date. Duplicates were retracted using a random selection process. Combined radium and fluoride data exhibit unique sampling dates and/or duplicate records; therefore, these analytes were segregated into separate worksheets for duplicate retraction and software upload.

#### 2.2 MCLs and Alternative Risk-Based GWPSs

As presented in the Introduction of this Tech Memo, the CCR Rule stipulates that GWPSs used in evaluation of assessment monitoring data are established by comparing the applicable U.S. EPA MCL or an alternative risk-based GWPS to a statistically-driven BTV calculated from background well data. The highest value is selected as the GWPS for each constituent. Table 1 lists the MCLs and alternative risk-based GWPSs used in this analysis.

### 3.0 STATISTICAL METHODS

Assessment monitoring data evaluation implements a single-sample population testing approach, where downgradient samples are compared to a pre-defined standard, in this case the GWPS. The detection monitoring data evaluation differs in that it is a two-sample population (or more) testing approach, where there is no GWPS to compare for compliance assessment. As such, the statistical methods and testing approaches differ between detection monitoring and assessment monitoring.

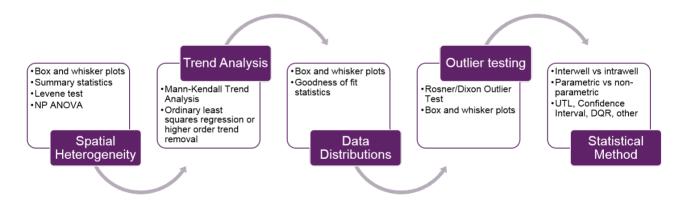
To establish BTVs for each Appendix IV constituent, background well data underwent exploratory data analysis (EDA) to select an appropriate statistical test for calculating the BTVs (see Section 3.1). In accordance with the Unified Guidance (U.S. EPA, 2009) and CCR Rule (40 C.F.R. § 257.93(f)(3)), the Statistical Data Analysis Work Plan (Wood, 2018) identifies the upper tolerance limit (UTL) method as the prescribed approach for establishing BTVs. This method encompasses a variety of statistical tests to establish BTVs in instances where a promulgated U.S. EPA MCL or alternative risk-based GWPS exists. The purpose of selecting the UTL method is its ability to serve as a single-sample statistical comparison. The statistical hypothesis structure for a single-sample comparison is reversible, such that the same fixed background level can be used for assessment monitoring and later for corrective action comparison testing, if necessary. The UTL tests are applicable for analytes that exhibit non-detectable frequencies of less than 100%. The U.S. EPA's Unified Guidance (2009) and the Statistical Data Analysis Work Plan (Wood, 2018) promotes the use of the Double Quantification Rule (DQR) to calculate the UTL in cases where the background non-detection frequency is equal to 100%. Where applicable, the DQR uses the maximum reporting limit (RL) as the BTV.

After establishing a GWPS it is appropriate to compare compliance data for each Appendix IV constituent to the corresponding GWPS. To perform this comparison, a threshold limit was established for each Appendix IV constituent in each compliance well using the confidence interval statistical method. This method encompasses a variety of statistical tests (U.S. EPA, 2009). For assessment monitoring, the lower confidence limit (LCL) for each Appendix IV constituent is compared to its respective GWPS to assess if the lower limit exceeds the GWPS and, if so, declares a statistically significant increase (SSI) in constituent concentrations above the GWPS. Much like the UTL, the confidence interval method's use is reversible. For assessment monitoring, the lower confidence limit is compared to the GWPS to determine if there is a potential release from the CCR unit whereas for the upper confidence limit is compared to the GWPS for corrective action analysis to assess if corrective action is successful. Each compliance well analyte underwent EDA (see Section 3.2) to ensure that the compliance well had no sample outliers and to assess for statistically-significant (p<0.05) increasing or decreasing temporal trends in the sample data. The EDA process also identified which statistical distribution the sample data best fit to select an appropriate statistical comparison (e.g. parametric versus non-parametric) to the GWPS (Wood, 2018).

The following section describe these statistical methods in more detail.

#### 3.1 EDA Workflow Procedures

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 SSI over the GWPS. Figure 1 generalizes the EDA workflow, including assessment of spatial heterogeneity, trend detection, data distribution assessment, and outlier detection. Sample number, monitoring well network configuration, sampling frequency and non-detect frequency determine which EDA methods are most useful. The final EDA step is selecting an adequate and appropriate statistical method. Notably, the EDA workflow procedure is standard between detection monitoring and assessment monitoring.



**Figure 1.** Assessment 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.

There are a number of different types of tolerance limit and confidence interval quantification methods to select from, depending on the statistical distribution, the presence of a temporal trend, the type of statistical comparison (e.g. interwell or intrawell) and the quantity of non-detect values in the background sample data. The following subsections describe these methods and criteria for their selection.

Appendix B summarizes the results of the EDA of URS Appendix IV groundwater data.

#### 3.2 Establishing Background Threshold Values

The EDA results for the subject analysis suggest that three UTL statistical tests are appropriate for collected URS background groundwater data: the parametric interwell upper tolerance limit, non-parametric interwell upper tolerance limit and the Double Quantification Rule. This work assumes that background well locations are adequate and thereby declare interwell comparisons appropriate. Each statistical test is described below.

### 3.2.1 Parametric Interwell Upper Tolerance Limit (P-UTL)

An interwell UTL represents an upper boundary, or threshold concentration value, that contains a prespecified proportion, or coverage, of the underlying statistical population. For example, this coverage can range from 95% to 99% of all possible sample measurements in the underlying background statistical population, depending on the data characteristics. To be meaningful, testing with the UTL assumes that this coverage is similar for any statistically similar population (e.g. downgradient compliance wells), thereby underscoring the importance of a representative background well. Declaring a tolerance coefficient is necessary to establish confidence that the background sample dataset contains the pre-specified coverage (U.S. EPA, 2009). Oftentimes a tolerance coefficient of at least 95% is used, which corresponds to a significance level ( $\alpha$ ) equal to 5% (U.S. EPA, 2009). Table 17-3 within the Unified Guidance (U.S. EPA, 2009) combines the coverage and confidence to calculate the UTL.

A parametric interwell upper tolerance limit (P-UTL) was calculated if the background sample data generally met the following criteria, which are tested using procedures declared in the Statistical Data Analysis Work Plan (Wood, 2018):

- 1. Temporal stationarity (no trend in concentration through time)
- 2. Normal or transformed normal data distribution
- 3. Spatial heterogeneity is minimal
- 4. Sample outliers have been removed
- 5. Sample data are statistically independent and identically distributed

The P-UTLs were calculated using a 99% coverage with a 95% confidence. Although the Unified Guidance (U.S. EPA, 2009) recommends at least a 95% coverage, the 99% coverage is justifiable for the following reasons:

- 1) The sampling frequency for the November 2015 to June 2018 sampling period is higher than quarterly in some cases, suggesting the background sample data might not be independent samples and might underrepresent long-term temporal variations in groundwater constituent concentrations. A larger coverage can help compensate for underrepresented temporal variation. A more conservative coverage (i.e. only 95%) is suggested once a longer history of samples exists and the background sampling frequency becomes more consistent (e.g., semiannual).
- 2) Spatial heterogeneity is suspected at the URS. Spatial heterogeneity introduces uncertainty in the sample data in that one sample location might have naturally occurring elevated concentrations of a constituent relative to other sample locations. This uncertainty can increase the chance of a declaring a false positive SSI. By increasing the UTL coverage it is possible to reduce the chance of declaring a false positive SSI due to spatial heterogeneity. This analysis assumes that the background well designations are adequate such that the other extreme does not occur (i.e., that

the spatial heterogeneity causes background analyte concentrations to be elevated and result in a false negative SSI downgradient of the site).

The UTL coverage assumes the background sample data set is adequate and representative of intrinsic spatial and temporal variability in groundwater constituent concentrations beneath the URS. Factors that can violate this assumption include: 1) background wells completed in a different water-bearing unit than compliance wells (i.e., spatial heterogeneity), 2) background wells that have not been sampled during times of extreme potentiometric level (drought and snow-melt), and 3) structurally-compromised wells that do not produce representative groundwater samples. Reference to the conceptual site model and professional judgement/interpretation are necessary to confirm the adequacy of background well designations.

Table 1 lists background analytes and wells that qualify for the P-UTL method.

## 3.2.2 Non-Parametric Interwell Upper Tolerance Limit (NP-UTL)

A non-parametric interwell tolerance limit (NP-UTL) was calculated if the upgradient sample data generally met the following diagnostic criteria:

- 1. Temporal stationarity
- 2. No discernable data distribution
- 3. Spatial heterogeneity is minimal
- 4. Sample outliers have been removed
- 5. Statistical independence

Criterion Number 2, where a parametric distribution is not discernable from the sample data, primarily drives the NP-UTL selection. A NP-UTL uses the first or second highest-ranked background concentration value to establish the UTL, depending on the number of data points. "Ranked" means the grouped background concentration values are ordered in decreasing order and assigned a rank based on this order, where a rank equal to one represents the maximum concentration value. Table 17-4 in the Unified Guidance (U.S. EPA, 2009) provides minimum coverage levels for the first and second ordered sample values with 95% confidence for different background sample numbers. Table 17-4 illustrates that the sample number controls the coverage for the NP-UTL and higher sample numbers are necessary to achieve a higher coverage. Overall, the non-parametric tolerance limit is less powerful in comparison to its parametric counterparts (but more appropriate when parametric assumptions are not met).

The NP-UTL uses the maximum ranked value in the background well, which can constitute a reporting limit value if the reporting limit is higher than detectable concentrations. It is preferable that the maximum reporting limit in compliance wells not exceed the maximum reporting limit in the background well.

Table 1 lists background analytes and wells that qualify for the NP-UTL method.

## 3.2.3 Double Quantification Rule

The DQR is appropriate when the analyte exhibits 100% non-detectable concentrations in the background data set. The DQR states that, for any given compliance well analyte, two consecutive detectable concentrations that are above the maximum reporting limit are sufficient evidence to declare an SSI.

It should be noted that implications exist when there are inconsistencies in reporting limit values over time and between monitoring wells. For example, when the downgradient wells reflect a higher maximum reporting limit in comparison to the background well, applying the DQR leads to uncertainty in identifying a real SSI (i.e., the statistical test results in a false negative SSI). In other cases, it is possible to have lower reporting limit values in downgradient wells, resulting in a higher detection frequencies, which can trigger a false positive SSI. For these reasons, it is recommended that the laboratory establish achievable and consistent analytical reporting limit values among all wells throughout the duration of the monitoring program.

Table 1 lists background analytes and wells that qualify for the DQR.

#### 3.3 Establishing Compliance Well Comparison Limits

Confidence intervals are a recommended approach for comparing compliance well (i.e., downgradient) data to a GWPS during assessment monitoring or corrective action (U.S. EPA, 2009). The confidence interval method estimates the range of concentration values (e.g. the upper and lower limits) in which the true central tendency (e.g. mean, median for this work) is expected to occur with a certain probability. The confidence interval accounts for both the level of statistical variation in the data and the desired confidence level. For this statistical analysis, the lower confidence limit is of interest and reflects the lowest concentration beyond which we do not expect the true mean of the downgradient sample data to reside.

Below is the formal null hypothesis statement for the confidence limit:

Ho: The true central tendency of the sample concentrations at the compliance point (e.g. downgradient well) is no greater than the predetermined GWPS.

This is the assumed condition unless, through a statistical test, the actual data demonstrates otherwise. The null hypothesis is rejected when the lower confidence limit (LCL) of the compliance sample dataset resides above the GWPS, resulting in sufficient evidence to declare an SSI.

Statistical power is the ability for the statistical test to detect a true increase above the GWPS. The statistical power can be negligible when the sample size is small, the sample variability is high and/or the confidence level is set too high (U.S. EPA, 2009). Statistical confidence should not be confused with the statistical power. The *statistical confidence* (1- $\alpha$ ) indicates how often the confidence limit will contain the statistical parameter of interest (i.e., mean or median). The *statistical power* indicates how often a test will correctly identify an exceedance, using the statistical parameter of interest, above the GWPS. Because the statistical power typically decreases with higher confidence levels, the Unified Guidance (U.S. EPA, 2009) recommends first establishing an acceptable level of statistical power and then computing the associated confidence level. The Unified Guidance (U.S. EPA, 2009) suggests that the compliance test have at least 80% statistical power to detect a compliance well central tendency that is two times above the GWPS. This recommendation primarily accommodates parametric statistical tests, meaning when parametric method assumptions are not met, the parametric methods' power and confidence are not meaningful. In these cases, non-parametric methods are appropriate and their confidence limits generally exhibit somewhat less statistical power than their parametric counterparts.

The EDA results for the subject analysis suggest that three LCL statistical tests are appropriate for groundwater data collected downgradient of the URS: the parametric lower confidence limit, non-parametric lower confidence limit and the parametric lower confidence limit with a temporal trend. Each statistical test is described below.

#### 3.3.1 Parametric Lower Confidence Limits (P-LCL)

For parametric data distributions, the mean (i.e., central tendency), standard deviation, and one-tailed Student's t value are necessary to calculate the parametric lower confidence limit (P-LCL) according to Equation 21.1 in the Unified Guidance (U.S. EPA, 2009). The confidence level (1- $\alpha$ ) is necessary to establish the Student's t value. The objective is to select the  $\alpha$  that achieves high statistical power with an acceptable level of confidence. Table 22-2 in Appendix D of the Unified Guidance (U.S. EPA, 2009) allows for the selection of  $\alpha$  based on the compliance well's sample number and the above statistical power criterion (i.e., at least 80%). The selected  $\alpha$  for the P-LCL test is the maximum value that achieves at least 80% statistical power for the set sample number (n) and the minimum RCRA standard requirement of  $\alpha$  = 0.01 (U.S. EPA, 2009).

Table 2 summarizes compliance well analytes that quality for the P-LCL test.

#### 3.3.2 Non-Parametric Lower Confidence Limits (NP-LCL)

For the non-parametric cases, the median represents the central tendency. The Unified Guidance (U.S. EPA, 2009) does not provide formal guidance for calculating the statistical power for a non-parametric statistical test using environmental data. As such, the non-parametric confidence limit calculations will achieve a minimum confidence level of 95%.

The non-parametric LCL (NP-LCL) test uses the sample number and the 95% confidence level  $(1-\alpha)$  to establish the LCL. The compliance well with a sample count (n) is first ordered from smallest to largest sample concentration then assigned a numeric rank, where 1 is the lowest concentration and (n) is the highest concentration. Table 21-11 in Appendix D of the Unified Guidance (U.S. EPA, 2009) provides achievable confidence levels for ranked values for small sample sizes (n<20). The rank value that achieves the 95% confidence level or higher serves as the lower non-parametric confidence limit.

Table 2 summarizes compliance well analytes that quality for the NP-LCL test.

## 3.3.3 Calculating the Trend-Dependent Lower Confidence Limit (P-LCLT)

The confidence interval tests are sensitive to temporal trends, which inflate the standard deviation. If the temporal Mann-Kendall trend was significant (p<0.05), and the data exhibit a parametric distribution, the 95% lower confidence interval was calculated around the temporal trend (P-LCLT). If a trend was significant (p<0.05) but the data distribution was non-parametric, then a NP-LCL was calculated. The P-LCLT was calculated in ProUCL 5.1 using equation 10-12 in the ProUCL 5.1.1 Technical Guidance (U.S. EPA, 2015). By proxy, the coefficient of variation was calculated to assess the statistical power of this parametric test. The Unified Guidance (Section 7.4.1) suggests that if the coefficient of variation is less than or equal to 0.5, the lower limit confidence exhibits adequate statistical power.

Table 2 summarizes compliance well analytes that quality for the P-LCLT test if the statistically significant (p<0.05) temporal trend is increasing or decreasing.

#### 4.0 RESULTS

Table 1 summarizes the GWPS selection for each Appendix IV constituent. The GWPS constitutes either the statistically calculated BTV, the U.S. EPA's promulgated MCL, or the risk-based alternative GWPS identified for constituents without MCLs, whichever value is higher.

Table 2 summarizes: 1) which compliance wells exhibit SSIs above 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 sufficient evidence to declare an SSI for fluoride in following wells: MW-66, MW-67, MW-68 and MW-69. Fluoride concentrations in MW-66, MW-67, and MW-69 exhibit concentrations that are at least one order of magnitude above the fluoride GWPS, which is equal to 4 mg/L. Data collected from each of these wells also exhibit statistically significant (p<0.05) increasing trends for fluoride. This statistical analysis indicates there is insufficient evidence to declare SSIs above their respective GWPS for the remaining Appendix IV analytes (i.e., excluding fluoride).

Several compliance monitoring wells exhibit statistically significant (p<0.05) temporal trends. Most notable are the statistically significant (p<0.05) increasing trends present in more than one compliance well for arsenic, cobalt, lithium and thallium. Statistically significant (p<0.05) trends were detected in the background dataset for cobalt (increasing), molybdenum (increasing), selenium (decreasing) and thallium (increasing). Most of these constituents exhibit relatively high non-detect frequencies with fluctuating reporting limit values over time. The fluctuation in reporting limit values creates subjective uncertainty regarding the true presence of temporal trends in background groundwater conditions.

This analysis suggests spatial heterogeneity is present for the grouped background wells (MW-71, MW-72 and MW-73) for multiple Appendix IV constituents, including arsenic, barium, cobalt, lead, lithium, molybdenum and selenium. Reference to the conceptual site model and professional judgement/interpretation are necessary to confirm adequacy and representativeness of background well designations for the URS.

#### 5.0 RECOMMENDATIONS

This statistical analysis results in the following recommendations for the URS assessment monitoring statistical analysis:

- There is sufficient evidence to declare an SSI above the GWPS for fluoride in wells MW-66, MW-67, MW-68 and MW-69. Therefore, proper notification in the facility's operation record should be made and, within 90 days of the date of this Tech Memo, APS should either begin corrective action monitoring or demonstrate that the SSI is due to an alternative source.
- A lower sampling frequency is necessary to avoid temporal autocorrelation in the groundwater monitoring data; a quarterly or semiannual frequency should be used until future data evaluations can establish a more objective, data-driven sampling frequency.
- The laboratory should achieve reporting limits below the U.S. EPA's promulgated MCLs and maintain a constant reporting limit for each analyte over time for all monitoring wells background and compliance. This recommendation will improve the certainty of detection of temporal trends

- in the groundwater sample data while also decreasing the probability for declaring a false negative or false positive SSIs when applying statistical tests, especially the DQR.
- Intrawell statistical comparisons should be considered for analytes that exhibit spatial
  heterogeneity. Reference to the conceptual site model and professional judgement/interpretation
  are necessary to confirm adequacy and representativeness of background well designations
  for URS.

#### 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., 2018. *Statistical Data Analysis Work Plan*. Coal Combustion Residual Rule Groundwater Monitoring System Compliance, Four Corners Power Plant, Fruitland, New Mexico. Prepared for Arizona Public Service. October, 2018.



**TABLES** 



Table 1
GWPS Selection for the FCPP URS
Appendix IV Statistical Comparison

		US EPA	Alternative Risk-Based	Background Threshold Value (Calculation		
Grouped Background Wells	Constituent	MCL	GWPS	Method <sup>1,2</sup> )	Units	GWPS Selection <sup>3</sup>
MW-71, MW-72, MW-73	Antimony	0.006		0.01 (NP-UTL)	mg/L	BTV
MW-71, MW-72, MW-73	Arsenic	0.01		0.013 (P-UTL)	mg/L	BTV
MW-71, MW-72, MW-73	Barium	2		0.051 (NP-UTL)	mg/L	US EPA MCL
MW-71, MW-72, MW-73	Beryllium	0.004		0.001 (DQR)	mg/L	US EPA MCL
MW-71, MW-72, MW-73	Cadmium	0.005		0.001 (NP-UTL)	mg/L	US EPA MCL
MW-71, MW-72, MW-73	Chromium	0.1		0.01 (NP-UTL)	mg/L	US EPA MCL
MW-71, MW-72, MW-73	Cobalt		0.006	0.016 (P-UTL)	mg/L	BTV
MW-71, MW-72, MW-73	Fluoride	4		4 (NP-UTL)	mg/L	BTV/US EPA MCL
MW-71, MW-72, MW-73	Lead		0.015	0.005 (NP-UTL)	mg/L	Alternative Risk-Based GWPS
MW-71, MW-72, MW-73	Lithium		0.04	0.8 (NP-UTL)	mg/L	BTV
MW-71, MW-72, MW-73	Mercury	0.002		0.0002 (DQR)	mg/L	US EPA MCL
MW-71, MW-72, MW-73	Molybdenum		0.1	0.011 (P-UTL)	mg/L	Alternative Risk-Based GWPS
MW-71, MW-72, MW-73	Selenium	0.05		0.45 (P-UTL)	mg/L	BTV
MW-71, MW-72, MW-73	Thallium	0.002		0.0014 (P-UTL)	mg/L	US EPA MCL
MW-71, MW-72, MW-73	Combined Radium	5		5.4 (P-UTL)	pCi/L	BTV

#### Notes:

BTV = Background Threshold Value

GWPS = Groundwater Protection Standard

US EPA MCL = United States Environmental Protection Agency Maximum Contaminant Level under the Safe Drinking Water Act

10/15/2018 Page 1

<sup>&</sup>lt;sup>1</sup> Double Quantification Rule (DQR), Parametric Upper Tolerance Limit (P-UTL), Non-Parametric Upper Tolerance Limit (NP-UTL)

<sup>&</sup>lt;sup>2</sup> The DQR BTV represents the maximum reporting limit value

 $<sup>^3</sup>$  The GWPS selection represents the highest value between the US EPA MCL, the Alternative Risk-Based GWPS and the BTV

Table 2
Statistical Results Summary - FCPP URS CCR Unit
Appendix IV Statistical Comparison

Appendix IV Constituent	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
GWPS	0.01	0.013	2	0.004	0.005	0.1	0.016	4	0.015	0.8	0.002	0.1	0.45	0.002	5.4
MW-66	NP-LCL (0.004)	P-LCLT (0.0024)	NP-LCL (0.021)	_	NP-LCL (0.0005)		P-LCLT (0.0072)	<u>NP-LCL (26)</u>	_	NP-LCL (0.36)	NP-LCL (0.0002)	NP-LCL (0.023)		P-LCL (0.0004)	P-LCL (2.0)
MW-67		P-LCL (0.0021)	P-LCL (0.019)		NP-LCL (0.0005)		P-LCL (0.0048)	P-LCLT (22)		P-LCLT (0.47)	NP-LCL (0.0002)	P-LCLT (0.034)	P-LCLT (0.0016)	P-LCLT (0.0007)	P-LCL (2.1)
MW-68		P-LCLT (0.0081)	NP-LCL (0.0093)	NP-LCL (0.001)	NP-LCL (0.00046)		P-LCL (0.0026)	<u>P-LCLT (11)</u>		P-LCLT (0.34)	NP-LCL (0.0002)	P-LCLT (0.0043)		P-LCLT (0.0007)	P-LCL (1.5)
MW-69		P-LCLT (0.0072)	P-LCL (0.015)	_	NP-LCL (0.0005)		P-LCLT (0.0053)	<u>P-LCLT (20)</u>	_	P-LCLT (0.46)	NP-LCL (0.0002)	P-LCL (0.015)	_	NP-LCL (0.00047)	P-LCLT (4.4)
MW-70	NP-LCL (0.01)	P-LCL (0.0043)		_	NP-LCL (0.0005)		P-LCLT (0.0054)	P-LCL (1.5)	NP-LCL (0.005)	NP-LCL (0.34)	NP-LCL (0.0002)	P-LCL (0.0050)	IP-I <i>C</i> T (0 18) I	NP-LCL (0.00057)	P-LCL (1.6)

# Legend

Method (LCL)	There is insufficient evidence to declare an SSI over the GWPS	NP-LCL	Non-Parametric Lower Confidence Limit
Method (LCL)	Statistically significant increasing trend (p<0.05)	P-LCLT	Parametric Lower Confidence Limit with a Trend
Method (LCL)	Statistically significant decreasing trend (p<0.05)	P-LCL	Parametric Lower Confidence Limit
Method (LCL)	There is sufficient evidence to declare an SSI over the GWPS	LCL	Lower Confidence Limit

10/15/2018 Page 1



# **APPENDIX A**

**PROUCL INPUT FILES** 

Table A-1 Fluoride - All Wells

	110	ioriae - Ali We	113	
Well	Sample Date	Fluoride	D_Fluoride	NumDate
MW-66	11/5/2015	18	1	42313.00
MW-66	4/27/2016	18	1	42487.00
MW-66	6/5/2016	20	1	42526.00
MW-66	8/20/2016	19	1	42602.00
MW-66	9/12/2016	17	1	42625.00
MW-66	10/19/2016	19	1	42662.00
MW-66	2/1/2017	19	1	42767.00
MW-66	4/16/2017	23	1	42841.00
MW-66	5/1/2017	24	1	42856.00
MW-66	5/29/2017	25	1	42884.00
MW-66	6/21/2017	24	1	42907.41
MW-66	7/21/2017	25	1	42937.00
MW-66	8/9/2017	26	1	42956.00
MW-66	8/16/2017	25	1	42963.00
MW-66	9/9/2017	26	1	42987.00
MW-66	10/13/2017	26	1	43021.00
MW-66	3/16/2018	41	1	43175.00
MW-66	5/31/2018	25	1	43251.00
MW-67	11/4/2015	18	1	42312.00
MW-67	4/27/2016	19	1	42487.00
MW-67	6/6/2016	24	1	42527.00
MW-67	8/20/2016	20	1	42602.00
MW-67	9/13/2016	17	1	42626.00
MW-67	10/20/2016	15	1	42663.00
MW-67	2/1/2017	16	1	42767.00
MW-67	4/17/2017	21	1	42842.00
MW-67	5/2/2017	37	1	42857.00
MW-67	5/29/2017	21	1	42884.00
MW-67	6/21/2017	21	1	42907.56
MW-67	7/21/2017	22	1	42937.00
MW-67	8/9/2017	22	1	42956.00
MW-67	8/16/2017	22	1	42963.00
MW-67	9/10/2017	24	1	42988.00
MW-67	10/13/2017	25	1	43021.00
MW-67	3/16/2018	31	1	43175.00
MW-67	6/2/2018	25	1	43253.00
MW-68	11/6/2015	7	1	42314.00
MW-68	4/26/2016	8	1	42486.00
MW-68	6/5/2016	10	1	42526.00
MW-68	8/20/2016	7.5	1	42602.00
MW-68	9/13/2016	5.7	1	42626.00
MW-68	10/20/2016	5.5	1	42663.00
MW-68	2/1/2017	6.8	1	42767.00
MW-68	4/17/2017	9.7	1	42842.00
MW-68	5/2/2017	10	1	42857.00
MW-68	5/29/2017	8.3	1	42884.00

Table A-1 Fluoride - All Wells

	110	ioriae - Ali We	113	
Well	Sample Date	Fluoride	D_Fluoride	NumDate
MW-68	6/21/2017	8.7	1	42907.59
MW-68	7/21/2017	9.6	1	42937.00
MW-68	8/9/2017	11	1	42956.00
MW-68	8/16/2017	11	1	42963.00
MW-68	9/10/2017	11	1	42988.00
MW-68	10/13/2017	10	1	43021.00
MW-68	3/16/2018	14	1	43175.00
MW-68	6/2/2018	12	1	43253.00
MW-69	11/4/2015	9.8	1	42312.00
MW-69	4/26/2016	13	1	42486.00
MW-69	6/5/2016	13	1	42526.00
MW-69	8/20/2016	13	1	42602.00
MW-69	9/13/2016	11	1	42626.00
MW-69	10/20/2016	9.6	1	42663.00
MW-69	2/1/2017	12	1	42767.00
MW-69	4/17/2017	17	1	42842.00
MW-69	5/2/2017	18	1	42857.00
MW-69	5/29/2017	16	1	42884.00
MW-69	6/21/2017	14	1	42907.53
MW-69	7/21/2017	18	1	42937.00
MW-69	8/9/2017	17	1	42956.00
MW-69	8/16/2017	17	1	42963.00
MW-69	9/10/2017	20	1	42988.00
MW-69	10/13/2017	20	1	43021.00
MW-69	3/16/2018	29	1	43175.00
MW-69	6/2/2018	21	1	43253.00
MW-70	11/9/2015	2.6	1	42317.00
MW-70	4/27/2016	2.3	1	42487.00
MW-70	6/5/2016	2.1	1	42526.00
MW-70	8/20/2016	0.8	0	42602.00
MW-70	9/12/2016	0.4	0	42625.00
MW-70	10/19/2016	0.4	0	42662.00
MW-70	2/1/2017	0.4	0	42767.00
MW-70	4/16/2017	0.85	1	42841.00
MW-70	5/1/2017	1.7	1	42856.00
MW-70	5/29/2017	2.6	1	42830.00
MW-70	6/21/2017	2.9	1	42907.50
MW-70	7/21/2017	2.1	1	42937.00
MW-70	8/9/2017	3	1	42956.00
MW-70	8/16/2017	3.2	1	42963.00
MW-70	9/9/2017	2.5	1	42987.00
MW-70	10/13/2017	1	1	43021.00
MW-70	3/16/2018	2.2	1	43021.00
MW-70	5/31/2018	1.8	1	43173.00
MW-71	4/26/2016	2	0	43251.00
MW-71		0.4	0	+
IVIVV-/I	6/6/2016	0.4	U	42527.00

Table A-1 Fluoride - All Wells

		ioriue - Air we	T	T
Well	Sample Date	Fluoride	D_Fluoride	NumDate
MW-71	8/21/2016	0.8	0	42603.00
MW-71	9/12/2016	0.4	0	42625.00
MW-71	10/20/2016	0.4	0	42663.00
MW-71	2/2/2017	0.4	0	42768.00
MW-71	4/17/2017	2	0	42842.00
MW-71	5/2/2017	0.44	1	42857.00
MW-71	5/29/2017	2	0	42884.48
MW-71	6/22/2017	2	0	42908.36
MW-71	7/21/2017	2	0	42937.00
MW-71	8/10/2017	2	0	42957.00
MW-71	8/17/2017	2	0	42964.00
MW-71	9/11/2017	2	0	42989.00
MW-71	10/13/2017	2	0	43021.00
MW-71	3/16/2018	4	0	43175.00
MW-71	6/2/2018	0.8	0	43253.00
MW-72	4/26/2016	2	0	42486.00
MW-72	6/6/2016	0.4	0	42527.00
MW-72	8/21/2016	0.8	0	42603.00
MW-72	9/13/2016	0.4	0	42626.00
MW-72	10/20/2016	0.4	0	42663.00
MW-72	2/2/2017	0.4	0	42768.00
MW-72	4/17/2017	2	0	42842.00
MW-72	5/2/2017	0.32	1	42857.00
MW-72	5/29/2017	2	0	42884.46
MW-72	6/22/2017	2	0	42908.33
MW-72	7/21/2017	2	0	42937.00
MW-72	8/10/2017	2	0	42957.00
MW-72	8/17/2017	2	0	42964.00
MW-72	9/10/2017	2	0	42988.00
MW-72	10/13/2017	2	0	43021.00
MW-72	3/16/2018	4	0	43175.61
MW-72	6/2/2018	0.8	0	43253.00
MW-73	2/2/2017	0.4	0	42768.00
MW-73	4/18/2017	0.8	0	42843.00
MW-73	5/2/2017	0.2	1	42857.00
MW-73	5/29/2017	0.8	0	42884.59
MW-73	6/22/2017	0.8	0	42908.39
MW-73	7/22/2017	2	0	42938.00
MW-73	8/10/2017	0.8	0	42957.00
MW-73	8/17/2017	0.8	0	42964.00
MW-73	9/10/2017	0.8	0	42988.00
MW-73	10/12/2017	0.8	0	43020.00
MW-73	3/16/2018	4	0	43175.00
MW-73	6/2/2018	0.8	0	43253.00

Table A-2 Fluoride - Background Wells Only

	Fluoriue - Backgr	1	
Well	Sample Date	Fluoride	D_Fluoride
MW-71	4/26/2016	2	0
MW-71	6/6/2016	0.4	0
MW-71	8/21/2016	0.8	0
MW-71	9/12/2016	0.4	0
MW-71	10/20/2016	0.4	0
MW-71	2/2/2017	0.4	0
MW-71	4/17/2017	2	0
MW-71	5/2/2017	0.44	1
MW-71	5/29/2017	2	0
MW-71	6/22/2017	2	0
MW-71	7/21/2017	2	0
MW-71	8/10/2017	2	0
MW-71	8/17/2017	2	0
MW-71	9/11/2017	2	0
MW-71	10/13/2017	2	0
MW-71	3/16/2018	4	0
MW-71	6/2/2018	0.8	0
MW-72	4/26/2016	2	0
MW-72	6/6/2016	0.4	0
MW-72	8/21/2016	0.8	0
MW-72	9/13/2016	0.4	0
MW-72	10/20/2016	0.4	0
MW-72	2/2/2017	0.4	0
MW-72	4/17/2017	2	0
MW-72	5/2/2017	0.32	1
MW-72	5/29/2017	2	0
MW-72	6/22/2017	2	0
MW-72	7/21/2017	2	0
MW-72	8/10/2017	2	0
MW-72	8/17/2017	2	0
MW-72	9/10/2017	2	0
-			
MW-72	10/13/2017	2	0
MW-72	3/16/2018	4	0
MW-72	6/2/2018	0.8	0
MW-73	2/2/2017	0.4	0
MW-73	4/18/2017	0.8	0
MW-73	5/2/2017	0.2	1
MW-73	5/29/2017	0.8	0
MW-73	6/22/2017	0.8	0
MW-73	7/22/2017	2	0
MW-73	8/10/2017	0.8	0
MW-73	8/17/2017	0.8	0
MW-73	9/10/2017	0.8	0
MW-73	10/12/2017	0.8	0
MW-73	3/16/2018	4	0
MW-73	6/2/2018	0.8	0

Table A-3 Radium - All Wells

	1	Radium - Ali Wei	T	
Well	Sample Date	Combined_Radium	D_CombinedRadium	Date
MW-66	11/5/2015	1.78	1	42313.00
MW-66	4/27/2016	0.6	1	42487.00
MW-66	6/5/2016	1.7	1	42526.00
MW-66	8/20/2016	0.4	1	42602.00
MW-66	9/12/2016	2.9	1	42625.00
MW-66	10/19/2016	3	1	42662.00
MW-66	2/1/2017	4	1	42767.00
MW-66	4/16/2017	3.8	1	42841.00
MW-66	5/1/2017	2.9	1	42856.00
MW-66	5/29/2017	2.8	1	42884.00
MW-66	6/21/2017	3.7	1	42907.41
MW-66	7/21/2017	1.2	1	42937.00
MW-66	8/9/2017	3.2	1	42956.00
MW-66	8/16/2017	2.5	1	42963.00
MW-66	9/9/2017	2.5	1	42987.00
MW-66	10/13/2017	5.1	1	43021.00
MW-66	3/16/2018	1.5	0	43175.00
MW-66	5/31/2018	2.1	1	43251.00
MW-67	11/4/2015	2.67	1	42312.00
MW-67	4/27/2016	2.1	1	42487.00
MW-67	6/6/2016	2	1	42527.00
MW-67	8/20/2016	3	1	42602.00
MW-67	9/13/2016	2.1	1	42626.00
MW-67	10/20/2016	4.1	1	42663.00
MW-67	2/1/2017	3	1	42767.00
MW-67	4/17/2017	3.2	1	42842.00
MW-67	5/2/2017	3.3	1	42857.00
MW-67	5/29/2017	2.2	1	42884.00
MW-67	6/21/2017	4.2	1	42907.56
MW-67	7/21/2017	2	0	42937.00
MW-67	8/9/2017	1.4	1	42956.00
MW-67	8/16/2017	2.6	1	42963.00
MW-67	9/10/2017	3.1	1	42988.00
MW-67	10/13/2017	2.7	1	43021.00
MW-67	3/16/2018	0.9	1	43175.00
MW-67	6/2/2018	1.5	1	43253.00
MW-68	11/6/2015	1.35	1	42314.00
MW-68	4/26/2016	1.5	1	42486.00
MW-68	6/5/2016	2.9	1	42526.00
MW-68	8/20/2016	1.9	1	42602.00
MW-68	9/13/2016	3.8	1	42626.00
MW-68	10/20/2016	1.4	1	42663.00
MW-68	2/1/2017	2.1	1	42767.00
MW-68	4/17/2017	2.2	1	42842.00
MW-68	5/2/2017	1.2	1	42857.00
MW-68	5/29/2017	0.6	0	42884.00

Table A-3 Radium - All Wells

Radium - All Wells					
Well	Sample Date	Combined_Radium	D_CombinedRadium	Date	
MW-68	6/21/2017	2.2	1	42907.59	
MW-68	7/21/2017	0.9	1	42937.00	
MW-68	8/9/2017	3.3	1	42956.00	
MW-68	8/16/2017	2.2	1	42963.00	
MW-68	9/10/2017	2.9	1	42988.00	
MW-68	10/13/2017	2.9	1	43021.00	
MW-68	3/16/2018	1	1	43175.00	
MW-68	6/2/2018	0.6	1	43253.00	
MW-69	11/4/2015	3.17	1	42312.00	
MW-69	4/26/2016	3.1	1	42486.00	
MW-69	6/5/2016	3.2	1	42526.00	
MW-69	8/20/2016	3.9	1	42602.00	
MW-69	9/13/2016	5.4	1	42626.00	
MW-69	10/20/2016	5.5	1	42663.00	
MW-69	2/1/2017	5.4	1	42767.00	
MW-69	4/17/2017	4.9	1	42842.00	
MW-69	5/2/2017	5	1	42857.00	
MW-69	5/29/2017	3.6	1	42884.00	
MW-69	6/21/2017	4.3	1	42907.53	
MW-69	7/21/2017	3.4	1	42937.00	
MW-69	8/9/2017	5.1	1	42956.00	
MW-69	8/16/2017	3.6	1	42963.00	
MW-69	9/10/2017	5.9	1	42988.00	
MW-69	10/13/2017	6.7	1	43021.00	
MW-69	3/16/2018	5.4	1	43175.00	
MW-69	6/2/2018	4.6	1	43253.00	
MW-70	11/9/2015	1.63	1	42317.00	
MW-70	4/27/2016	1	1	42487.00	
MW-70	6/5/2016	1.9	1	42526.00	
MW-70	8/20/2016	1.5	1	42602.00	
MW-70	9/12/2016	2.6	1	42625.00	
MW-70	10/19/2016	1.6	1	42662.00	
MW-70	2/1/2017	3.3	1	42767.00	
MW-70	4/16/2017	2.1	1	42841.00	
MW-70	5/1/2017	2.4	1	42856.00	
MW-70	5/29/2017	1.3	1	42884.00	
MW-70	6/21/2017	2.5	1	42907.50	
MW-70	7/21/2017	0.7	0	42937.00	
MW-70	8/9/2017	1.6	1	42956.00	
MW-70	8/16/2017	1.8	1	42963.00	
MW-70	9/9/2017	2	1	42987.00	
MW-70	10/13/2017	0.6	0	43021.00	
MW-70	3/16/2018	2.6	1	43175.00	
MW-70	5/31/2018	2.8	1	43251.00	
MW-71	4/26/2016	2.2	1	42486.00	
MW-71	6/6/2016	3.2	1	42527.00	

Table A-3 Radium - All Wells

)A/all	Cample Date	Combined Padium		Data
Well	Sample Date	Combined_Radium	D_CombinedRadium	Date
MW-71	8/21/2016	1.1	1	42603.00
MW-71	9/12/2016	2.1	1	42625.00
MW-71	10/20/2016	0.4	1	42663.00
MW-71	2/2/2017	1.9	1	42768.00
MW-71	4/17/2017	1.2	1	42842.00
MW-71	5/2/2017	0.7	1	42857.00
MW-71	5/29/2017	0.6	0	42884.48
MW-71	6/22/2017	2.7	1	42908.36
MW-71	7/21/2017	0.5	0	42937.00
MW-71	8/10/2017	0.7	0	42957.00
MW-71	8/17/2017	2	1	42964.00
MW-71	9/11/2017	0.7	0	42989.00
MW-71	10/13/2017	1.6	1	43021.00
MW-71	3/16/2018	0.8	1	43175.00
MW-71	6/2/2018	1.9	1	43253.00
MW-72	4/26/2016	0.8	0	42486.00
MW-72	6/6/2016	1.3	1	42527.00
MW-72	8/21/2016	3.2	1	42603.00
MW-72	9/13/2016	3.9	1	42626.00
MW-72	10/20/2016	4.2	1	42663.00
MW-72	2/2/2017	4.8	1	42768.00
MW-72	4/17/2017	3.5	1	42842.00
MW-72	5/2/2017	3.8	1	42857.00
MW-72	5/29/2017	2.2	1	42884.46
MW-72	6/22/2017	3	1	42908.33
MW-72	7/21/2017	1.7	1	42937.00
MW-72	8/10/2017	2.8	1	42957.00
MW-72	8/17/2017	2.1	1	42964.00
MW-72	9/10/2017	2.3	1	42988.00
MW-72	10/13/2017	3.1	1	43021.00
MW-72	3/16/2018	1.9	1	43175.61
MW-72	6/2/2018	2.8	1	43253.00
MW-73	2/2/2017	3.2	1	42768.00
MW-73	4/17/2017	1.8	1	42842.00
MW-73	5/2/2017	2.3	1	42857.00
MW-73	5/29/2017	0.6	0	42884.59
MW-73	6/22/2017	3.1	1	42908.39
MW-73	7/22/2017	2	1	42938.00
MW-73	8/10/2017	1.5	1	42957.00
MW-73	8/17/2017	1.5	1	42964.00
MW-73	9/10/2017	2.5	1	42988.00
MW-73	10/12/2017	0.9	1	43020.00
MW-73	3/16/2018	2.6	1	43175.00
MW-73	6/2/2018	2.8	1	43253.00

Table A-4
Radium - Background Wells Only

		n - Background Wells O	,
Well	Sample Date	Combined_Radium	D_CombinedRadium
MW-71	4/26/2016	2.2	1
MW-71	6/6/2016	3.2	1
MW-71	8/21/2016	1.1	1
MW-71	9/12/2016	2.1	1
MW-71	10/20/2016	0.4	1
MW-71	2/2/2017	1.9	1
MW-71	4/17/2017	1.2	1
MW-71	5/2/2017	0.7	1
MW-71	5/29/2017	0.6	0
MW-71	6/22/2017	2.7	1
MW-71	7/21/2017	0.5	0
MW-71	8/10/2017	0.7	0
MW-71	8/17/2017	2	1
MW-71	9/11/2017	0.7	0
MW-71	10/13/2017	1.6	1
MW-71	3/16/2018	0.8	1
MW-71	6/2/2018	1.9	1
MW-72	4/26/2016	0.8	0
MW-72	6/6/2016	1.3	1
MW-72	8/21/2016	3.2	1
MW-72	9/13/2016	3.9	1
MW-72	10/20/2016	4.2	1
MW-72	2/2/2017	4.8	1
MW-72	4/17/2017	3.5	1
MW-72	5/2/2017	3.8	1
MW-72	5/29/2017	2.2	1
MW-72	6/22/2017	3	1
MW-72	7/21/2017	1.7	1
MW-72	8/10/2017	2.8	1
MW-72	8/17/2017	2.1	1
MW-72	9/10/2017	2.3	1
MW-72	10/13/2017	3.1	1
MW-72	3/16/2018	1.9	1
MW-72	6/2/2018	2.8	1
MW-73	2/2/2017	3.2	1
MW-73	4/17/2017	1.8	1
MW-73	5/2/2017	2.3	1
MW-73	5/29/2017	0.6	0
MW-73	6/22/2017	3.1	1
MW-73	7/22/2017	2	1
MW-73	8/10/2017	1.5	1
MW-73	8/17/2017	1.5	1
MW-73	9/10/2017	2.5	1
MW-73	10/12/2017	0.9	1
MW-73	3/16/2018	2.6	1
MW-73	6/2/2018	2.8	1

Table A-5
All Constituents Except Fluoride and Radium - All Wells

								taciits Exce										
Well	Sample Date	Num_Date	Antimony	D_Antimony	Arsenic	D_Arsenic	Ln_As	D_Ln_As	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium	D_Chromium	Cobalt	D_Cobalt
Background	4/26/2016	42486.00	0.0025	0	0.0064	1	-5.05146	1	0.019	1	0.001	0	0.00015	1	0.0005	0	0.0049	1
Background	4/26/2016	42486.00	0.0025	0	0.0038	1	-5.57275	1	0.034	1	0.001	0	0.0001	0	0.0028	1	0.0087	1
Background	6/6/2016	42527.00	0.00012	1	0.0069	1	-4.97623	1	0.02	1	0.001	0	0.00015	1	0.0005	0	0.0041	1
Background	6/6/2016	42527.00	0.00027	1	0.0084	1	-4.77952	1	0.051	1	0.001	0	0.0002	0	0.0006	1	0.0029	1
Background	8/21/2016	42603.00	0.00024	1	0.0076	1	-4.87961	1	0.013	1	0.001	0	0.0002	0	0.001	0	0.001	0
Background	8/21/2016	42603.00	0.00022	1	0.0066	1	-5.02069	1	0.014	1	0.001	0	0.0002	0	0.001	0	0.001	0
Background	9/12/2016	42625.00	0.0025	0	0.001	0	-6.90776	0	0.013	1	0.001	0	0.0005	0	0.0025	0	0.0012	1
Background	9/13/2016	42626.00	0.0025	0	0.001	0	-6.90776	0	0.019	1			0.0005	0	0.0025	0	0.0073	1
Background	10/20/2016	42663.00	0.0005	0	0.00031	1	-8.07894	1	0.009	1	0.001	0	0.0001	0	0.0005	0	0.0002	0
Background	10/20/2016	42663.00	0.0005	0	0.00023	1	-8.37743	1	0.009	1	0.001	0	0.0001	0	0.0005	0	0.0024	1
Background	2/2/2017	42768.00	0.001	0	0.0094	1	-4.66705	1	0.012	1	0.001	0	0.00011	1	0.0005	0	0.0012	1
Background	2/2/2017	42768.00	0.002	0	0.0027	1	-5.9145	1	0.0084	1	0.001	0	0.0002	0	0.001	0	0.0025	1
Background	2/2/2017	42768.00	0.001	0	0.0015	1	-6.50229	1	0.043	1	0.001	0	0.00017	1	0.001	1	0.0073	1
Background	4/17/2017	42842.00	0.004	0	0.0063	1	-5.06721	1	0.01	1	0.001	0	0.0004	0	0.002	0	0.002	0
Background	4/17/2017	42842.00	0.004	0	0.0028	1	-5.87814	1	0.0096	1	0.001	0	0.0004	0	0.002	0	0.0024	1
Background	4/18/2017	42843.00	0.004	0	0.004	0	-5.52146	0	0.027	1	0.001	0	0.0004	0	0.002	0	0.0058	1
Background	5/2/2017	42857.00	0.001	0	0.0072	1	-4.93367	1	0.0087	1	0.001	0	0.0001	0	0.001	0	0.001	0
Background	5/2/2017	42857.00	0.001	0	0.003	1	-5.80914	1	0.0079	1	0.001	0	0.0001	0	0.001	0	0.0024	1
Background	5/2/2017	42857.00	0.002	0	0.001	0	-6.90776	0	0.026	1	0.001	0	0.00021	1	0.001	0	0.0067	1
Background	5/29/2017	42884.46	0.01	0	0.003	1	-5.80914	1	0.0093	1	0.001	0	0.001	0	0.005	0	0.0026	1
Background	5/29/2017	42884.48	0.01	0	0.007	1	-4.96185	1	0.01	1	0.001	0	0.001	0	0.005	0	0.005	0
Background	5/29/2017	42884.59	0.01	0	0.005	0	-5.29832	0	0.028	1	0.001	0	0.0003	1	0.005	0	0.0034	1
Background	6/22/2017	42908.33	0.004	0	0.0026	1	-5.95224	1	0.0073	1								
Background	6/22/2017	42908.36	0.004	0	0.0063	1	-5.06721	1	0.012	1	0.001	0	0.0004	0	0.002	0	0.002	0
Background	6/22/2017	42908.39	0.004	0	0.002	0	-6.21461	0	0.029	1	0.001	0	0.0004	0	0.002	0	0.0066	1
Background	7/21/2017	42937.00	0.004	0	0.0053	1	-5.24005	1	0.0086	1	0.001	0	0.0004	0	0.002	0	0.001	0
Background	7/21/2017	42937.00	0.004	0	0.0026	1	-5.95224	1	0.0073	1	0.001	0	0.0004	0	0.002	0	0.0024	1
Background	7/22/2017	42938.00	0.004	0	0.002	0	-6.21461	0	0.025	1	0.001	0	0.0004	0	0.002	0	0.0067	1
Background	8/10/2017	42957.00	0.01	0	0.0048	1	-5.33914	1	0.0092	1	0.001	0	0.001	0	0.004	0	0.002	0
Background	8/10/2017	42957.00	0.01	0	0.004	1	-5.52146	1	0.0075	1	0.001	0	0.0001	0	0.001	0	0.0023	1
Background	8/10/2017	42957.00	0.01	0	0.002	0	-6.21461	0	0.024	1	0.001	0	0.001	0	0.0041	1	0.0065	1
Background	8/17/2017	42964.00	0.004	0	0.006	1	-5.116	1	0.0093	1	0.001	0	0.0004	0	0.004	0	0.002	0
Background	8/17/2017	42964.00	0.004	0	0.002	0	-6.21461	0	0.0077	1	0.001	0	0.0004	0	0.004	0	0.0025	1
Background	8/17/2017	42964.00	0.004	0	0.002	0	-6.21461	0	0.024	1	0.001	0	0.0004	0	0.004	0	0.0066	1
Background	9/10/2017	42988.00	0.004	0	0.0029	1	-5.84304	1	0.0086	1	0.001	0	0.0004	0	0.004	0	0.0023	1
Background	9/10/2017	42988.00	0.004	0	0.002	1	-6.21461	1	0.023	1	0.001	0	0.0004	0	0.004	0	0.0048	1
Background	9/11/2017	42989.00	0.004	0	0.0048	1	-5.33914	1	0.0089	1	0.001	0	0.0004	0	0.004	0	0.002	0
Background	10/12/2017	43020.00	0.01	0	0.005	0	-5.29832	0	0.024	1	0.001	0	0.001	0	0.01	0	0.005	0
Background	10/13/2017	43021.00	0.01	0	0.005	0	-5.29832	0	0.012	1	0.001	0	0.001	0	0.01	0	0.005	0
Background	10/13/2017	43021.00	0.01	0	0.0052	1	-5.2591	1	0.011	1	0.001	0	0.001	0	0.01	0	0.005	0
Background	3/16/2018	43175.00	0.004	0	0.01	1	-4.60517	1	0.011	1	0.001	0	0.0004	0	0.004	0	0.002	0
Background	3/16/2018	43175.00	0.004	0	0.0034	1	-5.68398	1	0.02	1	0.001	0	0.0004	0	0.004	0	0.0057	1
Background	3/16/2018	43175.61	0.004	0	0.0067	1	-5.00565	1	0.0082	1	0.001	0	0.0004	0	0.004	0	0.0025	1
Background	6/2/2018	43253.00			0.012	1	-4.42285	1	0.01	0							0.01	0
Background	6/2/2018	43253.00			0.01	0	-4.60517	0	0.01	0							0.01	0
Background	6/2/2018	43253.00			0.01	0	-4.60517	0	0.023	1							0.01	0

OCTOBER 2018 Page 1 of 6

Table A-5
All Constituents Except Fluoride and Radium - All Wells

									711401140									T
Well	Sample Date	Num_Date	Antimony	D_Antimony	Arsenic	D_Arsenic	Ln_As	D_Ln_As	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium	D_Chromium	Cobalt	D_Cobalt
MW-66	11/5/2015	42313.00	0.002	0	0.0034	1	-5.68398	1	0.016	1	0.001	0	0.000062	1	0.001	1	0.0051	1
MW-66	4/27/2016	42487.00	0.0025	0	0.0013	1	-6.64539	1	0.0013	1	0.001	0	0.0001	0	0.0031	1	0.0076	1
MW-66	6/5/2016	42526.00	0.0001	0	0.00067	1	-7.30823	1	0.016	1	0.001	0	0.0001	0	0.00074	1	0.0078	1
MW-66	8/20/2016	42602.00	0.00013	1	0.0013	1	-6.64539	1	0.021	1	0.001	0	0.0001	0	0.0012	1	0.008	1
MW-66	9/12/2016	42625.00	0.0025	0	0.001	0	-6.90776	0	0.011	1	0.001	0	0.0005	0	0.0025	0	0.0029	1
MW-66	10/19/2016	42662.00	0.0005	0	0.001	1	-6.90776	1	0.022	1	0.001	0	0.0001	0			0.0057	1
MW-66	2/1/2017	42767.00	0.001	0	0.0014	1	-6.57128	1	0.021	1	0.001	0	0.0001	0	0.0031	1	0.0064	1
MW-66	4/16/2017	42841.00	0.004	0	0.002	0	-6.21461	0	0.02	1	0.001	0	0.0004	0	0.002	0	0.0071	1
MW-66	5/1/2017	42856.00	0.001	0	0.0018	1	-6.31997	1	0.02	1	0.001	0	0.0001	0	0.001	0	0.0073	1
MW-66	5/29/2017	42884.00	0.01	0	0.005	0	-5.29832	0	0.022	1	0.001	0	0.001	0	0.005	0	0.0077	1
MW-66	6/21/2017	42907.41	0.001	0	0.0028	1	-5.87814	1	0.022	1	0.001	0	0.0001	0	0.00088	1	0.0074	1
MW-66	7/21/2017	42937.00	0.004	0	0.002	0	-6.21461	0	0.02	1	0.001	0	0.0004	0	0.002	0	0.0065	1
MW-66	8/9/2017	42956.00	0.01	0	0.002	0	-6.21461	0	0.019	1	0.001	0	0.001	0	0.004	0	0.0072	1
MW-66	8/16/2017	42963.00	0.004	0	0.002	1	-6.21461	1	0.02	1	0.001	0	0.0004	0	0.004	0	0.0078	1
MW-66	9/9/2017	42987.00	0.004	0	0.002	0	-6.21461	0	0.019	1	0.001	0	0.0004	0	0.004	0	0.0069	1
MW-66	10/13/2017	43021.00	0.001	0	0.0021	1	-6.16582	1	0.021	1	0.001	0	0.0001	0	0.001	0	0.0075	1
MW-66	3/16/2018	43175.00	0.004	0	0.005	1	-5.29832	1	0.02	1	0.001	0	0.0004	0	0.004	0	0.0085	1
MW-66	5/31/2018	43251.00			0.01	0	-4.60517	0	0.02	1							0.01	1
MW-67	11/4/2015	42312.00	0.00019	1	0.00099	1	-6.91781	1	0.017	1	0.00017	1	0.00018	1	0.00078	1	0.0078	1
MW-67	4/27/2016	42487.00	0.0025	0	0.0029	1	-5.84304	1	0.017	1	0.001	0	0.0001	0	0.00069	1	0.0027	1
MW-67	6/6/2016	42527.00	0.00014	1	0.003	1	-5.80914	1	0.018	1	0.001	0	0.0001	0	0.0005	0	0.0025	1
MW-67	8/20/2016	42602.00	0.00029	1	0.004	1	-5.52146	1	0.022	1	0.001	0	0.0002	0	0.0016	1	0.0064	1
MW-67	9/13/2016	42626.00	0.0025	0	0.0023	1	-6.07485	1	0.021	1	0.001	0	0.0005	0	0.0025	0	0.0057	1
MW-67	10/20/2016	42663.00	0.0005	0	0.0014	1	-6.57128	1	0.022	1	0.001	0	0.0001	0	0.0005	0	0.005	1
MW-67	2/1/2017	42767.00	0.001	0	0.0033	1	-5.71383	1	0.019	1	0.001	0	0.00015	1	0.00058	1	0.0058	1
MW-67	4/17/2017	42842.00	0.004	0	0.002	1	-6.21461	1	0.02	1	0.001	0	0.0004	0	0.002	0	0.0062	1
MW-67	5/2/2017	42857.00	0.001	0	0.0027	1	-5.9145	1	0.019	1	0.001	0	0.00015	1	0.001	0	0.0065	1
MW-67	5/29/2017	42884.00	0.01	0	0.0033	1	-5.71383	1	0.022	1	0.001	0	0.001	0	0.005	0	0.006	1
MW-67	6/21/2017	42907.56	0.004	0	0.002	1	-6.21461	1	0.02	1	0.001	0	0.0004	0	0.002	0	0.0049	1
MW-67	7/21/2017	42937.00	0.004	0	0.0027	1	-5.9145	1	0.02	1	0.001	0	0.0004	0	0.002	0	0.0053	1
MW-67	8/9/2017	42956.00	0.01	0	0.0023	1	-6.07485	1	0.02	1	0.001	0	0.001	0	0.004	0	0.0045	1
MW-67	8/16/2017	42963.00	0.004	0	0.002	0	-6.21461	0	0.02	1	0.001	0	0.0004	0	0.004	0	0.0043	1
MW-67	9/10/2017	42988.00	0.004	0	0.002	0	-6.21461	0	0.02	1	0.001	0	0.0004	0	0.004	0	0.0047	1
MW-67	10/13/2017	43021.00	0.001	0	0.0027	1	-5.9145	1	0.022	1	0.001	0	0.00016	1	0.001	0	0.0064	1
MW-67	3/16/2018	43175.00	0.004	0	0.0046	1	-5.3817	1	0.019	1	0.001	0	0.0004	0	0.004	0	0.0072	1
MW-67	6/2/2018	43253.00			0.01	0	-4.60517	0	0.02	1							0.01	0
MW-68	11/6/2015	42314.00	0.00045	1	0.0027	1	-5.9145	1	0.0093	1	0.00033	1	0.00046	1	0.0012	1	0.0053	1
MW-68	4/26/2016	42486.00	0.0025	0	0.0032	1	-5.7446	1	0.013	1	0.001	0	0.0001	0	0.0012	1	0.003	1
MW-68	6/5/2016	42526.00	0.00011	1	0.0032	1	-5.7446	1	0.0099	1	0.001	0	0.0001	0	0.00073	1	0.0042	1
MW-68	8/20/2016	42602.00	0.00012	1	0.0065	1	-5.03595	1	0.0078	1	0.001	0	0.00016	1	0.00072	1	0.002	1
MW-68	9/13/2016	42626.00	0.0025	0	0.0016	1	-6.43775	1	0.0074	1	0.001	0	0.0005	0	0.0025	0	0.0025	1
MW-68	10/20/2016	42663.00	0.0005	0	0.0006	1	-7.41858	1	0.0071	1	0.001	0	0.0001	0	0.0005	0	0.0022	1
MW-68	2/1/2017	42767.00	0.001	0	0.0048	1	-5.33914	1	0.0082	1	0.001	0	0.00012	1	0.00081	1	0.0034	1
MW-68	4/17/2017	42842.00	0.004	0	0.0051	1	-5.27851	1	0.0078	1	0.001	0	0.0004	0	0.002	0	0.0028	1
MW-68	5/2/2017	42857.00	0.001	0	0.0084	1	-4.77952	1	0.0068	1	0.001	0	0.0001	0	0.001	0	0.0024	1
MW-68	5/29/2017	42884.00	0.01	0	0.0085	1	-4.76769	1	0.0086	1	0.001	0	0.00025	1	0.005	0	0.0017	1
17.77 00	3/23/2017	12007.00	0.01		0.0003	-	, 0, 0,	_	0.0000	-	5.001	J	0.00023		5.005		0.0017	

OCTOBER 2018 Page 2 of 6

Table A-5
All Constituents Except Fluoride and Radium - All Wells

			I							and Nadium	T -			T	T			
Well	Sample Date	Num_Date	Antimony	D Antimony	Arconic	D Arsenic	Ln As	D_Ln_As	Barium	D Barium	Beryllium	D Beryllium	Cadmium	D Cadmium	Chromium	D Chromium	Cobalt	D Cobalt
MW-68	6/21/2017	42907.59	0.004	0_Antimony	Arsenic 0.0079	1	-4.84089	1	0.0075	1	0.001	0_beryillulli	0.0004	0_Cadiiidiii	0.002	0	0.002	0_CODAIL
MW-68	7/21/2017	42937.00	0.004	0	0.0073	1	-4.81589	1	0.0075	1	0.001	0	0.0004	0	0.002	0	0.0017	1
MW-68	8/9/2017	42956.00	0.01	0	0.0055	1	-5.20301	1	0.0074	1	0.001	0	0.001	0	0.004	0	0.0025	1
MW-68	8/16/2017	42963.00	0.004	0	0.0069	1	-4.97623	1	0.0074	1	0.001	0	0.0004	0	0.004	0	0.0026	1
MW-68	9/10/2017	42988.00	0.004	0	0.0086	1	-4.75599	1	0.0075	1	0.001	0	0.0004	0	0.004	0	0.0023	1
MW-68	10/13/2017	43021.00	0.001	0	0.0097	1	-4.63563	1	0.0078	1	0.001	0	0.00011	1	0.001	0	0.0019	1
MW-68	3/16/2018	43175.00	0.004	0	0.0075	1	-4.89285	1	0.0072	1	0.001	0	0.0004	0	0.004	0	0.002	0
MW-68	6/2/2018	43253.00			0.01	0	-4.60517	0	0.01	0							0.01	0
MW-69	11/4/2015	42312.00	0.00046	1	0.0026	1	-5.95224	1	0.013	1	0.00029	1	0.00031	1	0.00081	1	0.0035	1
MW-69	4/26/2016	42486.00	0.0025	0	0.0031	1	-5.77635	1	0.013	1	0.001	0	0.0001	0	0.0005	0	0.0029	1
MW-69	6/5/2016	42526.00	0.00021	1	0.0037	1	-5.59942	1	0.015	1	0.001	0	0.0001	0	0.0005	0	0.0027	1
MW-69	8/20/2016	42602.00	0.00054	1	0.011	1	-4.50986	1	0.016	1	0.001	0	0.0001	0	0.00076	1	0.0037	1
MW-69	9/13/2016	42626.00	0.0025	0	0.0093	1	-4.67774	1	0.016	1	0.001	0	0.0005	0	0.0025	0	0.0042	1
MW-69	10/20/2016	42663.00	0.0005	0	0.0067	1	-5.00565	1	0.016	1	0.001	0	0.0001	0	0.0005	0	0.0037	1
MW-69	2/1/2017	42767.00	0.001	0	0.0042	1	-5.47267	1	0.017	1	0.001	0	0.0001	0	0.00083	1	0.0046	1
MW-69	4/17/2017	42842.00	0.004	0	0.0063	1	-5.06721	1	0.016	1	0.001	0	0.0004	0	0.002	0	0.0044	1
MW-69	5/2/2017	42857.00	0.001	0	0.0087	1	-4.74443	1	0.015	1	0.001	0	0.0001	0	0.001	0	0.0043	1
MW-69	5/29/2017	42884.00	0.01	0	0.0076	1	-4.87961	1	0.018	1	0.001	0	0.001	0	0.005	0	0.0042	1
MW-69	6/21/2017	42907.53	0.004	0	0.0063	1	-5.06721	1	0.016	1	0.001	0	0.0004	0	0.002	0	0.0041	1
MW-69	7/21/2017	42937.00	0.004	0	0.0083	1	-4.7915	1	0.016	1	0.001	0	0.0004	0	0.002	0	0.0048	1
MW-69	8/9/2017	42956.00	0.01	0	0.0066	1	-5.02069	1	0.016	1	0.001	0	0.001	0	0.004	0	0.0044	1
MW-69	8/16/2017	42963.00	0.004	0	0.0063	1	-5.06721	1	0.015	1	0.001	0	0.0004	0	0.004	0	0.0041	1
MW-69	9/10/2017	42988.00	0.004	0	0.0073	1	-4.91988	1	0.018	1	0.001	0	0.0004	0	0.004	0	0.0043	1
MW-69	10/13/2017	43021.00	0.001	0	0.0078	1	-4.85363	1	0.019	1	0.001	0	0.0001	0	0.001	0	0.0051	1
MW-69	3/16/2018	43175.00	0.004	0	0.0089	1	-4.7217	1	0.014	1	0.001	0	0.0004	0	0.004	0	0.0054	1
MW-69	6/2/2018	43253.00	0.00017	4	0.01	0	-4.60517	0	0.016	1	0.00011	4	0.00014	1	0.0000	4	0.01	0
MW-70	11/9/2015	42317.00	0.00017	1	0.0094	1	-4.66705	1	0.015	1	0.00011	1	0.00014	1	0.0006	1	0.0057	1
MW-70	4/27/2016 6/5/2016	42487.00 42526.00	0.0025 0.00011	0	0.0053 0.0044	1	-5.24005 -5.42615	1	0.012	1	0.001	0	0.0001 0.0001	0	0.00062 0.00084	1	0.0057	1
MW-70 MW-70	8/20/2016	42602.00	0.00011	1	0.0044	1	-5.42015	1	0.015	1	0.001	0	0.0001	0	0.00084	1	0.0031	1
MW-70	9/12/2016	42625.00	0.00025	0	0.0031	0	-6.90776	0	0.010	1	0.001	0	0.0002	0	0.0037	0	0.0032	1
MW-70	10/19/2016	42662.00	0.0025	0	0.0001	1	-7.62111	1	0.0073	1	0.001	0	0.0003	0	0.0025	0	0.0023	1
MW-70	2/1/2017	42767.00	0.001	0	0.0071	1	-4.94766	1	0.0070	-	0.001	0	0.0001	1	0.0016	1	0.0031	1
MW-70	4/16/2017	42841.00	0.001	0	0.0045	1	-5.40368	1	0.009	1	0.001	0	0.0004	0	0.002	0	0.0031	1
MW-70	5/1/2017	42856.00	0.001	0	0.007	1	-4.96185	1	0.0097	1	0.001	0	0.0001	0	0.001	0	0.0053	1
MW-70	5/29/2017	42884.00	0.01	0	0.0028	1	-5.87814	1	0.014	1	0.001	0	0.00024	1	0.005	0	0.0071	1
MW-70	6/21/2017	42907.50	0.004	0	0.0049	1	-5.31852	1	0.014	1	0.001	0	0.0004	0	0.002	0	0.0075	1
MW-70	7/21/2017	42937.00	0.004	0	0.0042	1	-5.47267	1	0.0095	1	0.001	0	0.0004	0	0.002	0	0.0055	1
MW-70	8/9/2017	42956.00	0.01	0	0.0047	1	-5.36019	1	0.013	1	0.001	0	0.001	0	0.004	0	0.0077	1
MW-70	8/16/2017	42963.00	0.004	0	0.0073	1	-4.91988	1	0.012	1	0.001	0	0.0004	0	0.004	0	0.0072	1
MW-70	9/9/2017	42987.00	0.004	0	0.0056	1	-5.18499	1	0.01	1	0.001	0	0.0004	0	0.004	0	0.0057	1
MW-70	10/13/2017	43021.00	0.01	0	0.0062	1	-5.08321	1	0.011	1	0.001	0	0.001	0	0.01	0	0.005	0
MW-70	3/16/2018	43175.00	0.004	0	0.0088	1	-4.733	1	0.0093	1	0.001	0	0.0004	0	0.004	0	0.0054	1
MW-70	5/31/2018	43251.00			0.01	0	-4.60517	0	0.012	1							0.01	0

OCTOBER 2018 Page 3 of 6

Table A-5
All Constituents Except Fluoride and Radium - All Wells

									onde and Nadidini - A								
Well	Sample Date	Lead	D Lead	Lithium	D Lithium	Mercury	D Mercury	Molybdenum	D Molybdenum	In Mb	D In Mb	Selenium	D Selenium	Thallium	D Thallium	Ln Tl	D Ln Tl
Background	4/26/2016	0.0005	0	0.45	1	0.0002	0	0.0018	1	-6.31997	1	0.31	1	0.00047	1	-7.66278	1
Background	4/26/2016	0.0011	1	0.4	1	0.0002	0	0.0093	1	-4.67774	1	0.16	1	0.00081	1	-7.11848	1
Background	6/6/2016	0.00073	1	0.41	1	0.0002	0	0.0014	1	-6.57128	1	0.28	1	0.00043	1	-7.75173	1
Background	6/6/2016	0.001	0	0.2	0	0.0002	0	0.0052	1	-5.2591	1	0.39	1	0.00058	1	-7.45248	1
Background	8/21/2016	0.001	0	0.37	1	0.0002	0	0.0024	1	-6.03229	1	0.25	1	0.00028	1	-8.18072	1
Background	8/21/2016	0.001	0	0.36	1	0.0002	0	0.0025	1	-5.99146	1	0.26	1	0.00029	1	-8.14563	1
Background	9/12/2016	0.0005	0	0.3	1	0.0002	0	0.0013	1	-6.64539	1	0.18	1	0.0005	0	-7.6009	0
Background	9/13/2016	0.0005	0	0.35	1	0.0002	0	0.011	1	-4.50986	1	0.003	0	0.00056	1	-7.48757	1
Background	10/20/2016	0.0001	0	0.33	1	0.0002	0	0.00062	1	-7.38579	1	0.19	1	0.0002	1	-8.51719	1
Background	10/20/2016	0.0001	0	0.39	1	0.0002	0	0.0011	1	-6.81245	1	0.11	1	0.00087	1	-7.04702	1
Background	2/2/2017	0.0005	0	0.39	1	0.0002	0	0.00078	1	-7.15622	1	0.34	1	0.00037	1	-7.90201	1
Background	2/2/2017	0.001	0	0.39	1	0.0002	0	0.001	1	-6.90776	1	0.12	1	0.00096	1	-6.94858	1
Background	2/2/2017	0.0005	0	0.21	1	0.0002	0	0.0086	1	-4.75599	1	0.029	1	0.0002	1	-8.51719	1
Background	4/17/2017	0.002	0	0.32	1	0.0002	0	0.002	0	-6.21461	0	0.2	1	0.0004	0	-7.82405	0
Background	4/17/2017	0.002	0	0.35	1	0.0002	0	0.002	0	-6.21461	0	0.1	1	0.00096	1	-6.94858	1
Background	4/18/2017	0.002	0	0.22	1	0.0002	0	0.0041	1	-5.49677	1	0.019	1	0.0004	0	-7.82405	0
Background	5/2/2017	0.0005	0	0.34	1	0.0002	0	0.001	0	-6.90776	0	0.27	1	0.00025	1	-8.29405	1
Background	5/2/2017	0.0005	0	0.38	1	0.0002	0	0.001	0	-6.90776	0	0.12	1	0.00091	1	-7.00207	1
Background	5/2/2017	0.0005	0	0.24	1	0.0002	0	0.0037	1	-5.59942	1	0.015	1	0.00024	1	-8.33487	1
Background	5/29/2017	0.005	0	0.37	1	0.0002	0	0.005	0	-5.29832	0	0.11	1	0.0011	1	-6.81245	1
Background	5/29/2017	0.005	0	0.33	1	0.0002	0	0.005	0	-5.29832	0	0.21	1	0.00029	1	-8.14563	1
Background	5/29/2017	0.005	0	0.2	0	0.0002	0	0.0025	1	-5.99146	1	0.043	1	0.00027	1	-8.21709	1
Background	6/22/2017																
Background	6/22/2017	0.002	0	0.38	1	0.0002	0	0.002	0	-6.21461	0	0.25	1	0.0004	0	-7.82405	0
Background	6/22/2017	0.002	0	0.25	1	0.0002	0	0.002	0	-6.21461	0	0.019	1	0.0004	0	-7.82405	0
Background	7/21/2017	0.002	0	0.4	0	0.0002	0	0.002	0	-6.21461	0	0.24	1	0.0004	0	-7.82405	0
Background	7/21/2017	0.002	0	0.8	0	0.0002	0	0.002	0	-6.21461	0	0.13	1	0.00089	1	-7.02429	1
Background	7/22/2017	0.002	0	0.4	0	0.0002	0	0.0021	1	-6.16582	1	0.015	1	0.0004	0	-7.82405	0
Background	8/10/2017	0.005	0	0.34	1	0.0002	0	0.005	0	-5.29832	0	0.21	1	0.001	0	-6.90776	0
Background	8/10/2017	0.0005	0	0.41	1	0.0002	0	0.00087	1	-7.04702	1	0.14	1	0.00091	1	-7.00207	1
Background	8/10/2017	0.005	0	0.27	1	0.0002	0	0.005	0	-5.29832	0	0.017	1	0.001	0	-6.90776	0
Background	8/17/2017	0.002	0	0.35	1	0.0002	0	0.002	0	-6.21461	0	0.21	1	0.0004	0	-7.82405	0
Background	8/17/2017	0.002	0	0.42	1	0.0002	0	0.002	0	-6.21461	0	0.1	1	0.001	1	-6.90776	1
Background	8/17/2017	0.002	0	0.28	1	0.0002	0	0.0029	1	-5.84304	1	0.018	1	0.0004	0	-7.82405	0
Background	9/10/2017	0.002	0	0.37	1	0.0002	0	0.002	0	-6.21461	0	0.1	1	0.00095	1	-6.95905	1
Background	9/10/2017	0.002	0	0.22	1	0.0002	0	0.0024	1	-6.03229	1	0.033	1	0.0004	0	-7.82405	0
Background	9/11/2017	0.002	0	0.32	1	0.0002	0	0.002	0	-6.21461	0	0.2	1	0.0004	0	-7.82405	0
Background	10/12/2017	0.005	0	0.2	0	0.0002	0	0.005	0	-5.29832	0	0.048	1	0.001	0	-6.90776	0
Background	10/13/2017	0.005	0	0.33	1	0.0002	0	0.005	0	-5.29832	0	0.2	1	0.001	0	-6.90776	0
Background	10/13/2017	0.005	0	0.38	1	0.0002	0	0.005	0	-5.29832	0	0.11	1	0.001	1	-6.90776	1
Background	3/16/2018	0.002	0	0.37	1	0.0002	0	0.002	0	-6.21461	0	0.28	1	0.0004	0	-7.82405	0
Background	3/16/2018	0.002	0	0.25	1	0.0002	0	0.002	0	-6.21461	0	0.017	1	0.0004	0	-7.82405	0
Background	3/16/2018	0.002	0	0.37	1	0.0002	0	0.002	0	-6.21461	0	0.11	1	0.001	1	-6.90776	1
Background	6/2/2018			0.32	1			0.01	1	-4.60517	1	0.2	1	0.002	0	-6.21461	0
Background	6/2/2018			0.35	1			0.01	1	-4.60517	1	0.1	1	0.002	0	-6.21461	0
Background	6/2/2018			0.26	1			0.01	1	-4.60517	1	0.011	1	0.002	0	-6.21461	0

OCTOBER 2018 Page 4 of 6

Table A-5
All Constituents Except Fluoride and Radium - All Wells

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Well	Sample Date	Lead	D_Lead	Lithium	D_Lithium	Mercury	D_Mercury	Molybdenum	D_Molybdenum	In_Mb	D_ln_Mb	Selenium	D_Selenium	Thallium	D_Thallium	Ln_Tl	D_Ln_Tl
MW-66	11/5/2015	0.00018	1	0.24	1	0.0002	0	0.016	1	-4.13517	1	0.0022	1	0.00063	1	-7.36979	1
MW-66	4/27/2016	0.00072	1	0.29	1	0.0002	0	0.012	1	-4.42285	1	0.0018	1	0.0007	1	-7.26443	1
MW-66	6/5/2016	0.0005	0	0.28	1	0.0002	0	0.013	1	-4.34281	1	0.0016	1	0.0006	1	-7.41858	1
MW-66	8/20/2016	0.0005	0	0.32	1	0.0002	0	0.039	1	-3.24419	1	0.0018	1	0.00062	1	-7.38579	1
MW-66	9/12/2016	0.0005	0	0.27	1	0.0002	0	0.01	1	-4.60517	1	0.11	1	0.00088	1	-7.03559	1
MW-66	10/19/2016	0.0001	0	0.28	1	0.0002	0	0.022	1	-3.81671	1	0.0019	1	0.00036	1	-7.92941	1
MW-66	2/1/2017	0.0005	0	0.29	1	0.0002	0	0.02	1	-3.91202	1	0.0019	1	0.0004	1	-7.82405	1
MW-66	4/16/2017	0.002	0	0.31	1	0.0002	0	0.022	1	-3.81671	1	0.002	0	0.0004	0	-7.82405	0
MW-66	5/1/2017	0.0005	0	0.32	1	0.0002	0	0.023	1	-3.77226	1	0.0022	1	0.00033	1	-8.01642	1
MW-66	5/29/2017	0.005	0	0.3	1	0.0002	0	0.023	1	-3.77226	1	0.0022	1	0.00057	1	-7.46987	1
MW-66	6/21/2017	0.0005	0	0.32	1	0.0002	0	0.023	1	-3.77226	1	0.0022	1	0.00041	1	-7.79935	1
MW-66	7/21/2017	0.002	0	0.8	0	0.0002	0	0.021	1	-3.86323	1	0.002	0	0.0004	0	-7.82405	0
MW-66	8/9/2017	0.005	0	0.34	1	0.0002	0	0.022	1	-3.81671	1	0.002	0	0.001	0	-6.90776	0
MW-66	8/16/2017	0.002	0	0.36	1	0.0002	0	0.022	1	-3.81671	1	0.002	0	0.00043	1	-7.75173	1
MW-66	9/9/2017	0.002	0	0.32	1	0.0002	0	0.021	1	-3.86323	1	0.002	0	0.0004	0	-7.82405	0
MW-66	10/13/2017	0.0005	0	0.34	1	0.0002	0	0.023	1	-3.77226	1	0.0021	1	0.00036	1	-7.92941	1
MW-66	3/16/2018	0.002	0	0.38	1	0.0002	0	0.022	1	-3.81671	1	0.002	0	0.00054	1	-7.52394	1
MW-66	5/31/2018	0.0001=	_	0.5	1			0.015	1	-4.19971	1	0.01	0	0.0025	1	-5.99146	1
MW-67	11/4/2015	0.00017	1	0.25	1	0.0002	0	0.05	1	-2.99573	1	0.0053	1	0.00047	1	-7.66278	1
MW-67	4/27/2016	0.0005	0	0.32	1	0.0002	0	0.043	1	-3.14656	1	0.043	1	0.00037	1	-7.90201	1
MW-67	6/6/2016	0.0005	0	0.3	1	0.0002	0	0.041	1	-3.19418	1	0.044	1	0.00031	1	-8.07894	1
MW-67	8/20/2016	0.001	0	0.35	1	0.0002	0	0.063	1	-2.76462	1	0.068	1	0.00034	1	-7.98656	1
MW-67	9/13/2016	0.0005	0	0.31	1	0.0002	0	0.045	1	-3.10109	1	0.059	1	0.0005	0	-7.6009	0
MW-67	10/20/2016	0.0001	0	0.34	1	0.0002	0	0.045	1	-3.10109	1	0.062	1	0.00034	1	-7.98656	1
MW-67	2/1/2017	0.0005	0	0.36	1	0.0002	0	0.046	1	-3.07911	1	0.064	1	0.00039	1	-7.84936	1
MW-67	4/17/2017	0.002	0	0.42	1	0.0002	0	0.039	1	-3.24419	1	0.032	1	0.0004	0	-7.82405	0
MW-67	5/2/2017	0.0005	0	0.43	1	0.0002	0	0.041	1	-3.19418	1	0.048	1	0.00042	1	-7.77526	1
MW-67	5/29/2017	0.005	0	0.38	1	0.0002	0	0.04	1	-3.21888	1	0.03	1	0.00074	1	-7.20886	1
MW-67	6/21/2017	0.002	0	0.4	1	0.0002	0	0.039	1	-3.24419	1	0.024	1	0.00057	1	-7.46987	1
MW-67	7/21/2017	0.002	0	0.8	0	0.0002	0	0.039	1	-3.24419	1	0.053	1	0.0005	1	-7.6009	1
MW-67	8/9/2017	0.005	0	0.44	1	0.0002	0	0.038	1	-3.27017	1	0.021	1	0.001	0	-6.90776	0
MW-67	8/16/2017	0.002	0	0.47	1	0.0002	0	0.037	1	-3.29684	1	0.016	1	0.00062	1	-7.38579	1
MW-67	9/10/2017	0.002	0	0.43	1	0.0002	0	0.038	1	-3.27017	1	0.023	1	0.00056	1	-7.48757	1
MW-67	10/13/2017	0.0005	0	0.49	1	0.0002	0	0.045	1	-3.10109	1	0.038	1	0.00054	1	-7.52394	1
MW-67	3/16/2018	0.002	0	0.55	1	0.0002	0	0.044	1	-3.12357	1	0.0064	1	0.00063	1	-7.36979	1
MW-67	6/2/2018	0.00010	4	0.5	1	0.0003		0.041	1	-3.19418	1	0.01	0	0.002	0	-6.21461	0
MW-68	11/6/2015	0.00019	1	0.22	1	0.0002	0	0.01	1	-4.60517	1	0.045	1	0.00089	1	-7.02429	1
MW-68	4/26/2016	0.00052	1	0.31	1	0.0002	0	0.0075	1	-4.89285	1	0.1	1	0.00056	1	-7.48757	1
MW-68	6/5/2016	0.0005	0	0.27	1	0.0002	0	0.01	1	-4.60517	1	0.11	1	0.00066	1	-7.32327	1
MW-68	8/20/2016	0.0005	0	0.35	1	0.0002	0	0.0095	1	-4.65646	1	0.22	1	0.00063	1	-7.36979	1
MW-68	9/13/2016	0.0005	0	0.29	1	0.0002	0	0.012	1	-4.42285	1	0.15	1	0.0005	0	-7.6009	0
MW-68	10/20/2016	0.0001	0	0.32	1	0.0002	0	0.0086	1	-4.75599	1	0.15	1	0.00059	1	-7.43539	1
MW-68	2/1/2017	0.0005	0	0.32	1	0.0002	0	0.01	1	-4.60517	1	0.17	1	0.0008	1	-7.1309	1
MW-68	4/17/2017	0.002	0	0.38	1	0.0002	0	0.008	1	-4.82831	1	0.16	1	0.00067	1	-7.30823	1
MW-68	5/2/2017	0.0005	0	0.37	1	0.0002	0	0.0073	1	-4.91988	1	0.28	1	0.00068	1	-7.29342	1
MW-68	5/29/2017	0.005	0	0.32	1	0.0002	0	0.0054	1	-5.22136	1	0.29	1	0.00078	1	-7.15622	1

OCTOBER 2018 Page 5 of 6

Table A-5
All Constituents Except Fluoride and Radium - All Wells

									Tilde alla Radialli - A	1							
Well	Sample Date	Lead	D Lead	Lithium	D Lithium	Mercury	D Mercury	Molybdenum	D Molybdenum	In Mb	D_ln_Mb	Selenium	D Selenium	Thallium	D Thallium	Ln Tl	D_Ln_Tl
MW-68	6/21/2017	0.002	0	0.33	1	0.0002	0	0.0051	1	-5.27851	1	0.28	1	0.00065	1	-7.33854	1
MW-68	7/21/2017	0.002	0	0.8	0	0.0002	0	0.0058	1	-5.1499	1	0.3	1	0.00062	1	-7.38579	1
MW-68	8/9/2017	0.005	0	0.37	1	0.0002	0	0.0067	1	-5.00565	1	0.27	1	0.001	0	-6.90776	0
MW-68	8/16/2017	0.002	0	0.38	1	0.0002	0	0.0068	1	-4.99083	1	0.25	1	0.00093	1	-6.98033	1
MW-68	9/10/2017	0.002	0	0.34	1	0.0002	0	0.0063	1	-5.06721	1	0.29	1	0.00083	1	-7.09408	1
MW-68	10/13/2017	0.0005	0	0.37	1	0.0002	0	0.0063	1	-5.06721	1	0.37	1	0.00069	1	-7.27882	1
MW-68	3/16/2018	0.002	0	0.4	1	0.0002	0	0.0064	1	-5.05146	1	0.27	1	0.00048	1	-7.64172	1
MW-68	6/2/2018			0.38	1			0.01	0	-4.60517	0	0.24	1	0.002	0	-6.21461	0
MW-69	11/4/2015	0.00021	1	0.27	1	0.0002	0	0.015	1	-4.19971	1	0.01	1	0.00047	1	-7.66278	1
MW-69	4/26/2016	0.0005	0	0.31	1	0.0002	0	0.013	1	-4.34281	1	0.011	1	0.00028	1	-8.18072	1
MW-69	6/5/2016	0.0005	0	0.27	1	0.0002	0	0.015	1	-4.19971	1	0.018	1	0.00022	1	-8.42188	1
MW-69	8/20/2016	0.0005	0	0.37	1	0.0002	0	0.015	1	-4.19971	1	0.015	1	0.00024	1	-8.33487	1
MW-69	9/13/2016	0.0005	0	0.31	1			0.015	1	-4.19971	1	0.012	1	0.0005	0	-7.6009	0
MW-69	10/20/2016	0.0001	0	0.36	1	0.0002	0	0.015	1	-4.19971	1	0.019	1	0.00014	1	-8.87387	1
MW-69	2/1/2017	0.0005	0	0.4	1	0.0002	0	0.016	1	-4.13517	1	0.015	1	0.00017	1	-8.67971	1
MW-69	4/17/2017	0.002	0	0.44	1	0.0002	0	0.014	1	-4.2687	1	0.01	1	0.0004	0	-7.82405	0
MW-69	5/2/2017	0.0005	0	0.45	1	0.0002	0	0.014	1	-4.2687	1	0.019	1	0.00017	1	-8.67971	1
MW-69	5/29/2017	0.005	0	0.37	1	0.0002	0	0.016	1	-4.13517	1	0.013	1	0.00032	1	-8.04719	1
MW-69	6/21/2017	0.002	0	0.36	1	0.0002	0	0.017	1	-4.07454	1	0.017	1	0.0004	0	-7.82405	0
MW-69	7/21/2017	0.002	0	0.8	0	0.0002	0	0.014	1	-4.2687	1	0.013	1	0.0004	0	-7.82405	0
MW-69	8/9/2017	0.005	0	0.44	1	0.0002	0	0.016	1	-4.13517	1	0.014	1	0.001	0	-6.90776	0
MW-69	8/16/2017	0.002	0	0.44	1	0.0002	0	0.017	1	-4.07454	1	0.014	1	0.0004	0	-7.82405	0
MW-69	9/10/2017	0.006	1	0.46	1	0.0002	0	0.016	1	-4.13517	1	0.014	1	0.0004	0	-7.82405	0
MW-69	10/13/2017	0.0005	0	0.5	1	0.0002	0	0.015	1	-4.19971	1	0.023	1	0.00022	1	-8.42188	1
MW-69	3/16/2018	0.002	0	0.52	1	0.0002	0	0.014	1	-4.2687	1	0.011	1	0.0004	0	-7.82405	0
MW-69	6/2/2018			0.49	1			0.016	1	-4.13517	1	0.014	1	0.002	0	-6.21461	0
MW-70	11/9/2015	0.00015	1	0.28	1	0.0002	0	0.0096	1	-4.64599	1	0.2	1	0.00049	1	-7.62111	1
MW-70	4/27/2016	0.0005	0	0.33	1	0.0002	0	0.0062	1	-5.08321	1	0.2	1	0.00038	1	-7.87534	1
MW-70	6/5/2016	0.0005	0	0.32	1	0.0002	0	0.006	1	-5.116	1	0.16	1	0.00027	1	-8.21709	1
MW-70	8/20/2016	0.001	0	0.35	1	0.0002	0	0.027	1	-3.61192	1	0.23	1	0.00057	1	-7.46987	1
MW-70	9/12/2016	0.0005	0	0.29	1	0.0002	0	0.0036	1	-5.62682	1	0.13	1	0.0005	0	-7.6009	0
MW-70	10/19/2016	0.0001	0	0.31	1	0.0002	0	0.0027	1	-5.9145	1	0.16	1	0.00039	1	-7.84936	1
MW-70	2/1/2017	0.0005	0	0.28	1	0.0002	0	0.0026	1	-5.95224	1	0.26	1	0.0004	1	-7.82405	1
MW-70	4/16/2017 5/1/2017	0.002	0	0.32	1	0.0002 0.0002	0	0.0037	1	-5.59942	1	0.2	1	0.00042	1	-7.77526	1
MW-70	* * *	0.0005	0	0.32	1		0	0.0057	1	-5.16729	1	0.25	1	0.00039	1	-7.84936	1
MW-70 MW-70	5/29/2017 6/21/2017	0.005 0.002	0	0.31	1	0.0002 0.0002	0	0.009 0.0088	1	-4.71053 -4.733	1	0.18 0.18	1	0.0005 0.0004	1 0	-7.6009 -7.82405	0
MW-70	7/21/2017	0.002	0	0.32	0	0.0002	0	0.0088	1 1	-4.733 -5.20301	1	0.18	1	0.0004	0	-7.82405	0
MW-70	8/9/2017	0.002	0	0.8		0.0002	0	0.0053		-4.67774	1	0.21	1	0.0004	0	-6.90776	0
MW-70	8/16/2017	0.003		0.34	1	0.0002	0	0.0093	1		1	0.18	1	0.001	0	-7.82405	0
MW-70	9/9/2017	0.002	0	0.35	1	0.0002	0	0.0083	1	-4.7915 -5.06721	1	0.17	1 1	0.0004	0	-7.82405	0
MW-70	10/13/2017	0.002		0.31		0.0002		0.0063		-5.29832	0	0.17		0.0004	0	-6.90776	0
	3/16/2018	0.003	0		1		0		0				1		0		
MW-70		0.002	0	0.32	1	0.0002	U	0.0048	1	-5.33914	1	0.2 0.18	1	0.0004		-7.82405	0
MW-70	5/31/2018			0.3	1			0.01	1	-4.60517	1	0.18	1	0.002	0	-6.21461	0

OCTOBER 2018 Page 6 of 6

Table A-6
All Constituents Except Fluoride and Radium - Background Wells Only

Well	Sample Date	Antimony	D Antimony	Arsenic	D Arsenic	Barium	D Barium	Beryllium	D Beryllium	Cadmium	D Cadmium	Chromium	D Chromium	Cobalt	D_Cobalt	Lead	D Lead	Lithium	D Lithium
MW-71	4/26/2016	0.0025	0	0.0064	1	0.019	1	0.001	0	0.00015	1	0.0005	0	0.0049	1	0.0005	0	0.45	1
MW-71	6/6/2016	0.00012	1	0.0069	1	0.02	1	0.001	0	0.00015	1	0.0005	0	0.0041	1	0.00073	1	0.41	1
MW-71	8/21/2016	0.00024	1	0.0076	1	0.013	1	0.001	0	0.0002	0	0.001	0	0.001	0	0.001	0	0.37	1
MW-71	9/12/2016	0.0025	0	0.001	0	0.013	1	0.001	0	0.0005	0	0.0025	0	0.0012	1	0.0005	0	0.3	1
MW-71	10/20/2016	0.0005	0	0.00031	1	0.009	1	0.001	0	0.0001	0	0.0005	0	0.0002	0	0.0001	0	0.33	1
MW-71	2/2/2017	0.001	0	0.0094	1	0.012	1	0.001	0	0.00011	1	0.0005	0	0.0012	1	0.0005	0	0.39	1
MW-71	4/17/2017	0.004	0	0.0063	1	0.01	1	0.001	0	0.0004	0	0.002	0	0.002	0	0.002	0	0.32	1
MW-71	5/2/2017	0.001	0	0.0072	1	0.0087	1	0.001	0	0.0001	0	0.001	0	0.001	0	0.0005	0	0.34	1
MW-71	5/29/2017	0.01	0	0.007	1	0.01	1	0.001	0	0.001	0	0.005	0	0.005	0	0.005	0	0.33	1
MW-71	6/22/2017	0.004	0	0.0063	1	0.012	1	0.001	0	0.0004	0	0.002	0	0.002	0	0.002	0	0.38	1
MW-71	7/21/2017	0.004	0	0.0053	1	0.0086	1	0.001	0	0.0004	0	0.002	0	0.001	0	0.002	0	0.4	0
MW-71	8/10/2017	0.01	0	0.0048	1	0.0092	1	0.001	0	0.001	0	0.004	0	0.002	0	0.005	0	0.34	1
MW-71	8/17/2017	0.004	0	0.006	1	0.0093	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.35	1
MW-71	9/11/2017	0.004	0	0.0048	1	0.0089	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.32	1
MW-71	10/13/2017	0.01	0	0.005	0	0.012	1	0.001	0	0.001	0	0.01	0	0.005	0	0.005	0	0.33	1
MW-71	3/16/2018	0.004	0	0.01	1	0.011	1	0.001	0	0.0004	0	0.004	0	0.002	0	0.002	0	0.37	1
MW-71	6/2/2018			0.012	1	0.01	0							0.01	0			0.32	1
MW-72	4/26/2016	0.0025	0	0.0038	1	0.034	1	0.001	0	0.0001	0	0.0028	1	0.0087	1	0.0011	1	0.4	1
MW-72	6/6/2016	0.00027	1	0.0084	1	0.051	1	0.001	0	0.0002	0	0.0006	1	0.0029	1	0.001	0	0.2	0
MW-72	8/21/2016	0.00022	1	0.0066	1	0.014	1	0.001	0	0.0002	0	0.001	0	0.001	0	0.001	0	0.36	1
MW-72	9/13/2016	0.0025	0	0.001	0	0.019	1			0.0005	0	0.0025	0	0.0073	1	0.0005	0	0.35	1
MW-72	10/20/2016	0.0005	0	0.00023	1	0.009	1	0.001	0	0.0001	0	0.0005	0	0.0024	1	0.0001	0	0.39	1
MW-72	2/2/2017	0.002	0	0.0027	1	0.0084	1	0.001	0	0.0002	0	0.001	0	0.0025	1	0.001	0	0.39	1
MW-72	4/17/2017	0.004	0	0.0028	1	0.0096	1	0.001	0	0.0004	0	0.002	0	0.0024	1	0.002	0	0.35	1
MW-72	5/2/2017	0.001	0	0.003	1	0.0079	1	0.001	0	0.0001	0	0.001	0	0.0024	1	0.0005	0	0.38	1
MW-72	5/29/2017	0.01	0	0.003	1	0.0093	1	0.001	0	0.001	0	0.005	0	0.0026	1	0.005	0	0.37	1
MW-72	6/22/2017	0.004	0	0.0026	1	0.0073	1		_				_				_		_
MW-72	7/21/2017	0.004	0	0.0026	1	0.0073	1	0.001	0	0.0004	0	0.002	0	0.0024	1	0.002	0	0.8	0
MW-72	8/10/2017	0.01	0	0.004	1	0.0075	1	0.001	0	0.0001	0	0.001	0	0.0023	1	0.0005	0	0.41	1
MW-72	8/17/2017	0.004	0	0.002	0	0.0077	1	0.001	0	0.0004	0	0.004	0	0.0025	1	0.002	0	0.42	1
MW-72	9/10/2017	0.004	0	0.0029	1	0.0086	1	0.001	0	0.0004	0	0.004	0	0.0023	1	0.002	0	0.37	1
MW-72	10/13/2017	0.01	0	0.0052	1	0.011	1	0.001	0	0.001	0	0.01	0	0.005	0	0.005	0	0.38	1
MW-72	3/16/2018	0.004	0	0.0067	1	0.0082	1	0.001	0	0.0004	0	0.004	0	0.0025	1	0.002	0	0.37	1
MW-72	6/2/2018	0.001		0.01	0	0.01	0	0.001		0.00017	4	0.001	4	0.01	0	0.0005	0	0.35	1
MW-73	2/2/2017	0.001	0	0.0015	1	0.043	1	0.001	0	0.00017	1	0.001	1	0.0073	1	0.0005	0	0.21	1
MW-73	4/18/2017	0.004	0	0.004	0	0.027	1	0.001	0	0.0004	0	0.002	0	0.0058	1	0.002	0	0.22	1
MW-73	5/2/2017	0.002	0	0.001	0	0.026	1	0.001	0	0.00021	1	0.001	0	0.0067	1	0.0005	0	0.24	1
MW-73 MW-73	5/29/2017	0.01	0	0.005	0	0.028	1	0.001	0	0.0003	1	0.005 0.002	0	0.0034	1	0.005	0	0.2	0
MW-73	6/22/2017 7/22/2017	0.004	0	0.002	0	0.029	1	0.001 0.001	0	0.0004	0	0.002	0	0.0066	1	0.002	0	0.25	1
MW-73	8/10/2017	0.004	0	0.002	0	0.025	1	0.001	0	0.0004	0	0.002	0	0.0067	1 1	0.002	0	0.4	0
MW-73	8/10/2017	0.01	0	0.002	0	0.024	1	0.001	0	0.001	0	0.0041	0	0.0065	1	0.003	0	0.27	1
MW-73	9/10/2017	0.004	0	0.002	1	0.024	1	0.001	0	0.0004	0	0.004	0	0.0048	1	0.002	0	0.28	1
MW-73	10/12/2017	0.004	0	0.002	0	0.023	1 1	0.001	0	0.0004	0	0.004	0	0.0048	0	0.002	0	0.22	0
MW-73	3/16/2018	0.004	0	0.003	1	0.024	1	0.001	0	0.001	0	0.004	0	0.0057	1	0.003	0	0.25	1
MW-73	6/2/2018	0.004	U	0.0034	0	0.023	1	0.001	U	0.0004	U	0.004	U	0.0037	0	0.002	U	0.25	1
10100 /3	0, 2, 2010			0.01	J	0.023	1							0.01	U			0.20	

Table A-6
All Constituents Except Fluoride and Radium - Background Wells Only

Well	Sample Date	Mercury	D_Mercury	Molybdenum	D_Molybdenum	Selenium	D_Selenium	Thallium	D_Thallium
MW-71	4/26/2016	0.0002	0	0.0018	1	0.31	1	0.00047	1
MW-71	6/6/2016	0.0002	0	0.0014	1	0.28	1	0.00043	1
MW-71	8/21/2016	0.0002	0	0.0024	1	0.25	1	0.00028	1
MW-71	9/12/2016	0.0002	0	0.0013	1	0.18	1	0.0005	0
MW-71	10/20/2016	0.0002	0	0.00062	1	0.19	1	0.0002	1
MW-71	2/2/2017	0.0002	0	0.00078	1	0.34	1	0.00037	1
MW-71	4/17/2017	0.0002	0	0.002	0	0.2	1	0.0004	0
MW-71	5/2/2017	0.0002	0	0.001	0	0.27	1	0.00025	1
MW-71	5/29/2017	0.0002	0	0.005	0	0.21	1	0.00029	1
MW-71	6/22/2017	0.0002	0	0.002	0	0.25	1	0.0004	0
MW-71	7/21/2017	0.0002	0	0.002	0	0.24	1	0.0004	0
MW-71	8/10/2017	0.0002	0	0.005	0	0.21	1	0.001	0
MW-71	8/17/2017	0.0002	0	0.002	0	0.21	1	0.0004	0
MW-71	9/11/2017	0.0002	0	0.002	0	0.2	1	0.0004	0
MW-71	10/13/2017	0.0002	0	0.005	0	0.2	1	0.001	0
MW-71	3/16/2018	0.0002	0	0.002	0	0.28	1	0.0004	0
MW-71	6/2/2018			0.01	1	0.2	1	0.002	0
MW-72	4/26/2016	0.0002	0	0.0093	1	0.16	1	0.00081	1
MW-72	6/6/2016	0.0002	0	0.0052	1	0.39	1	0.00058	1
MW-72	8/21/2016	0.0002	0	0.0025	1	0.26	1	0.00029	1
MW-72	9/13/2016	0.0002	0	0.011	1	0.003	0	0.00056	1
MW-72	10/20/2016	0.0002	0	0.0011	1	0.11	1	0.00087	1
MW-72	2/2/2017	0.0002	0	0.001	1	0.12	1	0.00096	1
MW-72	4/17/2017	0.0002	0	0.002	0	0.1	1	0.00096	1
MW-72	5/2/2017	0.0002	0	0.001	0	0.12	1	0.00091	1
MW-72	5/29/2017	0.0002	0	0.005	0	0.11	1	0.0011	1
MW-72	6/22/2017								
MW-72	7/21/2017	0.0002	0	0.002	0	0.13	1	0.00089	1
MW-72	8/10/2017	0.0002	0	0.00087	1	0.14	1	0.00091	1
MW-72	8/17/2017	0.0002	0	0.002	0	0.1	1	0.001	1
MW-72	9/10/2017	0.0002	0	0.002	0	0.1	1	0.00095	1
MW-72	10/13/2017	0.0002	0	0.005	0	0.11	1	0.001	1
MW-72	3/16/2018	0.0002	0	0.002	0	0.11	1	0.001	1
MW-72	6/2/2018			0.01	1	0.1	1	0.002	0
MW-73	2/2/2017	0.0002	0	0.0086	1	0.029	1	0.0002	1
MW-73	4/18/2017	0.0002	0	0.0041	1	0.019	1	0.0004	0
MW-73	5/2/2017	0.0002	0	0.0037	1	0.015	1	0.00024	1
MW-73	5/29/2017	0.0002	0	0.0025	1	0.043	1	0.00027	1
MW-73	6/22/2017	0.0002	0	0.002	0	0.019	1	0.0004	0
MW-73	7/22/2017	0.0002	0	0.0021	1	0.015	1	0.0004	0
MW-73	8/10/2017	0.0002	0	0.005	0	0.017	1	0.001	0
MW-73	8/17/2017	0.0002	0	0.0029	1	0.018	1	0.0004	0
MW-73	9/10/2017	0.0002	0	0.0024	1	0.033	1	0.0004	0
MW-73	10/12/2017	0.0002	0	0.005	0	0.048	1	0.0004	0
MW-73	3/16/2018	0.0002	0	0.002	0	0.048	1	0.0004	0
MW-73	6/2/2018	0.0002	0	0.01	1	0.017	1	0.0004	0



#### **APPENDIX B**

**PROUCL OUTPUT FILES** 

	General Statis	tics on Uncen	sored Data							
Computation	ProUCL 5.110	/9/2018 1:02:0	00 PM							
cted Options										
From File	Table1_Apper	ndixA_URS_A	ppendixIV_Pro	UCLUpload_	Sept2018.xls					
III Precision	OFF									
A_URS_Appe	ndixIV_ProUCI	_Upload_Sept	2018.xls							
	General Stat	tistics for Cens	ored Data Set	(with NDs) u	sing Kaplan Me	ier Method				
					T					
										KM CV
										0.265
										0.13
										0.302
	1		14	82.35%		0.01	2.2667E-4	2.4956E-8	1.5797E-4	0.697
17	1		14	82.35%	5.0000E-4	0.01	3.8625E-4	1.9598E-8	1.3999E-4	0.362
17	1	3	14		5.0000E-4	0.01	1.8000E-4	3.8000E-9	6.1644E-5	0.342
46	0	32	14		0.001	0.01	0.0039	9.1882E-6	0.00303	0.776
18	0	11	7	38.89%	0.001	0.01	0.00174	1.2106E-6	0.0011	0.631
18	0	15	3	16.67%	0.002	0.01	0.0025	9.4293E-7	9.7105E-4	0.388
18	0	17	1	5.56%	0.01	0.01	0.00581	7.1046E-6	0.00267	0.459
18	0	17	1	5.56%	0.01	0.01	0.00673	4.9250E-6	0.00222	0.33
18	0	16	2	11.11%	0.001	0.01	0.00519	5.6257E-6	0.00237	0.457
46	0	44	2	4.35%	0.01	0.01	0.0161	9.7898E-5	0.00989	0.616
18	0	18	0	0.00%	N/A	N/A	0.0184	2.5525E-5	0.00505	0.274
18	0	18	0	0.00%	N/A	N/A	0.0199	2.4575E-6	0.00157	0.0788
18	0	17	1	5.56%	0.01	0.01	0.00806	2.1085E-6	0.00145	0.18
18	0	18	0	0.00%	N/A	N/A	0.0158	2.5000E-6	0.00158	0.0999
17	1	17	0	0.00%	N/A	N/A	0.0114	6.3976E-6	0.00253	0.221
41	5	0	41	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
17	1	0	17	100.00%	0.001	0.001	N/A	N/A	N/A	N/A
17	1	1	16	94.12%	0.001	0.001	1.7000E-4	0	0	N/A
17	1	1	16	94.12%	0.001	0.001	3.3000E-4	0	0	N/A
17	1	1	16	94.12%	0.001	0.001	2.9000E-4	0	0	N/A
17	1	1	16	94.12%	0.001	0.001	1.1000E-4	0	0	N/A
42	4	6	36	85.71%	1.0000E-4	0.001	1.3513E-4	2.8975E-9	5.3828E-5	0.398
17	1	1	16	94.12%	1.0000E-4	0.001	6.2000E-5	0	0	N/A
17	1	4	13	76.47%	1.0000E-4	0.001	1.3429E-4	9.673E-10	3.1102E-5	0.232
17	1	5	12	70.59%	1.0000E-4	0.001	1.5200E-4	9.0393E-9	9.5075E-5	0.625
17	1	1	16	94.12%	1.0000E-4	0.001	1.2625E-4	4.8234E-9	6.9451E-5	0.55
17	1	3	14	82.35%	1.0000E-4	0.001	1.2479E-4	2.0833E-9	4.5643E-5	0.366
	NumObs  A_URS_Appe  NumObs  43  17  17  17  18  18  18  18  18  18  18	Prouding   Prouding	Prouct 5.110/9/2018 1:02:05	Table   Tabl	Prouct   Statistics   Prouct   Statistics   Prouct   Statistics   Prouct   Prouct   Statistics   Prouct   Pro		ProUCL 5.110/9/2018 1:02:00 PM		Computation   ProUCL 5.110/9/2018 1:02-00 PM   Cited Options   Table 1_AppendixA_URS_AppendixIV_ProUCLUpload_Sept2018.xls	Computation   ProUCL 5.110/9/2018 1:02:00 PM   Ceted Options   Trom File   Table 1_AppendixA_URS_AppendixIV_ProUCLUpload_Sept2018.xls

Chromium (background)	42	4	4	38	90.48%	5.0000E-4	0.01	7.3722E-4	5.2756E-7	7.2633E-4	0.985
Chromium (mw-66)	16	2	6	10	62.50%	0.001	0.005	0.00131	7.3633E-7	8.5810E-4	0.657
, /		General Stat	istics for Cens	sored Data Set	(with NDs) us	sing Kaplan Me	ier Method	1		1	
											1
Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Chromium (mw-67)	17	1	4	13	76.47%	5.0000E-4	0.005	7.3375E-4	1.1777E-7	3.4317E-4	0.468
Chromium (mw-68)	17	1	5	12	70.59%	5.0000E-4	0.005	8.1750E-4	5.8706E-8	2.4229E-4	0.296
Chromium (mw-69)	17	1	3	14	82.35%	5.0000E-4	0.005	6.5000E-4	2.2933E-8	1.5144E-4	0.233
Chromium (mw-70)	17	1	5	12	70.59%	5.0000E-4	0.01	0.00106	8.2307E-7	9.0723E-4	0.853
Cobalt (background)	45	1	27	18	40.00%	2.0000E-4	0.01	0.003	6.1980E-6	0.00249	0.831
Cobalt (mw-66)	18	0	18	0	0.00%	N/A	N/A	0.00708	2.2089E-6	0.00149	0.21
Cobalt (mw-67)	18	0	17	1	5.56%	0.01	0.01	0.00541	1.8876E-6	0.00137	0.254
Cobalt (mw-68)	18	0	15	3	16.67%	0.002	0.01	0.00259	8.7500E-7	9.3542E-4	0.361
Cobalt (mw-69)	18	0	17	1	5.56%	0.01	0.01	0.00414	4.5654E-7	6.7568E-4	0.163
Cobalt (mw-70)	18	0	16	2	11.11%	0.005	0.01	0.00502	3.1096E-6	0.00176	0.351
Lead (background)	42	4	2	40	95.24%	1.0000E-4	0.005	2.0824E-4	7.8238E-8	2.7971E-4	1.343
Lead (mw-66)	17	1	2	15	88.24%	1.0000E-4	0.005	1.9800E-4	3.1716E-8	1.7809E-4	0.899
Lead (mw-67)	17	1	1	16	94.12%	1.0000E-4	0.005	1.3500E-4	1.2250E-9	3.5000E-5	0.259
Lead (mw-68)	17	1	2	15	88.24%	1.0000E-4	0.005	1.8667E-4	1.5689E-8	1.2526E-4	0.671
Lead (mw-69)	17	1	2	15	88.24%	1.0000E-4	0.005	4.9882E-4	1.8943E-6	0.00138	2.759
Lead (mw-70)	17	1	1	16	94.12%	1.0000E-4	0.005	1.2500E-4	6.250E-10	2.5000E-5	0.2
Lithium (background)	45	1	39	6	13.33%	0.2	0.8	0.327	0.00453	0.0673	0.206
Lithium (mw-66)	18	0	17	1	5.56%	0.8	8.0	0.321	0.0031	0.0557	0.173
Lithium (mw-67)	18	0	17	1	5.56%	0.8	8.0	0.396	0.00613	0.0783	0.197
Lithium (mw-68)	18	0	17	1	5.56%	0.8	0.8	0.336	0.00206	0.0454	0.135
Lithium (mw-69)	18	0	17	1	5.56%	0.8	8.0	0.398	0.00578	0.076	0.191
Lithium (mw-70)	18	0	17	1	5.56%	0.8	0.8	0.315	4.0138E-4	0.02	0.0635
Mercury (background)	42	4	0	42	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (mw-66)	17	1	0	17	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (mw-67)	17	1	0	17	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (mw-68)	17	1	0	17	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (mw-69)	16	2	0	16	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Mercury (mw-70)	17	1	0	17	100.00%	2.0000E-4	2.0000E-4	N/A	N/A	N/A	N/A
Molybdenum (background)	45	1	23	22	48.89%	0.001	0.005	0.00269	8.8698E-6	0.00298	1.107
Molybdenum (mw-66)	18	0	18	0	0.00%	N/A	N/A	0.0205	3.9324E-5	0.00627	0.306
Molybdenum (mw-67)	18	0	18	0	0.00%	N/A	N/A	0.043	3.6824E-5	0.00607	0.141
Molybdenum (mw-68)	18	0	17	1	5.56%	0.01	0.01	0.0077	3.5494E-6	0.00188	0.245
Molybdenum (mw-69)	18	0	18	0	0.00%	N/A	N/A	0.0152	1.2059E-6	0.0011	0.0724
Molybdenum (mw-70)	18	0	17	1	5.56%	0.005	0.005	0.00737	2.8434E-5	0.00533	0.724
Selenium (background)	45	1	44	1	2.22%	0.003	0.003	0.144	0.0103	0.101	0.706
Selenium (mw-66)	18	0	11	7	38.89%	0.002	0.01	0.00792	6.1296E-4	0.0248	3.125

Selenium (mw-67)	18	0	17	1	5.56%	0.01	0.01	0.0357	4.0441E-4	0.0201	0.563
Selenium (mw-68)	18	0	18	0	0.00%	N/A	N/A	0.219	0.00737	0.0858	0.392
Selenium (mw-69)	18	0	18	0	0.00%	N/A	N/A	0.0146	1.2261E-5	0.0035	0.241
Selenium (mw-70)	18	0	18	0	0.00%	N/A	N/A	0.193	0.00104	0.0323	0.168
		General Sta	tistics for Cen	sored Data Se	et (with NDs) u	sing Kaplan Me	eier Method			'	
Variable	NumObs	# Missing	Num Ds	NumNDs	% NDs	Min ND	Max ND	KM Mean	KM Var	KM SD	KM CV
Thallium (background)	45	1	25	20	44.44%	4.0000E-4	0.002	5.0099E-4	9.6164E-8	3.1010E-4	0.619
Thallium (mw-66)	18	0	14	4	22.22%	4.0000E-4	0.001	6.0403E-4	2.3450E-7	4.8426E-4	0.802
Thallium (mw-67)	18	0	14	4	22.22%	4.0000E-4	0.002	4.7023E-4	1.5628E-8	1.2501E-4	0.266
Thallium (mw-68)	18	0	15	3	16.67%	5.0000E-4	0.002	6.8375E-4	1.6461E-8	1.2830E-4	0.188
Thallium (mw-69)	18	0	9	9	50.00%	4.0000E-4	0.002	2.3667E-4	6.8522E-9	8.2778E-5	0.35
Thallium (mw-70)	18	0	9	9	50.00%	4.0000E-4	0.002	3.9832E-4	6.0481E-9	7.7770E-5	0.195
Fluoride (background)	46	0	3	43	93.48%	0.4	4	0.275	0.00578	0.076	0.276
Fluoride (mw-66)	18	0	18	0	0.00%	N/A	N/A	23.33	30	5.477	0.235
Fluoride (mw-67)	18	0	18	0	0.00%	N/A	N/A	22.22	27.83	5.275	0.237
Fluoride (mw-68)	18	0	18	0	0.00%	N/A	N/A	9.211	4.992	2.234	0.243
Fluoride (mw-69)	18	0	18	0	0.00%	N/A	N/A	16.02	22.85	4.78	0.298
Fluoride (mw-70)	18	0	14	4	22.22%	0.4	0.8	1.803	0.909	0.953	0.529
binedRadium (background)	46	0	40	6	13.04%	0.5	0.8	2.066	1.25	1.118	0.541
CombinedRadium (mw-66)	18	0	17	1	5.56%	1.5	1.5	2.495	1.531	1.237	0.496
CombinedRadium (mw-67)	18	0	17	1	5.56%	2	2	2.519	0.807	0.899	0.357
CombinedRadium (mw-68)	18	0	17	1	5.56%	0.6	0.6	1.942	0.847	0.92	0.474
CombinedRadium (mw-69)	18	0	18	0	0.00%	N/A	N/A	4.565	1.152	1.073	0.235
CombinedRadium (mw-70)	18	0	16	2	11.11%	0.6	0.7	1.879	0.521	0.722	0.384
		1	1							1	
		Ge	neral Statistics	s for Raw Data	Sets using D	etected Data O	nly				
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Antimony (background)	4	3	1.2000E-4	2.7000E-4	2.1250E-4	2.3000E-4	4.2250E-9	6.5000E-5	3.7064E-5	-1.408	0.306
Antimony (mw-66)	1	1	1.3000E-4	1.3000E-4	1.3000E-4	1.3000E-4	N/A	N/A	0	N/A	N/A
Antimony (mw-67)	3	1	1.4000E-4	2.9000E-4	2.0667E-4	1.9000E-4	5.8333E-9	7.6376E-5	7.4129E-5	0.935	0.37
Antimony (mw-68)	3	1	1.1000E-4	4.5000E-4	2.2667E-4	1.2000E-4	3.7433E-8	1.9348E-4	1.4826E-5	1.727	0.854
Antimony (mw-69)	3	1	2.1000E-4	5.4000E-4	4.0333E-4	4.6000E-4	2.9633E-8	1.7214E-4	1.1861E-4	-1.321	0.427
Antimony (mw-70)	3	1	1.1000E-4	2.6000E-4	1.8000E-4	1.7000E-4	5.7000E-9	7.5498E-5	8.8955E-5	0.586	0.419
Arsenic (background)	32	0	2.3000E-4	0.012	0.00505	0.005	7.7772E-6	0.00279	0.00297	0.395	0.552
Arsenic (mw-66)	11	0	6.7000E-4	0.005	0.00207	0.0018	1.5705E-6	0.00125	7.4129E-4	1.409	0.605
Arsenic (mw-67)	15	0	9.9000E-4	0.0046	0.00268	0.0027	8.6126E-7	9.2804E-4	8.8955E-4	0.233	0.346
Arsenic (mw-68)	17	0	6.0000E-4	0.0097	0.00581	0.0065	7.5486E-6	0.00275	0.00282	-0.474	0.473
Arsenic (mw-69)	17	0	0.0026	0.011	0.00675	0.0067	5.2814E-6	0.0023	0.00237	-0.281	0.341
· ,	16	0	4.9000E-4	0.0094	0.00549	0.0052	4.8092E-6	0.00219	0.00148	-0.282	0.4
Arsenic (mw-70)	16	0	4.9000E-4	0.0094	0.00549	0.0052	4.8092E-6	0.00219	0.00148	-0.282	0.4

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Barium (background)	44	0	0.0073	0.051	0.0164	0.012	1.0193E-4	0.0101	0.00586	1.521	0.616
Barium (mw-66)	18	0	0.0013	0.022	0.0184	0.02	2.5525E-5	0.00505	0.00148	-2.68	0.274
Barium (mw-67)	18	0	0.017	0.022	0.0199	0.02	2.4575E-6	0.00157	0.00148	-0.31	0.0788
Barium (mw-68)	17	0	0.0066	0.013	0.00808	0.0075	2.3219E-6	0.00152	4.4477E-4	2.385	0.189
Barium (mw-69)	18	0	0.013	0.019	0.0158	0.016	2.5000E-6	0.00158	0.00148	0.00558	0.0999
Barium (mw-70)	17	1	0.0073	0.016	0.0114	0.012	6.3976E-6	0.00253	0.00297	0.0888	0.221
		Ge	eneral Statistic	s for Raw Data	Sets using De	etected Data O	nly				
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Beryllium (background)	0	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium (mw-66)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium (mw-67)	1	1	1.7000E-4	1.7000E-4	1.7000E-4	1.7000E-4	N/A	N/A	0	N/A	N/A
Beryllium (mw-68)	1	1	3.3000E-4	3.3000E-4	3.3000E-4	3.3000E-4	N/A	N/A	0	N/A	N/A
Beryllium (mw-69)	1	1	2.9000E-4	2.9000E-4	2.9000E-4	2.9000E-4	N/A	N/A	0	N/A	N/A
Beryllium (mw-70)	1	1	1.1000E-4	1.1000E-4	1.1000E-4	1.1000E-4	N/A	N/A	0	N/A	N/A
Cadmium (background)	6	4	1.1000E-4	3.0000E-4	1.8167E-4	1.6000E-4	4.4167E-9	6.6458E-5	4.4477E-5	1.274	0.366
Cadmium (mw-66)	1	1	6.2000E-5	6.2000E-5	6.2000E-5	6.2000E-5	N/A	N/A	0	N/A	N/A
Cadmium (mw-67)	4	1	1.5000E-4	1.8000E-4	1.6000E-4	1.5500E-4	2.000E-10	1.4142E-5	7.4129E-6	1.414	0.0884
Cadmium (mw-68)	5	1	1.1000E-4	4.6000E-4	2.2000E-4	1.6000E-4	2.1050E-8	1.4509E-4	7.4129E-5	1.542	0.659
Cadmium (mw-69)	1	1	3.1000E-4	3.1000E-4	3.1000E-4	3.1000E-4	N/A	N/A	0	N/A	N/A
Cadmium (mw-70)	3	1	1.1000E-4	2.4000E-4	1.6333E-4	1.4000E-4	4.6333E-9	6.8069E-5	4.4477E-5	1.361	0.417
Chromium (background)	4	4	6.0000E-4	0.0041	0.00213	0.0019	2.6492E-6	0.00163	0.00163	0.47	0.766
Chromium (mw-66)	6	2	7.4000E-4	0.0031	0.00167	0.0011	1.2497E-6	0.00112	4.2995E-4	0.89	0.669
Chromium (mw-67)	4	1	5.8000E-4	0.0016	9.1250E-4	7.3500E-4	2.1676E-7	4.6557E-4	1.4826E-4	1.816	0.51
Chromium (mw-68)	5	1	7.2000E-4	0.0012	9.3200E-4	8.1000E-4	6.1070E-8	2.4712E-4	1.3343E-4	0.522	0.265
Chromium (mw-69)	3	1	7.6000E-4	8.3000E-4	8.0000E-4	8.1000E-4	1.3000E-9	3.6056E-5	2.9652E-5	-1.152	0.0451
Chromium (mw-70)	5	1	6.0000E-4	0.0037	0.00147	8.4000E-4	1.7165E-6	0.00131	3.5582E-4	1.765	0.89
Cobalt (background)	27	1	0.0012	0.0087	0.00425	0.0034	4.8511E-6	0.0022	0.00208	0.385	0.518
Cobalt (mw-66)	18	0	0.0029	0.01	0.00708	0.00735	2.2089E-6	0.00149	6.6716E-4	-1.087	0.21
Cobalt (mw-67)	17	0	0.0025	0.0078	0.00541	0.0057	2.0056E-6	0.00142	0.00119	-0.584	0.262
Cobalt (mw-68)	15	0	0.0017	0.0053	0.0027	0.0025	9.5143E-7	9.7541E-4	7.4129E-4	1.619	0.361
Cobalt (mw-69)	17	0	0.0027	0.0054	0.00414	0.0042	4.8507E-7	6.9647E-4	5.9303E-4	-0.427	0.168
Cobalt (mw-70)	16	0	0.0022	0.0077	0.00516	0.00545	3.1866E-6	0.00179	0.00245	-0.295	0.346
Lead (background)	2	4	7.3000E-4	0.0011	9.1500E-4	9.1500E-4	6.8450E-8	2.6163E-4	2.7428E-4	N/A	0.286
Lead (mw-66)	2	1	1.8000E-4	7.2000E-4	4.5000E-4	4.5000E-4	1.4580E-7	3.8184E-4	4.0030E-4	N/A	0.849
Lead (mw-67)	1	1	1.7000E-4	1.7000E-4	1.7000E-4	1.7000E-4	N/A	N/A	0	N/A	N/A
Lead (mw-68)	2	1	1.9000E-4	5.2000E-4	3.5500E-4	3.5500E-4	5.4450E-8	2.3335E-4	2.4463E-4	N/A	0.657
Lead (mw-69)	2	1	2.1000E-4	0.006	0.00311	0.00311	1.6762E-5	0.00409	0.00429	N/A	1.319
Lead (mw-70)	1	1	1.5000E-4	1.5000E-4	1.5000E-4	1.5000E-4	N/A	N/A	0	N/A	N/A
Lithium (background)	39	1	0.21	0.45	0.337	0.35	0.00366	0.0605	0.0445	-0.568	0.18
Lithium (mw-66)	17	0	0.24	0.5	0.321	0.32	0.0033	0.0574	0.0445	1.912	0.179
		1	1	1	1	1	1	1	1	l .	

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Lithium (mw-67)	17	0	0.25	0.55	0.396	0.4	0.00651	0.0807	0.089	0.0873	0.204
Lithium (mw-68)	17	0	0.22	0.4	0.336	0.34	0.00219	0.0468	0.0445	-0.961	0.139
Lithium (mw-69)	17	0	0.27	0.52	0.398	0.4	0.00614	0.0784	0.0741	-0.199	0.197
Lithium (mw-70)	17	0	0.28	0.35	0.315	0.32	4.2647E-4	0.0207	0.0148	-0.0474	0.0655
Mercury (background)	0	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (mw-66)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (mw-67)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (mw-68)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Ge	neral Statistics	s for Raw Data	Sets using De	etected Data O	nly				
Variable	NumObs	# Missing	Minimum	Maximum	Mean	Median	Var	SD	MAD/0.675	Skewness	CV
Mercury (mw-69)	0	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (mw-70)	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molybdenum (background)	23	1	6.2000E-4	0.011	0.00416	0.0025	1.3162E-5	0.00363	0.00222	0.916	0.873
Molybdenum (mw-66)	18	0	0.01	0.011	0.00416	0.0025	3.9324E-5	0.00363	0.00222	1.063	0.873
Molybdenum (mw-67)	18	0	0.01	0.063	0.0203	0.022	3.6824E-5	0.00627	0.00148	2.276	0.300
Molybdenum (mw-68)	17	0	0.037	0.003	0.043	0.041	3.8589E-6	0.0007	0.00443	0.633	0.141
Molybdenum (mw-69)	18	0	0.0031	0.012	0.00773	0.0073	1.2059E-6	0.00190	0.00193	-0.0666	0.234
Molybdenum (mw-70)	17	0	0.013	0.017	0.0132	0.013	3.0949E-5	0.00556	0.00148	2.85	0.0724
Selenium (background)	44	1	0.0026	0.027	0.00759	0.0062	0.0103	0.00336	0.00363	0.344	0.733
Selenium (background) Selenium (mw-66)	11	0	0.0016	0.39	0.147	0.125	0.0103	0.101	2.9652E-4	3.316	2.758
Selenium (mw-67)	17	0	0.0010	0.068	0.0118	0.0021	3.9599E-4	0.0320	0.0222	-0.0553	0.531
Selenium (mw-68)	18	0	0.0055	0.008	0.0373	0.038	0.00737	0.0199	0.0222	-0.402	0.392
Selenium (mw-69)	18	0	0.043	0.023	0.219	0.243	1.2261E-5	0.0035	0.00371	0.816	0.392
Selenium (mw-70)	18	0	0.01	0.023	0.0140	0.014	0.00104	0.0333	0.00371	0.401	0.241
Thallium (background)	25	1	2.0000E-4	0.20	6.3160E-4	5.8000E-4	1.0651E-7	3.2636E-4	4.8925E-4	-0.055	0.100
Thallium (mw-66)	14	0	3.3000E-4	0.0011	6.6643E-4	5.5500E-4	3.0273E-7	5.5021E-4	2.1497E-4	3.247	0.826
Thallium (mw-67)	14	0	3.1000E-4	7.4000E-4	4.8571E-4	4.8500E-4	1.6903E-8	1.3001E-4	1.5567E-4	0.356	0.820
Thallium (mw-68)	15	0	4.8000E-4	9.3000E-4	6.9733E-4	6.7000E-4	1.5650E-8	1.2510E-4	1.1861E-4	0.366	0.200
Thallium (mw-69)	9	0	1.4000E-4	4.7000E-4	0.9733E-4 2.4778E-4	2.2000E-4	1.0119E-8	1.0060E-4	7.4129E-5	1.444	0.406
Thallium (mw-70)	9	0	2.7000E-4	5.7000E-4	4.2333E-4	4.0000E-4	7.5000E-9	8.6603E-5	2.9652E-5	0.0318	0.400
Fluoride (background)	3	0	0.2	0.44	0.32	0.32	0.0144	0.12	0.178	0.0318	0.203
Fluoride (mw-66)	18	0	17	41	23.33	24	30	5.477	2.965	1.914	0.235
Fluoride (mw-67)	18	0	15	37	22.22	21.5	27.83	5.275	3.706	1.385	0.237
Fluoride (mw-68)	18	0	5.5	14	9.211	9.65	4.992	2.234	2.001	0.139	0.243
Fluoride (mw-69)	18	0	9.6	29	16.02	16.5	22.85	4.78	5.189	1.009	0.298
Fluoride (mw-70)	14	0	0.85	3.2	2.204	2.25	0.48	0.693	0.593	-0.657	0.230
nbinedRadium (background)	40	0	0.4	4.8	2.315	2.2	0.987	0.994	0.964	0.299	0.429
CombinedRadium (mw-66)	17	0	0.4	5.1	2.599	2.8	1.51	1.229	1.334	-0.0361	0.423
CombinedRadium (mw-67)	17	0	0.9	4.2	2.592	2.67	0.8	0.895	0.845	0.00753	0.345
CombinedRadium (mw-68)	17	0	0.6	3.8	2.021	2.1	0.833	0.913	1.186	0.299	0.452
Combined (adddin (mw-00)	17	U	0.0	5.0	2.021	4.1	0.000	0.010	1.100	0.233	0.702

CombinedRadium (mw-69) 18	0	3.1	6.7	4.565	4.75	1.152	1.073	1.186	0.153	0.235
CombinedRadium (mw-70) 16	0	1	3.3	2.039	1.95	0.379	0.616	0.667	0.327	0.302
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10			MANN-KEN	 	<u></u>	 	
User Selected Options	Mann-Kendall 1	TIGHU TESTAN	aiyələ	 		 	
	ProUCL 5.19/14	1/2018 6-20-0	) DM	 		 	
	URS_Assessm			 		 	
	OFF			 			
	0.95			 			
	0.05			 		 	
Level of Significance				 			
Antimony-backgrou	ınd	1					
Anumony-backgrou							
General Statistics	<u> </u>						
Number or Reported Eve		0					
Number of Gene		43					
Number Values		46					
	alues Missing	3					
	r Values Used	43					
		1.2000E-4					
	Maximum	0.01					
	Mean	0.00423					
Ge	eometric Mean	0.00272			<u> </u>		
	Median	0.004					
Stand	dard Deviation	0.0033					
	nt of Variation	0.78			<u> </u>		
			-		<del>                                     </del>		
Mann-Kendall Tes	st			 	<u> </u>		
	Test Value (S)	428	+	 <del>                                     </del>	<del>                                     </del>		
	al Value (0.05)	1.645					
	Deviation of S	91.22					
Standardiz	zed Value of S	4.681					
Approx	kimate p-value	1.4292E-6					
Statistically significant evidence of an increase	sing						
trend at the specified level of significance.							
Antimony-mw-66	5						
General Statistics	s						
Number or Reported Eve		0					
Number of Gene		17			L		
Number Values		18					
Number V	alues Missing	1					
Number	r Values Used	17			L		
	Minimum 1						
	Maximum	0.01					
	Mean	0.00304					
Ge	eometric Mean	0.0017					
	Median	0.0025					
	dard Deviation	0.00299					
Coefficie	nt of Variation	0.984					
Mann-Kendall Tes							
	Test Value (S)	48					
	ulated p-value	0.023					
	Deviation of S	23.71					
	zed Value of S	1.983					
Approx	kimate p-value	0.0237					
			·	 		 	

		IVIAININ-KEIV					
Statistically significant evidence of an increasing		<u> </u>		-	<u> </u>	-	-
				-		-	
trend at the specified level of significance.						<u> </u>	
Antimony-mw-67						<u> </u>	
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	17		-				
Number Values Reported (n)	18						
Number Values Missing	1						
Number Values Used	17						
Minimum	1.4000E-4						
Maximum	0.01						
Mean	0.00312						
Geometric Mean	0.00172						
Median	0.0025						
Standard Deviation	0.00302		-				
Coefficient of Variation	0.966						
Mann-Kendall Test							
M-K Test Value (S)	62						
Tabulated p-value	0.005						
Standard Deviation of S	23.57						
Standardized Value of S	2.589						
Approximate p-value	0.00482						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Antimony-mw-68							
General Statistics							
Number or Reported Events Not Used					<u> </u>		
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing	1						
Number Values Used	17						
Minimum	1.1000E-4						
Maximum	0.01						
Mean	0.00313						
Geometric Mean	0.00169						
Median	0.0025						
Standard Deviation	0.00302						
Coefficient of Variation	0.964						
Mann-Kendali Test							
M-K Test Value (S)	60						
Tabulated p-value	0.007						
Standard Deviation of S	23.57						
Standardized Value of S	2.504						
Approximate p-value	0.00615						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Antimony-mw-69							

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General Statistics							
Number or Reported Events Not Used	0		-	-			
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing	1						
Number Values Used	17						
Minimum	2.1000E-4						
Maximum	0.01						
Mean	0.00316						
Geometric Mean	0.00192						
Median	0.0025						
Standard Deviation	0.00299						
Coefficient of Variation	0.945						
Mann-Kendall Test							
M-K Test Value (S)	60						
Tabulated p-value							
Standard Deviation of S	23.57						
Standardized Value of S							
Approximate p-value							
, applications of value							
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Antimony-mw-70							
, and the second							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing							
Number Values Wissing  Number Values Used	17						
	1.1000E-4						
	0.01						
Maximum							
Mean	0.00365						
Geometric Mean	0.00191						
Median	0.004						
Standard Deviation							
Coefficient of Variation	0.93						
N 2 18= 1							
Mann-Kendall Test	76						
M-K Test Value (S)							
Tabulated p-value							
Standard Deviation of S							
Standardized Value of S							
Approximate p-value	5.4253E-4						
Statistically significant evidence of an increasing							
trend at the specified level of significance.	1						
	Trend Test An	alysis			 		
User Selected Options					 		
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	mentMont_Sept	2018.xls					
Full Precision OFF					 		
Confidence Coefficient 0.95	<del></del>				 <del></del>	<del> </del>	

	JRS ProucL	 			
Level of Significance 0.05					
Arsenic-background					
Arsenic-background					
General Statistics					
Number or Reported Events Not Used	0				
Number of Number of Generated Events	46				
Number Values Reported (n)	46				
	2.3000E-4				
Maximum	0.012				
Mean	0.00465				
Geometric Mean	0.00357				
Median	0.0044				
Standard Deviation	0.0029				
Coefficient of Variation	0.625				
	5.525				
Mann-Kendall Test					
M-K Test Value (S)	134				
Critical Value (0.05)					
Standard Deviation of S					
Standardized Value of S					
Approximate p-value	0.104				
Insufficient evidence to identify a significant					
trend at the specified level of significance.					
Arsenic-mw-66					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	18				
Number Values Reported (n)	18				
Minimum	6.7000E-4				
Maximum	0.01				
Mean	0.0026				
Geometric Mean	0.00206				
Median	0.002				
Standard Deviation	0.00221				
Coefficient of Variation	0.852				
	ıt.				
Mann-Kendall Test					
M-K Test Value (S)	78				
Tabulated p-value					
Standard Deviation of S					
Standardized Value of S					
Approximate p-value	0.00155				
	·				
Statistically significant evidence of an increasing					
trend at the specified level of significance.					
Arsenic-mw-67					
General Statistics					
Number or Reported Events Not Used					
Number of Generated Events					
Number Values Reported (n)					
	9.9000E-4				

	RS ProUCL MA	AUTO INCIDE	JALL INLIN	D 7 (147 (E1515				
Maximum	0.01							
Mean	0.00301							
Geometric Mean	0.00265							
Median	0.0027							
Standard Deviation	0.00195							
Coefficient of Variation	0.647							
Mann-Kendall Test								
M-K Test Value (S)	22							
Tabulated p-value	0.205							
Standard Deviation of S	26.13							
Standard Deviation of S Standardized Value of S	0.804							
	0.804							
Approximate p-value	0.211							
Insufficient evidence to identify a significant								
trend at the specified level of significance.								
Arsenic-mw-68								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	6.0000E-4							
Maximum	0.01							
Mean	0.00604							
Geometric Mean	0.00505							
Median	0.0067							
Standard Deviation	0.0007							
Coefficient of Variation	0.00264							
Coefficient of Variation	0.47							
M VJ-II TA								
Mann-Kendall Test	00							
M-K Test Value (S)	92							
Tabulated p-value	0							
Standard Deviation of S	26.38							
Standardized Value of S	3.449							
Approximate p-value	2.8097E-4							
			-	-				
Statistically significant evidence of an increasing								
trend at the specified level of significance.								
Arsenic-mw-69								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	0.0026							
Maximum	0.0020							
	0.00693							
Mean Comment Management								
Geometric Mean	0.00647							
Median	0.007							
Standard Deviation	0.00236							
Coefficient of Variation	0.34							
Mann-Kendall Test								
M-K Test Value (S)	56							
					I .	l	1	L

		IVIAIVIV KEIV	IDALL TREN	DANALISIS	,		,
Tabulated p-value	0.016						
Standard Deviation of S	26.33						
Standardized Value of S	2.089						
Approximate p-value	0.0184						
1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7							
Statistically significant evidence of an increasing							
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Arsenic-mw-70							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
	4.9000E-4						
Maximum	0.01						
Mean	0.00549						
Geometric Mean	0.00456						
Median	0.0052						
Standard Deviation	0.00257						
Coefficient of Variation	0.469						
Mann-Kendall Test							
M-K Test Value (S)	39						
Tabulated p-value	0.076						
Standard Deviation of S	26.4						
Standardized Value of S	1.439						
Approximate p-value	0.075						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Mann-Kendall	Trend Test An	alveie					
User Selected Options	110110 1001711	alyolo					
-	4/2010 C: 4E:2	2 DM					
Date/Time of Computation ProUCL 5.19/1							
From File URS_Assessm	nentMont_Sep	t2018.xls					
Full Precision OFF							
Confidence Coefficient 0.95	<del></del>					 	
Level of Significance 0.05							
Barium-background							
General Statistics							
Number or Reported Events Not Used	0						
•							
Number of Generated Events	46						
Number Values Reported (n)	46						
Minimum	0.0073						
Maximum 0.051							
Mean 0.0161							
Geometric Mean 0.0139							
Median							
Standard Deviation							
Coefficient of Variation							
Coefficient of variation							
Mann-Kendali Test							
M-K Test Value (S)	-156						

Cross Value of (0.0)   -1.545.	U	IRS ProUCL	MANN-KEN	IDALL TREN	D ANALYSIS	<b>;*</b>		
Standard Development of School	Critical Value (0.05)	-1.645						
Insufficient evidence to identify a significant Trand at the specified level of algorithmene.  Berhammer-6  General Statistics  Number of Reported Events Not Used  Number of Reported Events Not Used  Number of Reported Events Not Used  Number of Reported Events Not Used  Number of Reported Events Not Used  Number of Reported Events Not Used  Number of Reported Events Not Used  Number of Reported Events Not Used  Nationum  O22  Median  Generalis Median  O25  Standard Deviation O265  Standard Deviation O274  Nem Nem Note of Variation  O274  Nem Note of Variation  Note of variation  Note of Variation  Note of Variation  Note of Variati	Standard Deviation of S	105.5						
Insufficient evidence to Identify a significant to the specified level of significants.  Befure at the specified level of significance.  Befure with the specified level of significance.  Command Statistics.  Number of Reported Events Not Used   0   0   0   0   0   0   0   0   0	Standardized Value of S	-1.469						
tend at the specifical level of significance.  Barium-mav-66  General Statistics  Number or Reported Events Not Used  Number or Reported Events Not Used  Number of Cenerated Events 18  Number Voluse Reported (o) 18  Memorium 0.0013  Maximum 0.0022  General Statistics  Coefficient of Variation 0.0274  Mana-Kardall Test  Mark Facet Value (S) 24  Tabulated p-value 0.184  Standard Deviation of S 7 58.8  Standard Value of S 0 8.95  Approximate p-value 0.185  Reported (value of S) 0.185  Deviation of Standard Standard Value of S 0 8.95  Approximate p-value 0.185  Reported (value of S) 0.185  Reported Value of S 0 8.95  Approximate p-value 0.185  Reported Value of S 0 8.95  Approximate p-value 0.185  Number or Reported Events Not Used 0.181  Number or Reported Events Not Used 0.193  Number of Ceneral Statistics  Number of Value Standard Only 18  Maximum 0.022  Maximum 0.022  Maximum 0.022  Maximum 0.022  Maximum 0.023  Standard Deviation 0.098  Median 0.099  General Statistics  Median 0.099  General Statistics  Number of Standard Deviation 0.0098  Median 0.099  General Statistics  Number of Standard Deviation 0.0098  Median 0.099  General Statistics  Number of Standard Deviation 0.0098  Median 0.099  General Statistics  Median 0.098  Median 0.098  Standard Deviation 0.0098  Median 0.098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Med	Approximate p-value	0.0709						
tend at the specifical level of significance.  Barium-mav-66  General Statistics  Number or Reported Events Not Used  Number or Reported Events Not Used  Number of Cenerated Events 18  Number Voluse Reported (o) 18  Memorium 0.0013  Maximum 0.0022  General Statistics  Coefficient of Variation 0.0274  Mana-Kardall Test  Mark Facet Value (S) 24  Tabulated p-value 0.184  Standard Deviation of S 7 58.8  Standard Value of S 0 8.95  Approximate p-value 0.185  Reported (value of S) 0.185  Deviation of Standard Standard Value of S 0 8.95  Approximate p-value 0.185  Reported (value of S) 0.185  Reported Value of S 0 8.95  Approximate p-value 0.185  Reported Value of S 0 8.95  Approximate p-value 0.185  Number or Reported Events Not Used 0.181  Number or Reported Events Not Used 0.193  Number of Ceneral Statistics  Number of Value Standard Only 18  Maximum 0.022  Maximum 0.022  Maximum 0.022  Maximum 0.022  Maximum 0.023  Standard Deviation 0.098  Median 0.099  General Statistics  Median 0.099  General Statistics  Number of Standard Deviation 0.0098  Median 0.099  General Statistics  Number of Standard Deviation 0.0098  Median 0.099  General Statistics  Number of Standard Deviation 0.0098  Median 0.099  General Statistics  Median 0.098  Median 0.098  Standard Deviation 0.0098  Median 0.098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Standard Deviation 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Median 0.0098  Med								
Berlum-new-66	Insufficient evidence to identify a significant							
Ceneral Statistics	trend at the specified level of significance.							
Number of Reported Events Not Used   Number of Generates Events   18	Barium-mw-66							
Number of Reported Events Not Used   Number of Generates Events   18								
Number of Generated Events   18   Number values Reported (n)   18   Number values Reported (n)   18   Number values Reported (n)   18   Number values Reported (n)   18   Number values Reported (n)   18   Number values Reported (n)   19   Number value   19   Number value values (n)   19   Number values (n)   19   Number of Generated Events Nu	General Statistics							
Number Values Reported (p)   18	Number or Reported Events Not Used	0						
Minimum	Number of Generated Events	18						
Maximum	Number Values Reported (n)	18						
Mean	Minimum	0.0013						
Geometric Mean   0.0165	Maximum	0.022						
Median 0.02 Standard Deviation 0.005055 Coefficient of Variation 0.274  Mann-Kendell Test  Mann-Kendell Test  Mann-Kendell Test  Mander Deviation of S 25.88 Standard Deviation of S 25.88 Standardized Value of S 25.89 Standardized Value of S 25.89 Standardized Value of S 25.89 Standardized Value of S 25.89 Approximate p-value 0.185  Insufficient evidence to identify a significant trend at the specified level of significance.  Bartum-mw-67  General Statistics Number of Reported Events Not Used Number of Generated Events Not Used N	Mean	0.0184						
Standard Deviation   0.00505   0.274   0.00505   0.274   0.00505   0.274   0.00505   0.274   0.00505   0.274   0.00505   0.0	Geometric Mean	0.0165						
Coefficient of Variation  Mann-Kondell Teet  Merit Test Value (S) 24  Tabulated p-value 0 1.84  Standard Deviation of S 2.68  Standardized Value of S 0.896  Approximate p-value 0 1.85  Insufficient evidence to identify a significant trend at the specified level of significance.  Barium-mw-67  General Statistics  Number of Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Reported (n) 19 General County of County	Median	0.02						
Mann-Kendall Test	Standard Deviation	0.00505						
M-K Test Value (S)   24	Coefficient of Variation	0.274						
M-K Test Value (S)   24								
Tabulated p-value 0.184  Standard Deviation of S 25.68  Standardized Value of S 0.896  Approximate p-value 0.185  Insufficient evidence to identify a significant trend at the specified level of significants  Trend at the specified level of significant trend at the specified level of significant trend at the specified level of significant trend at the specified level of significant trend at the specified level of significant trend at the specified level of significant trend at the specified level of significant trend at the specified level of significant trend at the specified level of significant trend at the specified level of significance.	Mann-Kendall Test							
Standard Deviation of S 25.68  Standardized Value of S 0.896 Approximate p-value 0.185  Insufficient evidence to Identify a significant trend at the specified level of significance.  Barlum-mw-87  General Statistics Number or Reported Events Not Used 0 Number or Reported Events 18 Number of Generated Events 18 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Walues Reported (n) 18 Generatic Maximum 0.017 Maximum 0.017  Generatic Mean 0.0199 Generatic Mean 0.0199 Generatic Mean 0.0198  Median 0.02 Standard Deviation 0.00157 Coefficient of Variation 0.0788  Mann-Kendall Test M-K-Test Value (s) 28 Tabulated p-value 0.147 Standard Deviation of S 25.29 Standard Deviation of S 25.29 Standard Deviation of S 1.068 Approximate p-value 0.143  Insufficient evidence to Identify a significant trend at the specified level of significance.	M-K Test Value (S)	24						
Standardized Value of S Approximate p-value  Approximate p-value  O.185  Insufficient evidence to identify a significant  trend at the specified level of significance.  Barium-mw-67  General Statistics  Number or Reported Events Not Used  Number of Generated Events  Number Values Reported (n)  Minimum  O.017  Maximum  O.022  Mean  O.0199  Geometric Mean  O.0198  Median  O.02  Standard Deviation  Coefficient of Variation  Mann-Kendall Test  M-K Test Value (S)  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Approximate p-value  Insufficient evidence to identify a significant  trend at the specified level of significance.	Tabulated p-value	0.184						
Approximate p-value 0.185   Insufficient evidence to identify a significant trend at the specified level of significance.	Standard Deviation of S	25.68						
Insufficient evidence to identify a significant trend at the specified level of significance.  Barlum-mw-67  General Statistics  Number or Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Reported (n) 18 October 19 Maximum 0.017 Maximum 0.022 Mean 0.0199 Geometric Mean 0.0198 Geometric Mean 0.0198 Coefficient of Variation 0.00157 Coefficient of Variation 0.00788  Mann-Kendall Test Tabulated p-value 0.147 Standard Deviation of S 25.29 Standard Deviation of S 25.29 Standard Deviation of S 1.068 Approximate p-value 0.143 Insufficient evidence to identify a significant trend at the specified level of significance.	Standardized Value of S	0.896						
Trend at the specified level of significance.   Barlum-mw-67	Approximate p-value	0.185						
Trend at the specified level of significance.   Barlum-mw-67								
Barlum-mw-67	Insufficient evidence to identify a significant							
General Statistics  Number or Reported Events Not Used 0 Number of Generated Events 18 Number Values Reported (n) 18 Minimum 0.017 Maximum 0.022 Mean 0.0199 Geometric Mean 0.0198 Median 0.02 Standard Deviation 0.00157 Coefficient of Variation 0.0788  MAINTHER STATIST Value (S) 28 Tabulated p-value 0.147 Standard Deviation of S 25.29 Standardized Value of S 1.068 Approximate p-value 0.143 Insufficient evidence to identify a significant trend at the specified level of significance.	trend at the specified level of significance.							
Number of Reported Events Not Used  Number of Generated Events  Number Values Reported (n)  Number Values Reported (n)  Minimum  0.017  Maximum  0.022  Mean  0.0199  Geometric Mean  Median  0.02  Standard Deviation  Coefficient of Variation  0.0788  Mann-Kendall Test  Mann-Kendall Test  Tabulated p-value  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Approximate p-value  0.143  Insufficient evidence to identify a significant  trend at the specified level of significance.	Barium-mw-67							
Number of Reported Events Not Used  Number of Generated Events  Number Values Reported (n)  Number Values Reported (n)  Minimum  0.017  Maximum  0.022  Mean  0.0199  Geometric Mean  Median  0.02  Standard Deviation  Coefficient of Variation  0.0788  Mann-Kendall Test  Mann-Kendall Test  Tabulated p-value  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  Approximate p-value  0.143  Insufficient evidence to identify a significant  trend at the specified level of significance.								
Number of Generated Events 18  Number Values Reported (n) 18  Minimum 0.017  Maximum 0.022  Mean 0.0199  Geometric Mean 0.0198  Median 0.02  Standard Deviation 0.00157  Coefficient of Variation 0.0788  Mann-Kendall Test  Mann-Kendall Test  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.	General Statistics							
Number Values Reported (n) 18  Minimum 0.017  Maximum 0.022  Mean 0.0199  Geometric Mean 0.0198  Median 0.02  Standard Deviation 0.00157  Coefficient of Variation 0.0788  Mann-Kendall Test  M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardzed Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.	Number or Reported Events Not Used	0						
Minimum 0.017  Maximum 0.022  Mean 0.0199  Geometric Mean 0.0198  Median 0.02  Standard Deviation 0.00157  Coefficient of Variation 0.0788  Mann-Kendall Test  M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significants  trend at the specified level of significance.	Number of Generated Events	18						
Maximum 0.022  Mean 0.0199  Geometric Mean 0.0198  Median 0.02  Standard Deviation 0.00157  Coefficient of Variation 0.0788  Mann-Kendall Test  M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to Identify a significant  trend at the specified level of significance.	Number Values Reported (n)							
Mean 0.0199 Geometric Mean 0.0198 Median 0.02 Standard Deviation 0.00157 Coefficient of Variation 0.0788  Mann-Kendall Test Mank Test Value (S) 28 Tabulated p-value 0.147 Standard Deviation of S 25.29 Standardized Value of S 1.068 Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.	Minimum	0.017						
Geometric Mean 0.0198  Median 0.02  Standard Deviation 0.00157  Coefficient of Variation 0.0788  Mann-Kendall Test  M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standard Deviation of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.	Maximum							
Median 0.02  Standard Deviation 0.00157  Coefficient of Variation 0.0788  Mann-Kendall Test  M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.	Mean							
Standard Deviation 0.00157 Coefficient of Variation 0.0788  Mann-Kendall Test  M-K Test Value (S) 28 Tabulated p-value 0.147 Standard Deviation of S 25.29 Standardized Value of S 1.068 Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.	Geometric Mean							
Coefficient of Variation 0.0788    Mann-Kendall Test	Median							
Mann-Kendall Test  M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant  trend at the specified level of significance.								
M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.	Coefficient of Variation	0.0788						
M-K Test Value (S) 28  Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.								
Tabulated p-value 0.147  Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant  trend at the specified level of significance.								
Standard Deviation of S 25.29  Standardized Value of S 1.068  Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.								
Standardized Value of S Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.								
Approximate p-value 0.143  Insufficient evidence to identify a significant trend at the specified level of significance.								
Insufficient evidence to identify a significant trend at the specified level of significance.								
trend at the specified level of significance.	Approximate p-value	0.143						
trend at the specified level of significance.								
Barium-mw-68								
	Barium-mw-68							

	RS Prouct	VI UVI NEIV	DALLE TILLIA	D 7 (147 (E1313	ı	
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	18					
Number Values Reported (n)	18					
Minimum	0.0066					
Maximum	0.013					
Mean	0.00818					
Geometric Mean	0.00807					
Median	0.00765					
Standard Deviation	0.00155					
Coefficient of Variation	0.189					
Mann-Kendall Test						
M-K Test Value (S)	-36					
Tabulated p-value	0.008					
Standard Deviation of S	26.24					
Standard Deviation of S Standardized Value of S	-1.334					
Standardized value of S  Approximate p-value	0.0911					
Арргохипаte p-value	0.0311					
Otatistically similforms of a decreasing						
Statistically significant evidence of a decreasing						
trend at the specified level of significance.						
Barium-mw-69						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	18					
Number Values Reported (n)	18					
Minimum	0.013					
Maximum	0.019					
Mean	0.0158					
Geometric Mean	0.0158					
Median	0.016					
Standard Deviation	0.00158					
Coefficient of Variation	0.0999					
Mann-Kendall Test						
M-K Test Value (S)	42					
Tabulated p-value	0.056					
Standard Deviation of S	25.02					
Standardized Value of S	1.639					
Approximate p-value	0.0506					
Insufficient evidence to identify a significant						
trend at the specified level of significance.						
Barium-mw-70						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	17					
Number Values Reported (n)	18					
Number Values Missing	1					
Number Values Used	17					
Minimum	0.0073					
Maximum	0.016					
Mean	0.0114					
Moun						

	ι	JRS ProUCL	MANN-KEN	IDALL TREN	D ANALYSIS	*			
C	Geometric Mean	0.0112							
	Median	0.012							
Sta	ndard Deviation	0.00253							
Coeffic	ient of Variation	0.221							
Mann-Kendall T	est								
M-H	(Test Value (S)	-15							
Та	bulated p-value	0.299							
Standard	d Deviation of S	24.16							
Standard	lized Value of S	-0.579							
Appro	oximate p-value	0.281							
Insufficient evidence to identify a significant	t								
trend at the specified level of significance.									
	Mann-Kendall	Trend Test An	alysis	I.	I.		I.	.1	II.
User Selected Options									
Date/Time of Computation	ProUCL 5.19/1	14/2018 6:52:4	8 PM						
From File	URS_Assessn	nentMont_Sep	t2018.xls						
Full Precision	OFF								
Confidence Coefficient	0.95								
Level of Significance	0.05								
	-								
Beryllium-backgr	ound								
General Statist	ics								
Number or Reported E	vents Not Used	0							
Number of Ge	nerated Events	41							
Number Valu	es Reported (n)	46							
Number	Values Missing	5							
Numb	er Values Used	41							
	Minimum	0.001							
	Maximum	0.001							
	Mean	0.001							
	Geometric Mean	0.001							
	Median	0.001							
Sta	ndard Deviation								
Coeffic	ient of Variation	N/A							
Mann-Kendall T	est								
	(Test Value (S)	0							
	cal Value (0.05)	N/A							
	d Deviation of S	0							
	lized Value of S	N/A							
	oximate p-value	N/A							
Insufficient evidence to identify a significant	t								
trend at the specified level of significance.									
Beryllium-mw-									
201 y main-min	Dolyman IIII oo								
General Statist	General Statistics								
	Number or Reported Events Not Used 0								
	Number of Generated Events 17								
	es Reported (n)	18							
	Values Missing	1							
Number	values iviissing	I							

	JRS Prouct N	MAININ KEIN	DALL INLIN	DANALISIS		
Number Values Used	17					
Minimum	0.001					
Maximum	0.001					
Mean	0.001					
Geometric Mean	0.001					
Median	0.001					
Standard Deviation	4.470E-19					
Coefficient of Variation	N/A					
Mann-Kendall Test						
M-K Test Value (S)	0					
Tabulated p-value	0.516					
Standard Deviation of S	0.010					
Standardized Value of S	N/A					
	N/A					
Approximate p-value	IN/A					
Inquifficient evidence to identify a similficent						
Insufficient evidence to identify a significant						
trend at the specified level of significance.						
Beryllium-mw-67						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	17					
Number Values Reported (n)	18					
Number Values Missing	1					
Number Values Used	17					
Minimum	1.7000E-4					
Maximum	0.001					
Mean	9.5118E-4					
Geometric Mean	9.0102E-4					
Median	0.001					
Standard Deviation	2.0130E-4					
Coefficient of Variation	0.212					
Mann-Kendall Test						
M-K Test Value (S)	16					
Tabulated p-value	0.271					
Standard Deviation of S	9.798					
Standardized Value of S	1.531					
Approximate p-value	0.0629					
лурголинае р-чаше	0.3020					
Insufficient evidence to identify a significant						
trend at the specified level of significance.						
Beryllium-mw-68						
Deryillurii-riiw-oo						
Compani Chatiatian						
General Statistics	0					
Number or Reported Events Not Used	0					
Number of Generated Events	17					
Number Values Reported (n)	18					
Number Values Missing	1					
Number Values Used	17					
	3.3000E-4					
Maximum						
	9.6059E-4				 	 
Geometric Mean	9.3687E-4					
				1	i .	1

	IRS ProUCL MA	ININ-KLINDALL	INCIND AINA	(LI 3I3		
Median	0.001					
Standard Deviation	1.6250E-4					
Coefficient of Variation	0.169					
Mann-Kendall Test						
M-K Test Value (S)	16					
Tabulated p-value	0.271					
Standard Deviation of S	9.798					
Standardized Value of S	1.531					
Approximate p-value	0.0629					
Insufficient evidence to identify a significant						
trend at the specified level of significance.						
Beryllium-mw-69						
,						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	17					
Number Values Reported (n)	18					
Number Values Missing	1					
Number Values Used	17					
	2.9000E-4					
Maximum	0.001					
	9.5824E-4					
Geometric Mean						
Median	0.001					
Standard Deviation						
Coefficient of Variation	0.18					
Coefficient of Variation	0.10					
Mann-Kendall Test						
M-K Test Value (S)	16					
Tabulated p-value	0.271					
Standard Deviation of S	9.798					
Standard Deviation of S	1.531					
Approximate p-value	0.0629					
Арргохіппате р-чапае	0.0029					
Insufficient evidence to identify a significant						
trend at the specified level of significance.						
Beryllium-mw-70						
Doi yiliani-niw-70						
General Statistics						
Number or Reported Events Not Used	0					
Number of Reported Events Not Osed  Number of Generated Events	17					
Number of Generated Events  Number Values Reported (n)	18					
Number Values Reported (n)  Number Values Missing	1					
Number Values Missing  Number Values Used	17					
	1.1000E-4				-	
Maximum	0.001					
	9.4765E-4					
Geometric Mean						
Median	0.001					
Standard Deviation						
Coefficient of Variation	0.228					
Mann-Kendali Test						

	URS ProUCL MANN-KENDALL TREND ANALYSIS*								
M-K	M-K Test Value (S) 16								
Tal	bulated p-value	0.271							
Standard	I Deviation of S	9.798							
	ized Value of S								
	ximate p-value								
Аррго	ximate p-value	0.0629							
Insufficient evidence to identify a significant	Ì .								
trend at the specified level of significance.									
·	Mann-Kendall	Trend Test An	alysis						
User Selected Options									
Date/Time of Computation	ProUCL 5.19/	14/2018 6:53:5	2 PM						
From File	From File URS_AssessmentMont_S								
Full Precision	OFF								
Confidence Coefficient	0.95								
Level of Significance	0.95								
Level of Significance									
				ı	1				
Cadmium-backgro									
Company Charlistics									
General Statistics									
Number or Reported Events Not Used 0									
Number of Generated Events 42									
Number Values Reported (n) 46									
Number '	Number Values Missing 4								
	er Values Used								
	Minimum								
	Maximum	0.001							
		4.1167E-4							
G	eometric Mean								
		4.0000E-4							
Star	ndard Deviation								
Coeffici	ent of Variation	0.714							
		1							
Mann-Kendall To	est								
M-K	Test Value (S)	321							
Critic	al Value (0.05)	1.645							
	Deviation of S								
Standard	ized Value of S	3.614							
	ximate p-value								
Дри	p value								
Statistically significant evidence of an increa	aeina								
	aony								
trend at the specified level of significance.									
Cadmium-mw-6	56								
General Statisti									
Number or Reported Ev	vents Not Used	0							
Number of Ge	nerated Events	17							
Number Values Reported (n) 18		18							
Number Values Missing 1									
	er Values Used								
		6.2000E-5							
	Maximum 0.001								
	Maximum 0.001  Mean 3.1541E-4								
G	eometric Mean								
	Median	1.0000E-4							

		MANN-KEN	DALLE THEIR	D 7 (14) (E13)3	1	
Standard Deviation						
Coefficient of Variation	0.952					
Mann-Kendall Test						
M-K Test Value (S)	45					
Tabulated p-value	0.038					
Standard Deviation of S	22.5					
Standardized Value of S	1.955					
Approximate p-value	0.0253					
Statistically significant evidence of an increasing						
trend at the specified level of significance.						
Cadmium-mw-67						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	17					
Number Values Reported (n)	18					
Number Values Missing	1					
Number Values Used						
	1.0000E-4					
Maximum	0.001					
	3.5529E-4					
Geometric Mean						
	4.0000E-4					
Standard Deviation						
Coefficient of Variation	0.783					
Goefficient of Variation	0.703					
Mann-Kendali Test						
M-K Test Value (S)	44					
Tabulated p-value						
Standard Deviation of S	23.57					
Standardized Value of S						
Approximate p-value						
Approximate p-value	0.034					
Statistically significant evidence of an increasing						
trend at the specified level of significance.  Cadmium-mw-68						
Caumum-mw-oo						
General Statistics						
	0					
Number of Reported Events Not Used						
Number of Generated Events	17					
Number Values Reported (n)	18					
Number Values Missing						
Number Values Used						
	1.0000E-4					
Maximum	0.001					
	3.1765E-4					
Geometric Mean						
	4.0000E-4					
Standard Deviation						
Coefficient of Variation	0.73					
Mann-Kendall Test						
M-K Test Value (S)	29					
			_	_	 _	 

		IVIAININ-KEIV		 I .	I	Ī	
Tabulated p-value	0.135						
Standard Deviation of S							
Standardized Value of S	1.191						
Approximate p-value	0.117						
	I.						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Cadmium-mw-69							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events							
Number Values Reported (n)	18						
Number Values Missing							
Number Values Used							
	1.0000E-4						
Maximum	0.001						
	3.4765E-4						
Geometric Mean							
	4.0000E-4						
Standard Deviation							
Coefficient of Variation	0.827						
Mann-Kendall Test							
M-K Test Value (S)	33						
Tabulated p-value	0.102						
Standard Deviation of S	22.71						
Standardized Value of S	1.409						
Approximate p-value	0.0794						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Cadmium-mw-70							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events							
Number Values Reported (n)	18						
Number Values Missing							
Number Values Used							
	1.0000E-4						
Maximum							
	3.5235E-4						
Mean Geometric Mean							
	4.0000E-4						
Standard Deviation							
Coefficient of Variation	0.799						
Mann-Kendall Test							
M-K Test Value (S)							
Tabulated p-value	0.004		-				
Standard Deviation of S	23.48		-				
Standardized Value of S	2.683						
Approximate p-value	0.00365						
	I						
				1	1	L	

Obstation in a legislation of the second sec		71.5 1 1 0 0 0 2	MANN-KEN	DATE THEIR	7 (14) (213)3			ı	
Statistically significant evidence of an increa	ising								
trend at the specified level of significance.									
	Mana 12 1 "	T	-11-						
110	Mann-Kendall	rend Test An	aıysıs						
User Selected Options	D. U.C 15	14/0040 7 00 -	0.014						
Date/Time of Computation	ProUCL 5.19/1								
From File	URS_Assessn	nentMont_Sept	ZU18.xls						
Full Precision	OFF								
	0.95								
Level of Significance	0.05								
Observious hashes								1	
Cnromium-backgro	ium-background								
General Statistic	<b>Ye</b>								
Number or Reported Ev		0							
Number or Reported Ev Number of Ger		42							
Number of Ger Number Value		42							
	/alues Missing	46							
	r Values Wissing	42							
ivumbe		5.0000E-4							
		0.01							
	Maximum Mean	0.001							
	меал eometric Mean	0.00295							
Ge		0.00211							
Ston	Mediar Standard Deviation								
		0.00246 0.832							
Coefficient of Variation		0.832							
Mann-Kendall Te	not .								
	Test Value (S)	437							
	al Value (0.05)	1.645							
	Deviation of S	90.74							
	zed Value of S	4.805							
	ximate p-value								
Дррго.	Amate p-value	7.700 IL-7							
Statistically significant evidence of an increa	esina								
trend at the specified level of significance.	ioniy								
Chromium-mw-6	36								
On Ontain III W-C									
General Statistic	<u></u>								
Number or Reported Ev		0							
Number of Ger		16							
Number Value		18							
	/alues Missing	2							
	r Values Used	16							
Number		7.4000E-4							
	Maximum	0.005							
	Mean	0.003							
C	eometric Mean	0.00247							
	Median	0.00205							
Stan	dard Deviation	0.00143							
	ent of Variation	0.578							
300111010									
Mann-Kendall Te	est								
	Test Value (S)	33							
	ulated p-value	0.083							
145					<u> </u>		<u> </u>		

		MANN-KEN	IDALL TREN	D ANALYSIS	, T		
Standard Deviation of S	21.89						
Standardized Value of S	1.462						
Approximate p-value	0.0719						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Chromium-mw-67							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing							
Number Values Used	17						
	5.0000E-4						
Maximum	0.005						
	0.005						
Mean							
Geometric Mean	0.00161						
Median	0.002						
Standard Deviation	0.00152						
Coefficient of Variation	0.714						
Mann-Kendall Test							
M-K Test Value (S)	61						
Tabulated p-value	0.007						
Standard Deviation of S	23.98						
Standardized Value of S	2.502						
Approximate p-value	0.00617						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Chromium-mw-68							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	17						
Number of Generated Events  Number Values Reported (n)							
Number Values Missing	1						
Number Values Wissing  Number Values Used	17						
	5.0000E-4						
Maximum	0.005						
Mean	0.00216						
Geometric Mean	0.00169						
Median	0.002						
Standard Deviation	0.00148						
Coefficient of Variation	0.686						
	-					 	
Mann-Kendall Test							
M-K Test Value (S)	53						
Tabulated p-value	0.017						
Standard Deviation of S	23.98						
Standardized Value of S	2.169						
Approximate p-value	0.0151						
	<u> </u>						
Statistically significant evidence of an increasing							

U	JRS ProUCL	IVIAININ-KEIV	IDALL IKEN	DANALISIS	'		
trend at the specified level of significance.							
Chromium-mw-69							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing	1						
Number Values Used	17						
	5.0000E-4						
Maximum	0.005						
Mean	0.00208						
Geometric Mean	0.00155						
Median	0.002						
Standard Deviation	0.00155						
Coefficient of Variation	0.742						
Mark Resident							
Mann-Kendall Test	74						
M-K Test Value (S)							
Tabulated p-value							
Standard Deviation of S	23.92						
Standardized Value of S	2.926						
Approximate p-value	0.00172						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Chromium-mw-70							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing	1						
Number Values Used	17						
Minimum	5.0000E-4						
Maximum	0.01						
Mean	0.00284						
Geometric Mean	0.00207						
Median	0.002						
Standard Deviation	0.00235						
Coefficient of Variation	0.827						
Someth of Variation	02/						
Mann-Kendall Test							
M-K Test Value (S)	77						
Tabulated p-value							
-							
Standard Deviation of S 24.02							
Standardized Value of S 3.164							
Approximate p-value 7.7829E-4							
tictically cignificant outdones of an increasing							
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
	Trend Test An	alysis				 	
User Selected Options							
User Selected Options  Date/Time of Computation   ProUCL 5.19/						 	

		IRS ProucL		 				
From File	URS_Assessn	nentMont_Sep	t2018.xls					
Full Precision	OFF			 				
Confidence Coefficient	0.95							
Level of Significance	0.05							
Cobalt-backgrou	nd							
General Statistic	<u>'</u> S							
Number or Reported Ev		0						
Number of Reported EV		45						
Number Value		46						
	Number Values Missing 1							
Number Values Used 45								
Minimum 2.0000E-4								
	Maximum	0.01						
Mean 0.00402								
Geometric Mean 0.00311								
	Median 0.0026							
Stan	Standard Deviation 0.00267							
	Coefficient of Variation 0.665							
Coemicie	3.000							
M 1/- 1 1 =								
Mann-Kendall Test  M-K Test Value (S) 184								
	` '							
Critical Value (0.05) 1.645								
Standard Deviation of S 101.9								
Standardia	Standardized Value of S 1.796							
Approx	ximate p-value	0.0363						
Statistically significant evidence of an increa	sing							
trend at the specified level of significance.								
Cobalt-mw-66								
General Statistic	·e							
Number or Reported Ev		0						
Number of Reported EV								
		18						
Number Value	. , ,	18						
	Minimum	0.0029						
	Maximum	0.01						
	Mean	0.00708						
Ge	eometric Mean	0.00689						
	Median	0.00735						
Stan	dard Deviation	0.00149						
Coefficie	ent of Variation	0.21						
Mann-Kendall Te	est							
	Test Value (S)	52						
	ulated p-value	0.024						
Standard Deviation of S 26.38								
Standardized Value of S 1.933								
Approximate p-value 0.0266								
Statistically significant evidence of an increa	sing							
trend at the specified level of significance.								
Cobalt-mw-67	Cobalt-mw-67							
L			l	l	L	l .	1	1

	NS 1100CL	IVIAIVIV KEIV	DALL INCIN	D ANALYSIS	'			
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	0.0025							
Maximum	0.01							
Mean	0.00566							
Geometric Mean	0.00539							
Median	0.00575							
Standard Deviation	0.00175							
Coefficient of Variation	0.309							
Mann-Kendall Test								
M-K Test Value (S)	18							
Tabulated p-value	0.25							
Standard Deviation of S	26.38							
Standardized Value of S	0.644							
Approximate p-value	0.26							
дриолинае р-чаше	0.20							
Insufficient evidence to identify a significant								
Insufficient evidence to identify a significant								
trend at the specified level of significance.								
Cobalt-mw-68								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	0.0017							
Maximum	0.01							
Mean	0.00303							
Geometric Mean	0.00269							
Median	0.00245							
Standard Deviation	0.00197							
Coefficient of Variation	0.649							
Mann-Kendall Test								
M-K Test Value (S)	-40							
Tabulated p-value	0.066							
Standard Deviation of S	26.29							
Standardized Value of S	-1.483							
Approximate p-value	0.069							
, pp. 5ate p value								
Insufficient evidence to identify a significant								
trend at the specified level of significance.								
Cobalt-mw-69								
CODDIT-111W-09								
General Statistics								
	0							
Number or Reported Events Not Used	0							
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	0.0027							
Maximum	0.01							
Mean	0.00447							
Geometric Mean	0.00429							
Median	0.00425							
		l .		l .	1	1	l	l .

URS ProUCL MANN-KENDALL TREND ANALYSIS*									
Star	dard Deviation	0.00154							
Coeffici	ent of Variation	0.344							
Mann-Kendali To	est								
M-K	Test Value (S)	92							
Tal	oulated p-value	0							
Standard	Deviation of S	26.31							
Standard	ized Value of S	3.459							
Appro	ximate p-value	2.7079E-4							
FF -									
Statistically significant evidence of an increa	asing								
trend at the specified level of significance.									
Cobalt-mw-70									
CODUR IIII 70									
General Statisti	00								
Number or Reported Ev	0								
	nerated Events	18							
Number Value	es Reported (n)	18							
	Minimum	0.0022							
	Maximum	0.01							
	Mean	0.00542							
G	eometric Mean	0.00503							
	Median	0.00545							
Star	0.00203								
Coeffici	ent of Variation	0.375							
Mann-Kendall To	est								
M-K	Test Value (S)	48							
Tal	oulated p-value	0.034							
Standard	Deviation of S	26.33							
Standard	ized Value of S	1.785							
Appro	ximate p-value	0.0371							
Statistically significant evidence of an increa	asing								
trend at the specified level of significance.									
	Mann-Kendall	Trend Test An	alvsis	<u> </u>					
User Selected Options									
Date/Time of Computation	ProUCL 5.19/1	5/2018 4-44-2	9 PM						
From File	WorkSheet.xls								
Full Precision	OFF								
Confidence Coefficient	0.95								
Level of Significance	0.05								
Openhir ad Davidson	deman en el								
CombinedRadium-bad	kyround								
0 10: ::									
General Statistic	0								
Number or Reported Ev	0								
Number of Generated Events 46									
Number Values Reported (n) 46									
	Minimum 0.4								
	Maximum 4.8								
	Mean	2.098							
G	eometric Mean	1.778							
	Median	2.05							
				1	1	I .	I .	I .	I .

L	IRS ProUCL	MANN-KEN	DALL TREN	D ANALYSIS	*		
Standard Deviation	1.086						
Coefficient of Variation	0.517						
Mann-Kendall Test							
M-K Test Value (S)	-59						
Critical Value (0.05)	-1.645						
Standard Deviation of S	105.5						
Standardized Value of S	-0.55						
Approximate p-value	0.291						
PP							
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
CombinedRadium-mw-66							
Combined Addid New Co							
General Statistics							
Number or Reported Events Not Used	0						
Number of Reported Events Not Osed  Number of Generated Events	18						
Number of Generated Events  Number Values Reported (n)	18						
Minimum	5.1						
Maximum							
Mean	2.538						
Geometric Mean	2.167						
Median	2.65						
Standard Deviation	1.22						
Coefficient of Variation	0.481						
Mann-Kendall Test							
M-K Test Value (S)	15						
Tabulated p-value	0.3						
Standard Deviation of S	26.36						
Standardized Value of S	0.531						
Approximate p-value	0.298						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
CombinedRadium-mw-67							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.9						
Maximum	4.2						
Mean	2.559						
Geometric Mean	2.4						
Median	2.635						
Standard Deviation	0.879						
Coefficient of Variation	0.343						
Mann-Kendali Test							
M-K Test Value (S)	-20						
Tabulated p-value	0.227						
Standard Deviation of S	26.34						
Standardized Value of S	-0.721						
Approximate p-value	0.235						
Approximate p-value	0.200						

	JRS ProucL	MANN-KEN	IDALL TREN	D ANALYSIS	) <sup>*</sup>		
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
CombinedRadium-mw-68							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.6						
Maximum	3.8						
Mean	1.942						
Geometric Mean	1.702						
Median	2						
Standard Deviation	0.947						
Coefficient of Variation	0.488						
	I						
Mann-Kendall Test							
M-K Test Value (S)	-6						
Tabulated p-value	0.411						
Standard Deviation of S	26.24						
Standardized Value of S	-0.191						
Approximate p-value	0.424						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
CombinedRadium-mw-69							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	3.1						
Maximum	6.7						
Mean	4.565						
Geometric Mean	4.444						
Median	4.75						
Standard Deviation	1.073						
Coefficient of Variation	0.235						
	I						
Mann-Kendall Test							
M-K Test Value (S)	49						
Tabulated p-value	0.034						
Standard Deviation of S	26.31						
Standardized Value of S	1.824						
Approximate p-value	0.0341						
	IL						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
CombinedRadium-mw-70							
General Statistics							
Number or Reported Events Not Used	0						
1							
Number of Generated Events	18						

	U		MANN-KEN	IDALL TREN	D ANALYSIS	Ť		
	Minimum	0.6						
	Maximum	3.3						
	Mean	1.885						
Geome	etric Mean	1.726						
	Median	1.85						
Standard	d Deviation	0.733						
Coefficient o	of Variation	0.389						
Mann-Kendali Test								
	t Value (S)	19						
	ed p-value	0.25						
Standard Dev		26.36						
Standard Dev		0.683						
Approxima	ate p-value	0.247						
Insufficient evidence to identify a significant								
trend at the specified level of significance.								
Mar	nn-Kendall 1	rend Test An	alysis					
User Selected Options								
Date/Time of Computation Prol	UCL 5.19/1	5/2018 5:49:2	4 PM					
From File Wor	rkSheet.xls							
Full Precision OFF	F							
Confidence Coefficient 0.95								
Level of Significance 0.05								
Ector of Organication 0.00	-							
Fluoride-background								
Fluoriue-background								
General Statistics								
	- Next to 1	0						
Number or Reported Events		0						
Number of Generat		46						
Number Values Re		46						
	Minimum	0.2						
	Maximum	4						
	Mean	1.395						
Geome	etric Mean	1.064						
	Median	0.8						
Standard	d Deviation	0.988						
Coefficient or	of Variation	0.709						
Mann-Kendali Test								
	t Value (S)	13						
	alue (0.05)	1.645						
Standard Dev	, ,	100.1						
Standard Dev		0.12						
		0.12						
Approxima	ate p-value	0.402						
Insufficient evidence to identify a significant								
trend at the specified level of significance.								
Fluoride-mw-66	Fluoride-mw-66							
General Statistics								
Number or Reported Events	s Not Used	0						
Number of Generat	ted Events	18						
Number Values Re		18						
		-						

	JRS ProUCL	MANN-KEN	DALL TREN	D ANALYSIS	, <sup>*</sup>		
Minimum	17						
Maximum	41						
Mean	23.33						
Geometric Mean	22.82						
Median	24						
Standard Deviation	5.477						
Coefficient of Variation	0.235						
Mann-Kendall Test							
M-K Test Value (S)	113						
Tabulated p-value	0						
Standard Deviation of S	26.06						
Standardized Value of S	4.298						
Approximate p-value	8.6109E-6						
<u> </u>							
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Fluoride-mw-67							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	15						
Maximum	37						
Mean	22.22						
Geometric Mean	21.7						
Median	21.5						
Standard Deviation	5.275						
Coefficient of Variation	0.237						
Goomelon of Variation	0.207						
Mann-Kendall Test							
M-K Test Value (S)	83						
Tabulated p-value	0.001						
Standard Deviation of S	26.22						
Standard Deviation of S	3.127						
Approximate p-value							
Арргохіптате p-value	J.UUUUL-4						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Fluoride-mw-68							
i idolido-liw-oo							
General Statistics							
Number or Reported Events Not Used	0						
Number of Reported Events Not Osed  Number of Generated Events	18						
Number of Generated Events  Number Values Reported (n)	18						
Number Values Reported (n)  Minimum	5.5						
Maximum	14						
	9.211						
Mean Connettis Mean	8.946						
Geometric Mean	9.65						
Median							
Standard Deviation	2.234						
Coefficient of Variation	0.243						
M 1/2   1   1   1   1   1   1   1   1   1							
Mann-Kendall Test							

L	JRS ProUCL	MANN-KEN	IDALL TREN	D ANALYSIS	*		
M-K Test Value (S)	89						
Tabulated p-value	0						
Standard Deviation of S	26.26						
Standardized Value of S	3.351						
Approximate p-value							
Approximate p-value	4.02/3⊏-4						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Fluoride-mw-69							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	9.6						
Maximum	29						
Mean	16.02						
Geometric Mean	15.4						
Median	16.5						
Standard Deviation	4.78					 	
Coefficient of Variation	0.298						
	i						
Mann-Kendall Test							
M-K Test Value (S)	103						
Tabulated p-value	0						
Standard Deviation of S	26.22						
Standardized Value of S	3.89						
Approximate p-value	5.0193E-5						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Fluoride-mw-70							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)							
Minimum	0.4						
Maximum	3.2						
Mean	1.825						
Geometric Mean	1.495						
Median	2.1						
Standard Deviation	0.952					 	
Coefficient of Variation	0.521						
Mann-Kendall Test							
M-K Test Value (S)	28						
Tabulated p-value	0.147						
Standard Deviation of S	26.29						
Standard Deviation of S Standardized Value of S	1.027						
Approximate p-value	0.152						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
		l .	l .	l .	1		

Mann-kanns	II Tuesd Teek As	aliceta.				
	II Trend Test An	aiysis				
User Selected Options	114/2010 7 11 2	6 DM				
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	mentMont_Sep	t2018.xls				
Full Precision OFF						
Confidence Coefficient 0.95			 		 	
Level of Significance 0.05						
Lead-background						
General Statistics						
Number or Reported Events Not Use						
Number of Generated Event	s 42					
Number Values Reported (r	) 46					
Number Values Missin	g 4					
Number Values Use	d 42					
Minimur	n 1.0000E-4					
Maximur	n 0.005					
Mea	n 0.00201					
Geometric Mea						
Media						
Standard Deviatio						
Coefficient of Variatio						
Coefficient of Variatio	0.750					
Mann-Kendall Test						
M-K Test Value (S	) 342					
-	-					
Critical Value (0.05	-					
Standard Deviation of						
Standardized Value of						
Approximate p-valu	e 5.4083E-5					
Statistically significant evidence of an increasing						
trend at the specified level of significance.						
Lead-mw-66						
General Statistics						
Number or Reported Events Not Use	0 b			-	-	-
Number of Generated Event	s 17					
Number Values Reported (r	) 18					
Number Values Missin	g 1					
Number Values Use	d 17					
Minimur	n 1.0000E-4					
Maximur	n 0.005					
Mea	n 0.00144					
Geometric Mea	n 8.6257E-4					
	n 5.0000E-4					
Standard Deviatio						
Coefficient of Variatio						
Mann-Kendall Test		-				
M-K Test Value (S	) 48					
Tabulated p-value	-					
•						
Standard Deviation of						
Standardized Value of						
Approximate p-valu						

	JRS Prouct	I REIT	D/ LEE TILEIV	D 7 (14) (E13)3	1	ı	ı	
Statistically significant evidence of an increasing								
trend at the specified level of significance.								
Lead-mw-67								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	17							
Number Values Reported (n)	18							
Number Values Missing	1							
Number Values Used	17							
Minimum	1.0000E-4							
Maximum	0.005							
Mean	0.00155							
Geometric Mean	9.5091E-4							
Median	0.001							
Standard Deviation	0.0015							
Coefficient of Variation	0.97							
	1							
Mann-Kendall Test								
M-K Test Value (S)	55							
Tabulated p-value	0.014							
Standard Deviation of S	23.06							
Standardized Value of S								
Approximate p-value								
The state of the s								
Statistically significant evidence of an increasing								
trend at the specified level of significance.								
Lead-mw-68								
Ecad-IIIW-co								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	17							
Number Values Reported (n)	18							
Number Values Meported (ii)  Number Values Missing								
	1 17							
Number Values Used								
	1.0000E-4							
Maximum								
Mean								
Geometric Mean								
	5.2000E-4							
Standard Deviation								
Coefficient of Variation	0.997							
Mann-Kendall Test	1							
M-K Test Value (S)								
Tabulated p-value								
Standard Deviation of S								
Standardized Value of S								
Approximate p-value	0.0151							
	•							
Statistically significant evidence of an increasing								
trend at the specified level of significance.								
Lead-mw-69								
		1		E.	1	l	L	

		IRS ProUCL	IVIANIN-KEN	DALL TREN	D ANALYSIS	-1-			
General Statistic	s								
Number or Reported Eve	ents Not Used	0							
Number of Gen	erated Events	17							
Number Values	Reported (n)	18							
Number V	alues Missing	1							
Number	r Values Used	17							
	Minimum	1.0000E-4							
	Maximum	0.006							
	Mean	0.00175							
Ge	ometric Mean								
-		5.0000E-4							
Stand	dard Deviation	0.00186							
	nt of Variation	1.062							
Odemole	iii oi valiation	1.002							
Mann-Kendali Te	<b>~</b>								
		C4							
	Test Value (S)	64							
	ulated p-value	0.004							
	Deviation of S	22.96							
	ed Value of S	2.743							
Approx	timate p-value	0.00304							
Statistically significant evidence of an increase	sing								
trend at the specified level of significance.									
Lead-mw-70									
General Statistic	s								
Number or Reported Eve	ents Not Used	0							
Number of Gen	erated Events	17							
Number Values	Reported (n)	18							
Number V	alues Missing	1							
Number	r Values Used	17							
	Minimum	1.0000E-4							
	Maximum	0.005							
	Mean	0.00181							
Ge	ometric Mean	0.00101							
de	Median	0.00108							
Charles									
	dard Deviation								
Coefficie	nt of Variation	0.934							
Mann-Kendall Te									
	Test Value (S)	72							
	ulated p-value	0.001							
	Deviation of S	23.25							
Standardiz	ed Value of S	3.053							
Approx	timate p-value	0.00113							
	<u> </u>								
Statistically significant evidence of an increase	sing								
trend at the specified level of significance.									
	Mann-Kendall	Trend Test Ana	alysis	<u> </u>	1		1	<u>I</u>	1
User Selected Options									
·	ProUCL 5.19/1	4/2018 8:07:54	4 PM						
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	OFF	>p.							
	0.95								
Confidence Coefficient	0.30								

l	JRS ProUCL	MANN-KEN	IDALL TREN	D ANALYSIS	*		
Level of Significance 0.05							
Lithium-background							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	45						
	46						
Number Values Reported (n)							
Number Values Missing	1						
Number Values Used	45						
Minimum	0.2						
Maximum	8.0						
Mean	0.341						
Geometric Mean	0.329						
Median	0.35						
Standard Deviation	0.0973						
Coefficient of Variation	0.286						
	<u> </u>						
Mann-Kendall Test							
M-K Test Value (S)	-126						
Critical Value (0.05)	-1.645						
Standard Deviation of S							
Standard Deviation of S							
Approximate p-value							
Approximate p-value	0.11						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Lithium-mw-66							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.24						
Maximum	0.8						
Mean	0.348						
Geometric Mean	0.334						
Median	0.32						
Standard Deviation	0.126						
Coefficient of Variation							
Mann-Kendali Test							
M-K Test Value (S)	104						
Tabulated p-value							
Standard Deviation of S							
Standard Deviation of S							
Approximate p-value							
Approximate p-value	1.1000L-0						
Statistically significant avidence of an increasing							
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Lithium-mw-67							
General Statistics	1						
Number or Reported Events Not Used							
Number of Generated Events	18					 	

L	JRS ProUCL	MANN-KEN	DALL TREN	D ANALYSIS	•			
Number Values Reported (n)	18							
Minimum	0.25							
Maximum	0.8							
Mean	0.419							
Geometric Mean	0.404							
Median	0.41							
Standard Deviation	0.123							
Coefficient of Variation	0.294							
	1							
Mann-Kendall Test								
M-K Test Value (S)	118							
Tabulated p-value	0							
Standard Deviation of S	26.38							
Standardized Value of S	4.435							
Approximate p-value	4.6063E-6							
Statistically significant evidence of an increasing								
trend at the specified level of significance.								
Lithium-mw-68								
General Statistics								
Number or Reported Events Not Used	0							
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	0.22							
Maximum	8.0							
Mean	0.362							
Geometric Mean	0.35							
Median	0.345							
Standard Deviation	0.118							
Coefficient of Variation	0.327							
335,135,135,135,135,135,135,135,135,135,	****							
Mann-Kendall Test								
M-K Test Value (S)								
Tabulated p-value	0							
Standard Deviation of S	26.19							
Standardized Value of S	3.398							
Approximate p-value	3.3936E-4							
Statistically significant evidence of an increasing								
trend at the specified level of significance.								
Lithium-mw-69								
Liulium-iliw-09								
General Statistics								
Number or Reported Events Not Used								
Number of Generated Events	18							
Number Values Reported (n)	18							
Minimum	0.27							
Maximum	0.8							
Mean	0.42							
Geometric Mean	0.42							
Median	0.42							
Standard Deviation	0.122							
Coefficient of Variation	0.289							
		1		1	1	1	l .	1

BF 1/ 3-P = -			MANN-KEN	DALL TILLIA	D / ((4/AE1313	1	I	I .	1
Mann-Kendall Test		104							
	est Value (S)	104							
	lated p-value	0							
	eviation of S	26.26							
	ed Value of S	3.923							
Approxin	mate p-value	4.3720E-5							
Statistically significant evidence of an increasi	ing								
trend at the specified level of significance.									
Lithium-mw-70									
General Statistics									
Number or Reported Even	nts Not Used	0							
Number of Gener		18		<del>                                     </del>					1
Number Values F		18							
	Minimum	0.28							
	Maximum	0.8							1
	Mean	0.342							
Can	metric Mean	0.342							
Geo	Median	0.32							
011-	ard Deviation	0.32							1
	t of Variation								
Coefficient	t of variation	0.339							
Mann-Kendall Test									
	est Value (S)	9							
	Tabulated p-value 0.383								
	eviation of S	25.88							
	ed Value of S	0.309							
Approxin	mate p-value	0.379							
	<u></u>								
Insufficient evidence to identify a significant									
trend at the specified level of significance.									
М	fann-Kendall	Trend Test Ana	alysis		H.	l .	l .	l .	1
User Selected Options									
Date/Time of Computation P	roUCL 5.19/1	4/2018 8:16:07	7 PM						
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	)FF								
	.95								
	.05								
Mercury-background	d								
moroury buonground									
General Statistics									
Number or Reported Even		0							
•		42							
Number Values Reported (n) 46  Number Values Missing 4									
٩									
Number Values Used 42									
Minimum 2.0000E-4									
	Maximum 2.0000E-4								
	Mean 2.0000E-4								
Geor	metric Mean								
	Median	2.0000E-4							
						1			

		MANN-KEN	DALL TREN	D ANALYSIS	Ψ.		
Standard Deviation	1.097E-19						
Coefficient of Variation	N/A						
Mann-Kendali Test							
M-K Test Value (S)	0						
Critical Value (0.05)	N/A						
Standard Deviation of S	0						
Standardized Value of S	N/A						
Approximate p-value							
/ pproximate p value	1071						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Mercury-mw-66							
Welculy-liw-00							
General Statistics							
Number or Reported Events Not Used							
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing	1						
Number Values Used							
	2.0000E-4						
	2.0000E-4						
Mean	2.0000E-4						
Geometric Mean	2.0000E-4						
Median	2.0000E-4						
Standard Deviation	5.588E-20						
Coefficient of Variation	N/A						
Mann-Kendall Test							
M-K Test Value (S)	0						
Tabulated p-value	0.516						
Standard Deviation of S	0						
Standardized Value of S	N/A						
Approximate p-value	N/A						
PP - 11P - 11							
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Mercury-mw-67							
Wording-Tilw-07							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	17						
Number Values Reported (n)	18						
Number Values Missing	1						
Number Values Used							
	2.0000E-4						
	2.0000E-4						
	2.0000E-4						
Geometric Mean							
	2.0000E-4						
Standard Deviation	5.588E-20		-	-		-	
Coefficient of Variation	N/A						
Mann-Kendall Test							
M-K Test Value (S)	0						

Tabulated p-value   0.516   Slandadized Value of S  NA   Approximate p-value   N/A   Insufficient evidence to Identify a significant   Insufficient evidence to Identify a Significant   Insufficient evidence to Identify a Significant   Insufficient evidence to Identify a Significant   Insufficient evidence to Identify a Significant   Insufficient evidence to Identify a Significant   Insufficient evidence to Identify a Significant   Insufficien		N3 PIOUCL	 	D 7 (14) (E10)0	1	1	Ī	ı
Standardized Value of S Approximate p-value N/A Approximate p-value N/A Approximate p-value N/A  Insufficient evidence to identify a significant Insufficient evidence to identify a significant.  Mercury-mw-68  General Statistics Number of Reported Events Nut Used Number of Reported Events Nut Used Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Reported (n) 19 Minimum 2,0000E-4 Mescale 17 Minimum 2,0000E-4 Mescale 2,0000E-4 Mescale 2,0000E-4 Mescale 2,0000E-4 Mescale 2,0000E-4 Mescale 2,0000E-4 Mescale 2,0000E-4 Mescale 2,0000E-4 Satandard Deviation 6,588E-20 Coefficient of Values NA Mescale 2,000E-4 Satandard Deviation 6,588E-20 Coefficient of Values of S Sisnificat Deviation 6 5 0 Standard Deviation 6 5 0 Standard Deviation 6 5 0 Standard Deviation 6 5 0 Standard Deviation 6 5 0 Standard Deviation 6 5 0 Standard Deviation 6 5 0 Mescale 2,000E-4 Mescale 2,000	·							
Approximate p-value Insufficient evidence to identify a significant Itend at the specified lavel of significance.  Microury-mive SB  General Statistics  Number of Reported Events Not Used  Number of Reported Events Not Used  Number Values Reported (n)  Number Values Reported (n)  Number Values Reported (n)  Number Values Reported (n)  Number Values Reported (n)  Number Values Reported (n)  Number Values Reported (n)  Microury 20000E-4  Microury 20000E-4  Microury 20000E-4  Genometric Mean 2, 20000E-4  Genometric Mean 2, 20000E-4  Standard Deviation (SSBSE-20)  Coefficient of Variation  N/A  Menn-Acendal Test  MK-Test Value (S)  Standard Deviation of S  Standard Deviation of S  Standard Deviation of S  N/A  Approximate p-value  N/A  Insufficient evidence to Identify a significant  Insufficient evidence to Ident								
Insufficient evidence to identify a significance.  Mercury-mw-68  General Statistics  Number of Paported Events Nort Used  Number of Conerated Events (17)  Number Values Reported (n) 18  Number Values Reported (n) 18  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Reported (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Number Values Values (n) 19  Standardardee Value (n) 5 (n) 19  Standardardee Value (n) 5 (n) 19  Standardardee Value (n) 5 (n) 19  Standardardee Value (n) 5 (n) 19  Standardardee Value (n) 5 (n) 19  Number Values Values (n) 19  Number Values Reported (n) 19  Numb	Standardized Value of S	N/A						
Tend at the specified level of significance.	Approximate p-value	N/A						
Tend at the specified level of significance.	'							
Mercury-mw-88	nsufficient evidence to identify a significant							
Number or Reported Events Not Used   Number of Reported Events Not Used   Number of Generated Events   17   Number Values Missing   1   Number Values Missing   1   Number Values Missing   1   Number Values Missing   1   Number Values Used   17   Number Values Used   17   Number Values Used   17   Number Values Used   17   Number Values Used   17   Number Values Used   18   Number Values Used   18   Number Values Used   18   Number Values Used   Number Values Used   Number Values Used   Number Values Used   Number Values Used   Number Values Used   Number Values Used   Number Values Used   Number Values Used   Number Values Used   Number Values Wissing   2   Number Values Used   18   Number Values Used   18   Number Values Used   18   Number Values Used   18   Number Values Wissing   2   Number Values	trend at the specified level of significance.							
Number of Reported Events Not Used   0	Mercury-mw-68							
Number of Reported Events Not Used   0   1   1   1   1   1   1   1   1   1								
Number of Generated Events   17	General Statistics							
Number of Generated Events   17	Number or Reported Events Not Used	0						
Number Values Missing		17						
Number Values Missing	Number Values Reported (n)	18						
Number Values Used								
Minimum   2,0000E-4								
Maximum								
Mean   2,0000E-4								
Geometric Mean   2,0000E-4								
Median   2,000E-4								
Standard Deviation   5.588E-20   N/A      Mann-Kendall Test   M-K Test Value (S)   0     Tabulated p-value   0.516     Standard Deviation of S   0     Standard Deviation of S   0     Approximate p-value   N/A     Approximate p-value   N/A     Approximate p-value   N/A     Approximate p-value   N/A     Insufficient evidence to identify a significant     Trend at the specified level of significance.     Mercury-mw-69   Mercury-mw-69     Aumber or Reported Events Not Used   0     Number of Generated Events   16     Number Values Reported (n)   18     Number Values Missing   2     Number Values Missing   2     Number Values Missing   2     Number Values Missing   2     Aliminum   2.0000E-4     Meximum   2.0000E-4     Geometric Mean   2.0000E-4     Median   2.0000E-4     Standard Deviation   S.599E-20     Coefficient of Variation   N/A     Mann-Kendall Test   M-K Test Value (S)   0								
Coefficient of Variation   Ni/A								
Mann-Kendell Test  M-K Test Value (S) 0  Tabulated p-value 0.516  Standard Devistion of S 0  Standardized Value of S N/A Approximate p-value N/A  Insufficient evidence to identify a significant trend at the specified level of significance.  Mercury-mw-69  General Statistics Number of Reported Events Not Used 0 Number of Reported Events Not Used 16 Number Values Reported (n) 18 Number Values Missing 2 Number Values Wissing 2 Number Values Used 16 Minimum 2.0000E-4 Maximum 2.0000E-4 Median 2.0000E-4 Geometric Mean 2.0000E-4 Standard Devisition 5.599E-20 Coefficient of Variation N/A  Mann-Kendell Test M-K Test Value (S) 0								
M-K Test Value (S)	Coefficient of Variation	N/A						
M-K Test Value (S)								
Tabulated p-value 0.516 Standard Deviation of S 0 Standard Deviation of S 0 Standardized Value of S N/A Approximate p-value N/A  Insufficient evidence to identify a significant trend at the specified level of significance.  Mercury-mw-69  General Statistics Number or Reported Events Not Used 0 Number or Reported Events Not Used 0 Number Values Reported (n) 18 Number Values Missing 2 Number Values Used 16 Minimum 2 Number Values Used 16 Maximum 2 0000E-4 Mean 2 0000E-4 Geometric Mean 2 Median 2 Standard Deviation N/A  Menn-Kendall Test M-K Test Value (S) 0								
Standard Deviation of S Standardized Value of S Standardized Value of S N/A Approximate p-value N/A  Insufficient evidence to identify a significant trend at the specified level of significance.  Mercury-mw-69  General Statistics  Number or Reported Events Not Used Number of Generated Events 16 Number Values Reported (n) Number Values Reported (n) Number Values Wissing 2 Number Values Used 16 Minimum 2.0000E-4 Meximum Amaximum 2.0000E-4 Geometric Mean 2.0000E-4 Geometric Mean Standard Deviation Standard Deviation Coefficient of Variation Men-Kendail Test M-K Test Value (S)  Men Men Men Men Men Men Men Men Men Me								
Standardized Value of S Approximate p-value  N/A  Insufficient evidence to identify a significant trend at the specified level of significance.  Mercury-mw-69  General Statistics  Number or Reported Events Not Used Number of Generated Events 16 Number Values Reported (n) 18 Number Values Reported (n) 18 Number Values Noissing Endowment Values Used Minimum 2.0000E-4 Maximum 2.0000E-4 Mean 2.0000E-4 Geometric Mean 2.0000E-4 Median 2.0000E-4 Standard Deviation 5.599E-20 Coefficient of Variation Min-Kendall Test M-K Test Value (S) 0	-							
Approximate p-value N/A  Insufficient evidence to identify a significant trend at the specified level of significance.  Mercury-mw-69  General Statistics Number or Reported Events Not Used 0 Number of Generated Events 16 Number Values Reported (n) 18 Number Values Missing 2 Number Values Missing 2 Number Values Used 16 Minimum 2.0000E-4 Maximum 2.0000E-4 Mean 2.0000E-4 Geometric Mean 2.0000E-4 Geometric Mean 2.0000E-4 Standard Deviation 5.599E-20 Coefficient of Variation N/A  Menn-Kendall Test M-K Test Value (S) 0								
Insufficient evidence to identify a significant trend at the specified level of significance.  Mercury-mw-69  General Statistics Number or Reported Events Not Used Number of Generated Events Number Values Reported (n) Number Values Missing Number Values Used Minimum 2.0000E-4 Maximum 2.0000E-4 Geometric Mean 2.0000E-4 Geometric Mean 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 2.0000E-4 Median 3.000E-4 Median 3.000E-4	Standardized Value of S	N/A						
Trend at the specified level of significance.	Approximate p-value	N/A						
Trend at the specified level of significance.								
Mercury-mw-69	nsufficient evidence to identify a significant							
General Statistics   Number or Reported Events Not Used   Number of Generated Events   16	trend at the specified level of significance.							
Number of Reported Events Not Used   0	Mercury-mw-69							
Number of Reported Events Not Used   0								
Number of Generated Events   16	General Statistics							
Number Values Reported (n)   18	Number or Reported Events Not Used	0						
Number Values Missing   2	Number of Generated Events	16						
Number Values Used   16	Number Values Reported (n)	18						
Minimum   2.0000E-4	Number Values Missing	2						
Minimum   2.0000E-4	Number Values Used	16						
Mean   2.0000E-4	Minimum 2							
Mean   2.0000E-4	Maximum 2	2.0000E-4						
Geometric Mean   2.0000E-4								
Median   2.0000E-4								
Standard Deviation   5.599E-20								
Coefficient of Variation N/A  Mann-Kendall Test  M-K Test Value (S) 0								
Mann-Kendall Test  M-K Test Value (S) 0								
M-K Test Value (S) 0	Common variation							
M-K Test Value (S) 0	Mann-Kandall Taet							
		0						
1 abulated p-value 0.516								
Standard Povistion of S. C.								
Standard Deviation of S 0								
Standardized Value of S N/A								
Approximate p-value N/A	Approximate p-value	N/A						

		INS PIOUCL	IVIAIVIN-KEI	IDALL IKEN	ID ANALYSIS	1	1	I	
Insufficient evidence to identify a significant									
trend at the specified level of significance.									
Mercury-mw-7	0								
General Statistic									
Number or Reported Ev		0							
Number of Ger		17							
	es Reported (n)	18							
	Values Missing	1							
Numbe	er Values Used	17							
		2.0000E-4							
		2.0000E-4							
		2.0000E-4							
G	eometric Mean								
		2.0000E-4							
	dard Deviation								
Coefficie	ent of Variation	N/A							
Mann-Kendall To									
	Test Value (S)	0							
	oulated p-value	0.516							
	Deviation of S	0							
Standardi	ized Value of S	N/A							
Appro	ximate p-value	N/A							
Insufficient evidence to identify a significant									
trend at the specified level of significance.									
	Mann-Kendall	Trend Test An	alysis						
User Selected Options									
Date/Time of Computation	ProUCL 5.19/								
From File	URS_Assessn	nentMont_Sep	t2018.xls						
Full Precision	OFF								
Confidence Coefficient	0.95								
Level of Significance	0.05								
			1	1		1	T.	1	1
Molybdenum-backg	round								
General Statistic									
Number or Reported Ev		0							
Number of Ger		45							
	es Reported (n)	46							
	Values Missing	1							
Numbe	er Values Used	45							
		6.2000E-4							
	Maximum	0.011							
	Mean	0.00352							
G	eometric Mean	0.00267							
	Median	0.002							
	Standard Deviation 0.00285								
Coefficie	Coefficient of Variation 0.808								
Mann-Kendall Te									
	Test Value (S)	173							
Critic	al Value (0.05)	1.645							

	IRS ProucL	IVIAIVIV ICEIV	IDALL INCIN	DANALISIS	,		,
Standard Deviation of S	100.6						
Standardized Value of S	1.709					 	
Approximate p-value	0.0437						
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Molybdenum-mw-66							
·							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number of deficiated Events  Number Values Reported (n)	18						
Minimum	0.01						
	0.01						
Maximum							
Mean	0.0205						
Geometric Mean	0.0196						
Median	0.022						
Standard Deviation	0.00627						
Coefficient of Variation	0.306						
Mann-Kendall Test							
M-K Test Value (S)	26						
Tabulated p-value	0.165						
Standard Deviation of S	25.9						
Standardized Value of S	0.965						
Approximate p-value	0.167						
, pp. o.u.iido p vaido							
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Molybdenum-mw-67							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.037						
Maximum	0.063						
Mean	0.043						
Geometric Mean	0.0427						
Median	0.041						
Standard Deviation	0.00607						
Coefficient of Variation	0.141						
Mann-Kendall Test							
M-K Test Value (S)	-61						
Tabulated p-value	0.011						
-							
Standard Deviation of S	26.17						
Standardized Value of S	-2.292						
Approximate p-value	0.0109						
	<del></del>					 	
Statistically significant evidence of a decreasing							
trend at the specified level of significance.							
Molybdenum-mw-68							
General Statistics							
		1			I		

U	IRS ProUCL	MANN-KEN	DALL TREN	D ANALYSIS	*		
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.0051						
Maximum	0.012						
Mean	0.00787						
Geometric Mean	0.00764						
Median	0.0074						
Standard Deviation	0.00198						
Coefficient of Variation	0.251						
Mann-Kendall Test							
M-K Test Value (S)	-58						
Tabulated p-value	0.013						
Standard Deviation of S	26.22						
Standardized Value of S	-2.174						
Approximate p-value	0.0148						
PP 1 1 1 P 1 2 2 2							
Statistically significant evidence of a decreasing							
trend at the specified level of significance.							
Molybdenum-mw-69							
·							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.013						
Maximum	0.017						
Mean	0.0152						
Geometric Mean	0.0151						
Median	0.015						
Standard Deviation	0.0011						
Coefficient of Variation	0.0724						
Mann-Kendall Test							
M-K Test Value (S)	33						
Tabulated p-value	0.115						
Standard Deviation of S	25.34						
Standardized Value of S	1.263						
Approximate p-value	0.103						
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Molybdenum-mw-70							
General Statistics	·		·				
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.0026						
Maximum	0.027		·				
Mean	0.00745						
Geometric Mean	0.00632						
Median	0.0061						
Standard Deviation	0.00543						

		U	IRS ProUCL	MANN-KEN	IDALL TREN	D ANALYSIS	*		
	Coefficie	ent of Variation	0.729						
		'							
Mann-H	Kendall Te	est							
	M-K	Test Value (S)	3						
	Tab	oulated p-value	0.47						
	Standard	Deviation of S	26.4						
	Standardi	ized Value of S	0.0758						
		ximate p-value	0.47						
		, , , , , , , , , , , , , , , , , , ,	****						
Insufficient evidence to identify a s	sianificant	<u> </u>							
trend at the specified level of sign	-	•							
a crid at the specifica level of sign	illiodrico.								
		Mann-Kendall	Trand Test An	alveie					
Hear Coloated	Ontions	Walli-Nelluali	TIEIR TESCAII	alysis					
User Selected	-	Drollot 5 40/4	4/2010 0 10 5	2 DM					
Date/Time of Comp		ProUCL 5.19/1							
		URS_Assessm	nentMont_Sep	t∠U18.xls				 	
	recision	OFF							
Confidence Co		0.95							
Level of Sign	ificance	0.05							
			-					 -	
Seleniun	n-backgro	ound							
Gener	al Statistic	cs							
Number or Re	ported Ev	ents Not Used	0						
Numb	ber of Ger	nerated Events	45						
Num	ber Value	es Reported (n)	46						
		Values Missing	1						
		er Values Used	45						
		Minimum	0.003						
		Maximum	0.39						
		Mean	0.144						
		eometric Mean	0.144						
	G								
		Median	0.12						
		idard Deviation	0.103						
	Coefficie	ent of Variation	0.714						
Mann-l	Kendall Te	est							
	M-K	Test Value (S)	-241						
	Critic	al Value (0.05)	-1.645						
	Standard	Deviation of S	102.1						
,	Standardi	ized Value of S	-2.352						
	Appro	ximate p-value	0.00934						
	·								
Statistically significant evidence of	f a decrea	ısing							
trend at the specified level of signi		-							
	ium-mw-6	66							
Conor	al Statistic	rs							
		vents Not Used	0						
		nerated Events	18						
Num	iner value	es Reported (n)	18						
		Minimum	0.0016						
		Maximum	0.11						
		Mean	0.00844						
	Ge	eometric Mean	0.00272						

	N3 PIUUCL	T		T	T	T	
Median	0.002						
Standard Deviation	0.0254						
Coefficient of Variation	3.012						
Mann-Kendall Test							
M-K Test Value (S)	40						
Tabulated p-value	0.066						
Standard Deviation of S	25.65						
Standardized Value of S	1.52						
Approximate p-value	0.0642						
PP							
Insufficient evidence to identify a significant							
trend at the specified level of significance.							
Selenium-mw-67							
Scienium-mw-07							
Onnoval Statistics							
General Statistics	0						
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18						
Minimum	0.0053						
Maximum	0.068						
Mean	0.0359						
Geometric Mean	0.0287						
Median	0.035						
Standard Deviation	0.0204						
Coefficient of Variation	0.567						
Mann-Kendall Test							
M-K Test Value (S)	-59						
Tabulated p-value	0.013						
Standard Deviation of S	26.4						
Standardized Value of S	-2.197						
Approximate p-value	0.014						
Approximate p-value	5.014						
Statistically significant evidence of a decreasing							
trend at the specified level of significance.							
Selenium-mw-68							
General Statistics							
Number or Reported Events Not Used	0						
Number of Generated Events	18						
Number Values Reported (n)	18		 				
Minimum	0.045						
Maximum	0.37						
Mean	0.219						
Geometric Mean	0.198						
Median	0.245						
Standard Deviation	0.0858						
Coefficient of Variation	0.392						
5555 755	-						
Mann-Kendall Test							
M-K Test Value (S)	87						
Tabulated p-value	0						
·							
Standard Deviation of S	26.32						
Standardized Value of S	3.267						

	IRS ProucL	MANN-KEN	DALL TREN	D ANALYSIS	 	 
Approximate p-value	5.4372E-4					
	-					
Statistically significant evidence of an increasing						
trend at the specified level of significance.						
Selenium-mw-69						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	18					
Number Values Reported (n)	18					
Minimum	0.01					
Maximum	0.023					
Mean	0.0146					
Geometric Mean	0.0142					
Median	0.014					
Standard Deviation	0.0035					
Coefficient of Variation	0.0035					
Coefficient of Variation	0.241					
Mana Mandall Tank						
Mann-Kendall Test	10					
M-K Test Value (S)	16					
Tabulated p-value	0.275					
Standard Deviation of S	26.14					
Standardized Value of S	0.574					
Approximate p-value	0.283					
Insufficient evidence to identify a significant						
trend at the specified level of significance.						
Selenium-mw-70						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	18					
Number Values Reported (n)	18					
Minimum	0.13					
Maximum	0.26					
Mean	0.193					
Geometric Mean	0.19					
Median	0.19					
Standard Deviation	0.0323					
Coefficient of Variation	0.168					
Mann-Kendall Test						
M-K Test Value (S)	-4					
Tabulated p-value	0.441					
Standard Deviation of S	26.01					
Standardized Value of S	-0.115					
Approximate p-value	0.454					
,, , , , , , , , , , , , , , , , , , , ,						
Insufficient evidence to identify a significant						
trend at the specified level of significance.						
Mann-Kendali	Trend Test An	alvsis				
User Selected Options	. rona restran	a.,, o.o				
Date/Time of Computation ProUCL 5.19/1	4/2018 8·22·0	2 PM				
	nentMont_Sept					
	INDIAN SEN	∠∪ 10.XIS				

E ND. 11 JOSE		 	D ANALYSIS				
Full Precision OFF		 					
Confidence Coefficient 0.95		 					
Level of Significance 0.05		 					
Thallium-background					i	i	
General Statistics			_				
Number or Reported Events Not Used	0		-	<del>                                     </del>			
Number of Reported Events Not Osed  Number of Generated Events	45		-	<del>                                     </del>			
Number of Generated Events  Number Values Reported (n)	45		-				
Number Values Reported (n)  Number Values Missing					<del></del>	<del></del>	
Number Values Missing  Number Values Used				<u> </u>	<u> </u>	<u> </u>	
	2.0000E-4			<u> </u>	<u> </u>	<u> </u>	
Maximum	0.002		-				
	0.002 6.9089E-4				<del></del>	<del></del>	
Mean Geometric Mean				<u> </u>	<u> </u>	<u> </u>	
	5.7235E-4 4.7000E-4			<u> </u>	<u> </u>	<u> </u>	
Median Standard Deviation							
Standard Deviation  Coefficient of Variation							
Coemicient of Variation	<b>ს.</b> 003		-				
Mann Van dell W							
Mann-Kendall Test  M-K Test Value (S)	312						
1							
Critical Value (0.05)							
Standard Deviation of S Standardized Value of S							
Approximate p-value	0.00103						
Statistically clanificant cyldense of an in							
Statistically significant evidence of an increasing							
trend at the specified level of significance.							
Thallium-mw-66							
General Statistics							
	0						
Number or Reported Events Not Used  Number of Generated Events							
Number Values Reported (n)							
	3.3000E-4 0.0025			ļ	<u> </u>	<u> </u>	
Maximum Mean							
	6.4056E-4						
Geometric Mean				ļ	<u> </u>	<u> </u>	
	4.8500E-4						
Standard Deviation				<u> </u>			
Coefficient of Variation	0.78						
Monn Vandell Torr							
Mann-Kendall Test  M-K Test Value (S)	-16						
Tabulated p-value Standard Deviation of S							
Standardized Value of S							
Approximate p-value	∪.∠84						
Insufficient avidence to identify a street					<u> </u>	<u> </u>	
Insufficient evidence to identify a significant							
trend at the specified level of significance.  Thallium-mw-67							
Thallium-mw-67							
General Statistics							
General Statistics				<u> </u>			

	JRS Prouct IV	IAININ KEINI	DALL INLIN	DANALISIS		
Number or Reported Events Not Used	0					
Number of Generated Events	18					
Number Values Reported (n)	18					
Minimum	3.1000E-4					
Maximum	0.002					
Mean	5.9444E-4					
Geometric Mean	5.2800E-4					
	5.0000E-4					
Standard Deviation						
Coefficient of Variation	0.654					
Coefficient of Variation	0.054					
Mann-Kendall Test						
M-K Test Value (S)	91					
Tabulated p-value	0					
Standard Deviation of S	26.36					
Standardized Value of S	3.414					
Approximate p-value	3.2021E-4					
Statistically significant evidence of an increasing						
trend at the specified level of significance.						
Thallium-mw-68						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	18					
Number Values Reported (n)	18					
	4.8000E-4					
Maximum	0.002					
	7.7556E-4					
Geometric Mean						
	6.7500E-4					
Standard Deviation						
Coefficient of Variation	0.435					
Coefficient of Variation	0.435					
Mann-Kendall Test						
M-K Test Value (S)	37					
Tabulated p-value						
Standard Deviation of S	26.4					
Standardized Value of S	1.364					
Approximate p-value	0.0863					
Statistically significant evidence of an increasing						
trend at the specified level of significance.						
Thallium-mw-69						
General Statistics						
Number or Reported Events Not Used	0					
Number of Generated Events	18					
Number Values Reported (n)	18					
	1.4000E-4					
Maximum						
	4.5167E-4					
Geometric Mean						
	4.0000E-4					
Standard Deviation						
Standard Deviation						

			DANALISIS		
Coefficient of Variation	0.956				
Mann-Kendall Test					
M-K Test Value (S)	36				
Tabulated p-value	0.008				
Standard Deviation of S	25.82				
Standardized Value of S	1.356				
Approximate p-value	0.0876				
Statistically significant evidence of an increasing					
trend at the specified level of significance.					
Thallium-mw-70					
General Statistics					
Number or Reported Events Not Used	0				
Number of Reported Events Not Osed	18				
	18				
Number Values Reported (n)	2.7000E-4				
Maximum	0.002				
	5.7278E-4				
Geometric Mean					
	4.0000E-4				
Standard Deviation					
Coefficient of Variation	0.711				
Manual Kanadall Tax					
Mann-Kendall Test					
M-K Test Value (S)	39				
Tabulated p-value	0.076				
Standard Deviation of S	25.8				
Standardized Value of S	1.473				
Approximate p-value	0.0704				
Insufficient evidence to identify a significant					
trend at the specified level of significance.					

Goodne	ss-of-Fit Tes	t Statistics	for Data S	ets with No	n-Detecte		
User Selected Options	SS-UIFFIL 188	n oransucs	יטו שמו ט	CIS WILL INO			
·	5.110/9/201	8 1:33·43 F	PM				
·	AppendixA_			oUCI Unios	ad Sent20	18.xls	
Full Precision OFF	, .ppo.iai.v.1_	.cc_/ .ppc		230LOPIOC	.u_00pi20	. 5.7.10	
Confidence Coefficient 0.95							
OSTINGUISE SOCIACION 0.33							
Antimony (background)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statisti	cs 46	3	43	4	39	90.70%	
		1	1	1	I.	I .	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects On	y) 39	5.0000E-4	0.01	0.00464	0.004	0.00318	
Statistics (Non-Detects On	y) 4	1.2000E-4	2.7000E-4	2.1250E-4	2.3000E-4	6.5000E-5	
Statistics (All: NDs treated as DL valu	e) 43	1.2000E-4	0.01	0.00423	0.004	0.0033	
Statistics (All: NDs treated as DL/2 value	e) 43	1.2000E-4	0.005	0.00212	0.002	0.00164	
Statistics (Normal ROS Imputed Date	a) 43	7.4830E-5	3.5017E-4	2.1250E-4	2.1811E-4	6.4559E-5	
Statistics (Gamma ROS Imputed Date	a) 43	1.2000E-4	0.01	0.00909	0.01	0.00288	
Statistics (Lognormal ROS Imputed Date	- 1	9.7162E-5	4.2569E-4	2.1554E-4	2.0959E-4	7.4633E-5	
-	1	1	I.	1	1	1	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects On	y) 11.55	3.055	1.8391E-5	-8.5	0.362	-0.0425	
Statistics (NDs = DI	.) 1.27	1.197	0.0033	-5.908	1.146	-0.194	
Statistics (NDs = DL/2	2) 1.45	1.364	0.00146	-6.537	1.007	-0.154	
Statistics (Gamma ROS Estimate	3) 2.024	1.899	0.00449	-4.968	1.149	-0.231	
Statistics (Lognormal ROS Estimate	s)			-8.5	0.347	-0.0409	
	Normal GOF	Test Resu	lts				
	No NDs			Jormal RO			
Correlation Coefficient	R 0.94	0.906	0.902	0.996			
			1				
		Crit. (0.05)		nclusion wi		.05)	
Shapiro-Wilk (Detects On	• •			ear Normal			
Shapiro-Wilk (NDs = D	,		Data Not				
Shapiro-Wilk (NDs = DL/	,		Data Not				
Shapiro-Wilk (Normal ROS Estimate	,			ear Normal			
Lilliefors (Detects On			• •	ear Normal			
Lilliefors (NDs = D			Data Not				
Lilliefors (NDs = DL	,		Data Not				
Lilliefors (Normal ROS Estimate	s) 0.0725	0.134	Data App	ear Normal			
	) 00T	Test	.14				
	Gamma GOF	· rest Resu	lits				
	Na ND	NDs = D'	NDs - DL '	10mm= D0	I		1
06	No NDs			amma RO			1
Correlation Coefficient	R 0.888	0.893	0.898	0.383			
	Toet volve	Crit (0.05)	V 0-	nolucion ···	th Alpha/O	05)	
Andorson Darling (Datasta Or		Crit. (0.05)	,	nclusion wi	шт Аірпа(О	.00)	1
Anderson-Darling (Detects On	• /	0.657	Doto et'	Data 4	or Com-	Dioteih	
Kolmogorov-Smirnov (Detects On	,		Detected	Data Appea	ai Gamma	טetributed	
Anderson-Darling (NDs = D	,		Det- N	Cam: 5:	akuila : .k = 1		1
Kolmogorov-Smirnov (NDs = D	L) 0.222	0.138	Data Not	Gamma Dis	stributed		

No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	lormal RO				
Correlation Coefficient R	0.982	0.897	0.891	0.991				
		I.			I.			
	Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.964	0.767	Data Appe	ar Normal				
Shapiro-Wilk (NDs = DL)	0.801	0.892	Data Not N	lormal				
Shapiro-Wilk (NDs = DL/2)	0.79	0.892	Data Not N	lormal				
Shapiro-Wilk (Normal ROS Estimates)	0.976		Data Appe					
Lilliefors (Detects Only)	0.253		Data Appe					
Lilliefors (NDs = DL)	0.268	0.207	Data Not N	lormal				
Lilliefors (NDs = DL/2)	0.272	0.207	Data Not N	lormal				
Lilliefors (Normal ROS Estimates)	0.12	0.207	Data Appe	ar Normal				
Ga	mma GOF	Test Resu	ılts					
					I			
	No NDs		NDs = DL/2					
Correlation Coefficient R	N/A	0.942	0.944	0.445				
	Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0	.05)		
Anderson-Darling (Detects Only)	N/A	N/A						
Kolmogorov-Smirnov (Detects Only)	N/A	N/A						
Anderson-Darling (NDs = DL)	0.589	0.767						
Kolmogorov-Smirnov (NDs = DL)	0.193	0.215	Data Appe	ar Gamma	a Distribute	ed		
Anderson-Darling (NDs = DL/2)	0.658	0.763						
Kolmogorov-Smirnov (NDs = DL/2)	0.187	0.214	Data Appe	ar Gamma	a Distribute	ed		
derson-Darling (Gamma ROS Estimates)	4.936	0.763						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.522	0.215	Data Not C	Gamma Di	stributed			
Logi	normal GO	F Test Res	sults					
				L DOC				
Correlation Coefficient R	No NDs 0.996	0.956	NDs = DL/2 0.963	0.991				
Correlation Coefficient R	0.990	0.930	0.903	0.991				
	Test value	Crit. (0.05)	Cor	nclusion w	ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.991	0.767	Data Appe			- /		
Shapiro-Wilk (NDs = DL)	0.903	0.892						
Shapiro-Wilk (NDs = DL/2)	0.915	0.892						
Shapiro-Wilk (Lognormal ROS Estimates)	0.976	0.892	• • •					
Lilliefors (Detects Only)	0.209	0.425						
Lilliefors (NDs = DL)	0.211	0.207	Data Not L					
Lilliefors (NDs = DL/2)	0.213	0.207	Data Not L					
Lilliefors (Lognormal ROS Estimates)	0.121	0.207			mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Antimony (mw-68)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	1	17	3	14	82.35%		
	Number	Minimum	Maximum	Mean	Median	SD		
		1			1	1	1	l

Statistics (Non-Detects Only)	14	5.0000E-4		0.00375		0.00297	1	
Statistics (Non-Detects Only)	3	1.1000E-4	4.5000E-4	2.2667E-4				
Statistics (All: NDs treated as DL value)	17	1.1000E-4	0.01	0.00313	0.0025	0.00302	1	
Statistics (All: NDs treated as DL/2 value)	17	1.1000E-4	0.005	0.00158	0.00125	0.00149		
Statistics (Normal ROS Imputed Data)	17	-4.241E-5	4.9574E-4	2.2667E-4	2.2667E-4	1.5195E-4	1	
Statistics (Gamma ROS Imputed Data)	17	1.1000E-4	0.01	0.00828	0.01	0.00384		
Statistics (Lognormal ROS Imputed Data)	17	5.9394E-5	5.5223E-4	2.1792E-4	1.8110E-4	1.3992E-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)	0.945	0.818	0.00331	-6.382	1.36	-0.213	·	
Statistics (NDs = DL/2)	1.127	0.967	0.00141	-6.953	1.159	-0.167		
Statistics (Gamma ROS Estimates)	1.101	0.946	0.00752	-5.313	1.601	-0.301		
Statistics (Lognormal ROS Estimates)				-8.616	0.628	-0.0728		
,								
No	rmal GOF	Test Resu	lts					
							·	
	No NDs	NDs = DL	NDs = DL/2	lormal RO			·	
Correlation Coefficient R	0.879	0.897	0.893	0.986				
Corrolation Coomicion 11	0.070	0.007	0.000	0.000				
	Test value	Crit. (0.05)	Co	nclusion w	th Alpha(N	05)		
Shapiro-Wilk (Detects Only)	0.772			ear Normal		.00)		
Shapiro-Wilk (NDs = DL)	0.802	0.892						
Shapiro-Wilk (NDs = DL/2)	0.794							
Shapiro-Wilk (Normal ROS Estimates)	0.794			ear Normal				
Lilliefors (Detects Only)								
, , , , , , , , , , , , , , , , , , , ,	0.376		Data Appe					
Lilliefors (NDs = DL)	0.269	0.207						
Lilliefors (NDs = DL/2)	0.272	0.207						
Lilliefors (Normal ROS Estimates)	0.17	0.207	Data Appe	ear Normal				
Ga	mma GOF	Test Resu	IITS					
			I					
	No NDs			amma RO				
Correlation Coefficient R	N/A	0.941	0.944	0.442				
		1	1					
	Test value	Crit. (0.05)	Со	nclusion w	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	N/A	N/A						
Kolmogorov-Smirnov (Detects Only)	N/A	N/A						
Anderson-Darling (NDs = DL)	0.575	0.768						
Kolmogorov-Smirnov (NDs = DL)	0.193	0.216	Data Appe	ear Gamma	a Distribute	d	<u></u>	
Anderson-Darling (NDs = DL/2)	0.607	0.763						
Kolmogorov-Smirnov (NDs = DL/2)	0.186		Data Appe	ear Gamma	a Distribute	d		
nderson-Darling (Gamma ROS Estimates)	4.877	0.764				<del>.</del>	·	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.523	0.215	Data Not (	Gamma Di	stributed			
Logr	normal GO	F Test Res	sults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.892	0.949	0.959	0.987				
		1	I	I	I			
	Test value	Crit. (0.05)	Со	nclusion w	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.796	0.767		ear Lognor				
Shapiro-Wilk (NDs = DL)	0.892	0.892		ear Lognor				
Shapiro-Wilk (NDs = DL/2)	0.91	0.892		ear Lognor				
			P P -		-			1

r			T= -					
Shapiro-Wilk (Lognormal ROS Estimates)	0.967			ear Lognori				
Lilliefors (Detects Only)	0.366			ear Lognori	mal			
Lilliefors (NDs = DL)	0.207			Lognormal			L	
Lilliefors (NDs = DL/2)	0.209		Data Not I	-			<u> </u>	
Lilliefors (Lognormal ROS Estimates)	0.156	0.207	Data Appe	ear Lognori	mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Antimony (mw-69)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		+
Raw Statistics	18	1	17	3	14	82.35%		
						0.0		
	Number		Maximum		Median	SD		
Statistics (Non-Detects Only)	14	5.0000E-4		0.00375		0.00297	<del> </del>	
Statistics (Non-Detects Only)	3			4.0333E-4			<b> </b>	
Statistics (All: NDs treated as DL value)	17	2.1000E-4		0.00316		0.00299		
Statistics (All: NDs treated as DL/2 value)	17	2.1000E-4		0.00162			<u> </u>	
Statistics (Normal ROS Imputed Data)	17			3.7810E-4				
Statistics (Gamma ROS Imputed Data)	17	2.1000E-4		0.00831	0.01	0.00377	<u> </u>	
Statistics (Lognormal ROS Imputed Data)	17	2.0817E-4	5.7646E-4	3.6448E-4	3.4641E-4	1.1320E-4		
	K hat	K Star	Theta hat	Log Mean	Log Stdy	Log CV		-
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A		
Statistics (NDs = DL)	1.144	0.981	0.00276		1.131	-0.181		
Statistics (NDs = DL/2)	1.403	1.195	0.00270		0.963	-0.141		-
Statistics (Gamma ROS Estimates)	1.411	1.193	0.00589		1.304	-0.141		-
Statistics (Cognormal ROS Estimates)				-7.963	0.317	-0.231		
Stationios (Eognormal 1100 Eoumatos)				7.000	0.017	0.0000		+
No	rmal GOF	Test Resu	lts					
	NI NID	ND DI	UD DI #	4	I			
0 1: 0 5: 10	No NDs			Jormal RO				-
Correlation Coefficient R	0.959	0.891	0.883	0.987				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	05)		
Shapiro-Wilk (Detects Only)	0.919	` '		ear Normal		,		-
Shapiro-Wilk (NDs = DL)	0.792		Data Not					-
Shapiro-Wilk (NDs = DL/2)	0.778		Data Not I					+
Shapiro-Wilk (Normal ROS Estimates)	0.96			ear Normal				+
Lilliefors (Detects Only)	0.296			ear Normal				+
Lilliefors (NDs = DL)	0.271	0.207	Data Not					+
Lilliefors (NDs = DL/2)	0.278		Data Not					+
Lilliefors (Normal ROS Estimates)	0.151			ear Normal				+
		1	- 1516.					1
Ga	mma GOF	Test Resu	ilts					
	NI- NID	ND- C'	ND D: "	<u>5</u> 0				
	No NDs			amma RO				
Correlation Coefficient R	N/A	0.944	0.943	0.471				-
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		-
Anderson-Darling (Detects Only)	N/A	N/A	- 50			,		+
Kolmogorov-Smirnov (Detects Only)	N/A	N/A						+
Anderson-Darling (NDs = DL)	0.645							+
Kolmogorov-Smirnov (NDs = DL)	0.187		Data Ann	ear Gamma	n Distribute	d		+
Rollinggordy-Sithling (NDS - DL)	0.107	0.214	Data Appl	Jai Gaillille	שוטטווזפום ג	u		

	0110002	GOODINE	33 OF FIT	0171110111	50			
Anderson-Darling (NDs = DL/2)	0.751	0.758						
Kolmogorov-Smirnov (NDs = DL/2)	0.199	0.213	Data Appe	ear Gamma	Distribute	ed	i	
nderson-Darling (Gamma ROS Estimates)	4.812	0.758						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.517	0.213	Data Not (	Gamma Dis	stributed			
Logi	normal GO	F Test Res	sults					
		ND D	lin	. 500				
	No NDs		NDs = DL/2	ŭ				
Correlation Coefficient R	0.934	0.963	0.961	0.985				
	<b>-</b>	0 : (0.05)				05)		
OI : M/II (D O I )		Crit. (0.05)		nclusion wi		.05)		
Shapiro-Wilk (Detects Only)	0.873		Data Appe	-				
Shapiro-Wilk (NDs = DL)	0.919		Data Appe					
Shapiro-Wilk (NDs = DL/2)	0.914		Data Appe					
Shapiro-Wilk (Lognormal ROS Estimates)	0.955		Data Appe					
Lilliefors (Detects Only)	0.326		Data Appe	-	mal			
Lilliefors (NDs = DL)	0.212		Data Not L	-				
Lilliefors (NDs = DL/2)	0.208		Data Not L					
Lilliefors (Lognormal ROS Estimates)	0.149	0.207	Data Appe	ear Lognorr	mal			
Note: Substitution methods such as DL or	DI /2 are n	ot recomm	ended				i	
Note: Substitution methods such as DE of		ot recomm	enueu.					
Antimony (mw-70)								
, anamony (mw 70)							1	
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	1	17	3	14	82.35%		
Nun Guadas	.0	·	.,	ŭ		02.0070		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	14	5.0000E-4	0.01	0.00439	0.004	0.00329		
Statistics (Non-Detects Only)	3	1.1000E-4	2.6000E-4	1.8000E-4	1.7000E-4	7.5498E-5	·	
Statistics (All: NDs treated as DL value)	17	1.1000E-4	0.01	0.00365	0.004	0.0034		
Statistics (All: NDs treated as DL/2 value)	17	1.1000E-4	0.005	0.00184	0.002	0.00168	·	
Statistics (Normal ROS Imputed Data)	17	6.1291E-5	2.9871E-4	1.8000E-4	1.8000E-4	6.5542E-5	·	
Statistics (Gamma ROS Imputed Data)	17	1.1000E-4	0.01	0.00827	0.01	0.00386		
Statistics (Lognormal ROS Imputed Data)	17	8.5761E-5	3.3465E-4	1.8091E-4	1.6941E-4	6.7753E-5		
. ,	i	1	1	i		1		<u> </u>
	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	<del></del>	
Statistics (NDs = DL)	0.905	0.785	0.00403	-6.258	1.42	-0.227	·	<u> </u>
Statistics (NDs = DL/2)	1.077	0.926	0.00171	-6.829	1.208	-0.177		
Statistics (Gamma ROS Estimates)	1.081	0.929	0.00765	-5.325	1.61	-0.302		
Statistics (Lognormal ROS Estimates)	-			-8.683	0.375	-0.0432		
No	rmal GOF	Test Resu	lts					
	NI- NID	ND- D'	۱۳ D. "	I DO				
0	No NDs		NDs = DL/2					
Correlation Coefficient R	0.993	0.91	0.906	0.991				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha/A	05)	1	
Shapiro-Wilk (Detects Only)	0.987		Data Appe		ui Vihiia(0	.00)		
Shapiro-Wilk (NDs = DL)	0.987		Data Not N					-
Shapiro-Wilk (NDs = DL/2)	0.814		Data Not I					
Shapiro-Wilk (Normal ROS Estimates)	0.807		Data Appe					-
Lilliefors (Detects Only)	0.970		Data Appe					-
Lillelois (Detects Offly)	0.213	0.423	Para Appe	ui ivoiiiidi				

OI.	3 PIOUCL	GOODINE	33 01 111	STATISTIC	50			
Lilliefors (NDs = DL)		0.207						
Lilliefors (NDs = DL/2)		0.207						
Lilliefors (Normal ROS Estimates)	0.12	0.207	Data Appe	ar Normal				
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DI	NDs = DL/2	amma RO				
Correlation Coefficient R		0.92	0.926	0.439				
Correlation Coefficient N	IN/A	0.32	0.920	0.433				
	Test value	Crit. (0.05	roO	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)		N/A	, 33.		,	,		
Kolmogorov-Smirnov (Detects Only)		N/A						
Anderson-Darling (NDs = DL)		0.77						
Kolmogorov-Smirnov (NDs = DL)		0.216	Data Appe	ar Gamma	Distribute	d		
Anderson-Darling (NDs = DL/2)		0.764						
Kolmogorov-Smirnov (NDs = DL/2)		0.215	Data Appe	ar Gamma	Distribute	d		
derson-Darling (Gamma ROS Estimates)		0.764						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.523	0.215	Data Not 0	Gamma Dis	stributed			
Log	normal GO	F Test Res	sults					
	<del>-</del>							
			NDs = DL/2	Ŭ				
Correlation Coefficient R	1	0.945	0.956	0.989				
	Test value			nclusion wi		.05)		
Shapiro-Wilk (Detects Only)		0.767	• •		mal			
Shapiro-Wilk (NDs = DL)			Data Not L	-				
Shapiro-Wilk (NDs = DL/2)			Data Appe	_				
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe	-				
Lilliefors (Detects Only)			Data Appe	-	mal			
Lilliefors (NDs = DL)			Data Not L	-				
Lilliefors (NDs = DL/2)			Data Not L					
Lilliefors (Lognormal ROS Estimates)	0.121	0.207	Data Appe	ear Lognorr	mal		<u> </u>	
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Arsenic (background)								
accine (sacingicalia)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	46	0	46	32	14	30.43%		
		•				•		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)		0.001	0.01	0.00371	0.002	0.00305		
Statistics (Non-Detects Only)		2.3000E-4		0.00505		0.00279		
Statistics (All: NDs treated as DL value)		2.3000E-4		0.00465		0.0029		
Statistics (All: NDs treated as DL/2 value)		2.3000E-4		0.00408		0.00287		
Statistics (Normal ROS Imputed Data)		-0.00193		0.00381	0.0032	0.00316		
Statistics (Gamma ROS Imputed Data)		2.3000E-4		0.00656				
Statistics (Lognormal ROS Imputed Data)	46	2.3000E-4	0.012	0.00396	0.003	0.0029		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)		2.057	0.00225		0.867	-0.157		
Statistics (NDs = DL)	2.041	1.922	0.00228		0.853	-0.157		
Statistics (NDs = DL/2)	1.592	1.503	0.00256		0.969	-0.166		
Otationico (NDS - DL/Z)	1.032	1.503	0.00230	0.047	0.303	0.100	<u> </u>	

	0.400	0.001			2 222	0.10	1	
Statistics (Gamma ROS Estimates)	2.436	2.291	0.00269	-5.246	0.838	-0.16		
Statistics (Lognormal ROS Estimates)				-5.877	0.941	-0.16		
NI.		T D	la -					
No	rmal GOF	rest Resu	ITS					
	No NDs	NDc - DI	NDs = DL/2	lormal PO				
Correlation Coefficient B		0.978	0.972	0.991				
Correlation Coefficient R	0.967	0.976	0.972	0.991				
	Tost value	Crit. (0.05)	Cor	actucion wi	th Alpha(0.	05)		
Shapiro-Wilk (Detects Only)	0.97	0.93	Data Appe		iii Aipiia(u.	.03)		
Shapiro-Wilk (NDs = DL)			Data Appe					
Shapiro-Wilk (NDs = DL/2)			Data Not N					
Shapiro-Wilk (Normal ROS Estimates)			Data Not N					
Lilliefors (Detects Only)			Data Appe					
Lilliefors (NDs = DL)			Data Appe					
Lilliefors (NDs = DL/2)			Data Not N					
Lilliefors (Normal ROS Estimates)			Data Not N					
Elilielois (Normal ROS Estimates)	0.101	0.129	рата Арре	ai Noilliai				
Ga	mma GOF	Test Resu	ılts					
		100111000						
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R		0.98	0.978	0.881				
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	.05)		
Anderson-Darling (Detects Only)		0.757			1 - (-	,		
Kolmogorov-Smirnov (Detects Only)		0.157	Detected D	Data appea	r Approxim	nate Gamn	r	
Anderson-Darling (NDs = DL)		0.761						
Kolmogorov-Smirnov (NDs = DL)		0.132	Data Appe	ar Gamma	Distribute	d		
Anderson-Darling (NDs = DL/2)		0.766						
Kolmogorov-Smirnov (NDs = DL/2)		0.133	Data Appe	ar Gamma	Distribute	d		
nderson-Darling (Gamma ROS Estimates)		0.759						
Kolmogorov-Smirnov (Gamma ROS Est.)			Data Not C	Gamma Dis	stributed			
,								
Logi	normal GO	F Test Res	sults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.895	0.949	0.961	0.976				
		Crit. (0.05)			th Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)	0.811	0.93	Data Not L	•				
Shapiro-Wilk (NDs = DL)		0.945						
Shapiro-Wilk (NDs = DL/2)		0.945						
Shapiro-Wilk (Lognormal ROS Estimates)		0.945						
Lilliefors (Detects Only)		0.154						
Lilliefors (NDs = DL)		0.129						
Lilliefors (NDs = DL/2)		0.129	Data Not L	-				
Lilliefors (Lognormal ROS Estimates)	0.12	0.129	Data Appe	ar Lognorr	mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Arsenic (mw-66)								
	N1 0:	A1 A	h	D	N.B.	0/ 1/5		
<b>D</b> 0			Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	0	18	11	7	38.89%		

	Nii	N 4::	NA :	M	Madian	CD		
0, (1, 0, 1)	Number		Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	7	0.001	0.01	0.00343	0.002	0.00315		-
Statistics (Non-Detects Only)		6.7000E-4		0.00207	0.0018	0.00125		
Statistics (All: NDs treated as DL value)		6.7000E-4		0.0026	0.002	0.00221		
Statistics (All: NDs treated as DL/2 value)		5.0000E-4		0.00193	0.00135			
Statistics (Normal ROS Imputed Data)	18	1.9522E-6		0.00169	0.00148			
Statistics (Gamma ROS Imputed Data)	18	6.7000E-4		0.00515	0.0031	0.00409		
Statistics (Lognormal ROS Imputed Data)	18	6.5069E-4	0.005	0.00171	0.0014	0.00109		
	1	1	I I					
	K hat	K Star		Log Mean		Log CV		
Statistics (Non-Detects Only)	3.478	2.59	5.9519E-4	-6.331	0.572	-0.0904		
Statistics (NDs = DL)	2.318	1.969	0.00112	-6.184	0.656	-0.106	<u> </u>	
Statistics (NDs = DL/2)	2.606		7.4133E-4	-6.453	0.648	-0.1		
Statistics (Gamma ROS Estimates)	1.42	1.22	0.00363	-5.66	0.971	-0.171		
Statistics (Lognormal ROS Estimates)				-6.518	0.542	-0.0831		
No	ormal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Iormal RO				
Correlation Coefficient R	0.933	0.825	0.91	0.938				
	Test value	Crit. (0.05)	Car	nclusion wit	h Alpha/A	05)		-
Shapiro-Wilk (Detects Only)	0.879	, ,	Data Appe		iii Aipiia(u	.03)		
Shapiro-Wilk (NDs = DL)			Data Not N					
Shapiro-Wilk (NDs = DL/2)								
Shapiro-Wilk (Normal ROS Estimates)		0.897	Data Not Not Not Not Not Not Not Not Not Not					
		0.897						-
Lilliefors (Detects Only)		0.251						
Lilliefors (NDs = DL)		0.202						
Lilliefors (NDs = DL/2)		0.202						-
Lilliefors (Normal ROS Estimates)	0.194	0.202	Data Appe	ar Normai				
Ga	mma GOF	Test Resu	ilts					
	No NDs	NDs = DI	NDs = DL/2	amma R∩				
Correlation Coefficient R		0.934	0.971	0.836				
Correlation Coefficient R	0.967	0.934	0.971	0.630				
	Toot value	Crit. (0.05)	Cor	nclusion wit	h Alpha/A	OE)		-
Anderson-Darling (Detects Only)	0.228	` ,	Cor	iciusiuli Wil	ıı Aiþila(0.	.00)		-
<b>3</b> ( ),	0.228	0.733	Detected [	Data Anno	r Commo	Dietributed		1
Kolmogorov-Smirnov (Detects Only)  Anderson-Darling (NDs = DL)			Detected L	лата Арреа	ıı Gariiiia	Pistributed		1
		0.75	Data Nat C	Commo D:-	tribute d			-
Kolmogorov-Smirnov (NDs = DL)	0.258	0.206	Data Not C	aarrima Dis	uibuted			
Anderson-Darling (NDs = DL/2)			Dot- ^		Dietait	۵.		-
Kolmogorov-Smirnov (NDs = DL/2)	0.166	0.206	Data Appe	ar Gamma	DISTribute	u		-
derson-Darling (Gamma ROS Estimates)		0.758	D N	D:				
Kolmogorov-Smirnov (Gamma ROS Est.)	0.265	0.208	Data Not C	amma Dis	tributea			
Logi	normal GO	F Test Res	sults					
	No NDs	NDs - Di	NDs = DL/2	Log POS				-
Correlation Coefficient R		0.968	0.981	0.98				
Conciation Coefficient N	0.332	0.300	0.301	0.30				-
	Test value	Crit. (0.05)	Cor	nclusion wit	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.988	0.85		ar Lognorn		,		
Singpino Trini (Dottotto Offis)	0.000	3.00	_ ~ , .ppc				L	

-								
Shapiro-Wilk (NDs = DL)	0.945	0.897	Data Appe	ear Lognorn	nal			
Shapiro-Wilk (NDs = DL/2)	0.955			ear Lognorn			İ	
Shapiro-Wilk (Lognormal ROS Estimates)	0.96	0.897	Data Appe	ear Lognorn	nal		1	
Lilliefors (Detects Only)	0.117			ear Lognorn		i		
Lilliefors (NDs = DL)	0.211		Data Not L	-			İ	
Lilliefors (NDs = DL/2)	0.147	0.202	Data Appe	ear Lognorn	nal		1	
Lilliefors (Lognormal ROS Estimates)	0.122	0.202	Data Appe	ear Lognorn	nal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Arsenic (mw-67)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	0	18	15	3	16.67%		
Than Stations				.0		10.0770		
	Number	Minimum	Maximum	Mean	Median	SD	1	
Statistics (Non-Detects Only)	3	0.002	0.01	0.00467	0.002	0.00462		
Statistics (Non-Detects Only)	15	9.9000E-4		0.00467		9.2804E-4	1	-
Statistics (All: NDs treated as DL value)	18	9.9000E-4		0.00200	0.0027	0.00195		
Statistics (All: NDs treated as DL/2 value)	18	9.9000E-4	0.005	0.00361	0.0027	0.00193		
Statistics (Normal ROS Imputed Data)	18	9.3170E-4		0.00262		9.7747E-4		
,	18				0.0026			
Statistics (Gamma ROS Imputed Data)		9.9000E-4		0.0039		0.00293		
Statistics (Lognormal ROS Imputed Data)	18	9.9000E-4	0.0046	0.00251	0.00252	9.4788E-4		
	171	14.0						
	K hat	K Star		Log Mean		Log CV		
Statistics (Non-Detects Only)	7.962		3.3653E-4	-5.986	0.39	-0.0651		
Statistics (NDs = DL)	4.026		7.4781E-4	-5.935	0.491	-0.0827	<u> </u>	
Statistics (NDs = DL/2)	4.854	4.082	5.4005E-4	-6.05	0.499	-0.0824	<u> </u>	
Statistics (Gamma ROS Estimates)	2.544	2.157	0.00153	-5.756	0.637	-0.111	<u> </u>	
Statistics (Lognormal ROS Estimates)				-6.06	0.409	-0.0675		
No	rmal GOF	Test Resu	lts					
	No NDs	NDo = DI	NDs = DL/2	Iormal DO				
Correlation Coefficient R	0.986	0.805	0.979	0.986			i	
Correlation Coefficient N	0.360	0.803	0.979	0.360				
	Test value	Crit. (0.05)	Cor	nclusion wit	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.978	` ,	Data Appe			,		
Shapiro-Wilk (NDs = DL)	0.677		Data Not N					
Shapiro-Wilk (NDs = DL/2)	0.95		Data Not i				1	
Shapiro-Wilk (Normal ROS Estimates)	0.97	0.897	Data Appe				1	
Lilliefors (Detects Only)	0.37	0.897		ear Normal			<u> </u>	
Lilliefors (NDs = DL)	0.118		Data Not N					
Lilliefors (NDs = DL/2)	0.274							
Lilliefors (Normal ROS Estimates)	0.113		Data Appe				ı	
Lillelois (Notitial ROS Estiffates)	0.0936	0.202	рага Арре	aı NUIIIIdl				
Ga	mma GOF	Test Resu	lts				<u> </u>	
	Na ND	ND D'	ND= - D1	- DO				
Correlation Coefficient R	No NDs 0.984	NDs = DL 0.887	NDs = DL/2 0.982	amma RO 0.915				
Confedution Coefficient N	0.304	0.007	0.302	0.313				
	Toot value	Crit (0.05)	0	nolucios ····	th Alaba/A	05)	i	
Andorson Darling (Datasta Cally)		Crit. (0.05) 0.738	Col	nclusion wit	ш Аірпа(О	.00)	i	
Anderson-Darling (Detects Only)	0.285		Doto ot 1	)oto ^	r Co	Diatrib : +- 1	i	
Kolmogorov-Smirnov (Detects Only)	0.156	0.222	Detected I	Data Appea	ıı Gamma	טוstributed		

Un	3 FIOUCL	GOODINE	33 OF FIT	STATISTIC	,,,		
Anderson-Darling (NDs = DL)		0.743					
Kolmogorov-Smirnov (NDs = DL)		0.205	Detected D	Data appea	r Approxin	nate Gamm	
Anderson-Darling (NDs = DL/2)		0.743					
Kolmogorov-Smirnov (NDs = DL/2)		0.204	Data Appe	ar Gamma	Distribute	d	
nderson-Darling (Gamma ROS Estimates)		0.749					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.24	0.206	Data Not C	Gamma Dis	tributed		
Logi	normal GO	F Test Res	sults				 
	1						
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.964	0.952	0.965	0.98			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)	 -
Shapiro-Wilk (Detects Only)			Data Appe			,	 +
Shapiro-Wilk (NDs = DL)		0.897					 +
Shapiro-Wilk (NDs = DL/2)		0.897					 +
Shapiro-Wilk (Lognormal ROS Estimates)		0.897					 +
Lilliefors (Detects Only)		0.22	Data Appe				+
Lilliefors (NDs = DL)		0.202					 +
Lilliefors (NDs = DL/2)			Data Appe				 +
Lilliefors (Lognormal ROS Estimates)			Data Appe				+
							 +
Note: Substitution methods such as DL or	DL/2 are r	ot recomm	ended.				
Arsenic (mw-68)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
	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)	17	6.0000E-4	0.0097	0.00581	0.0065	0.00275	
Statistics (All: NDs treated as DL value)	18	6.0000E-4	0.01	0.00604	0.0067	0.00284	
Statistics (All: NDs treated as DL/2 value)	18	6.0000E-4	0.0097	0.00577	0.006	0.00267	
Statistics (Normal ROS Imputed Data)	18	6.0000E-4	0.0097	0.00581	0.00616	0.00267	
Statistics (Gamma ROS Imputed Data)	18	6.0000E-4		0.00604	0.0067	0.00284	
Statistics (Lognormal ROS Imputed Data)	18	6.0000E-4	0.0097	0.00576	0.006	0.00268	
	K hat	K Star	Theta hat	Log Mean	Log Stdy	Log CV	
Statistics (Non-Detects Only)		2.45	0.00199	-5.328	0.734	-0.138	 +
Statistics (NDs = DL)	2.941	2.488	0.00193	-5.288	0.734	-0.139	 +
Statistics (NDs = DL/2)	3.081	2.604	0.00200	-5.327	0.733	-0.139	 +
Statistics (Gamma ROS Estimates)	2.941	2.488	0.00187	-5.288	0.713	-0.134	-
Statistics (Lognormal ROS Estimates)				-5.328	0.713	-0.134	
	1	1		5.525	3.7.10	3.101	
No	rmal GOF	Test Resu	lts				
	T	1	,				
-	No NDs		NDs = DL/2				
Correlation Coefficient R	0.974	0.977	0.979	0.978			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	05)	 +
Shapiro-Wilk (Detects Only)	0.936				/	.50,	 +
Shapiro-Wilk (NDs = DL)			Data Appe				 +
Shapiro-Wilk (NDs = DL/2)							 +
Chapito Wilk (1400 - DE/Z)	J.J-7	3.007	a.a , .ppc				1

Shapiro-Wilk (Normal ROS Estimates)	0.946	0.897		ear Normal			L	
Lilliefors (Detects Only)	0.142	0.207		ear Normal			İ	
Lilliefors (NDs = DL)	0.14		Data Appe				i	
Lilliefors (NDs = DL/2)	0.131		Data Appe				i	
Lilliefors (Normal ROS Estimates)	0.126	0.202	Data Appe	ear Normal				
Go	mma GOE	Test Resu	ılte					
Ga	IIIIIa GOF	Test Rest	JILS				<u> </u>	
	No NDs	NDs = DL	NDs = DL/2	amma RO			i .	
Correlation Coefficient R	0.903	0.908	0.915	0.908				
	Test value	Crit. (0.05	Co	nclusion wi	th Alpha(N	05)	i	
Anderson-Darling (Detects Only)	0.812	0.746	, 001	ilciusion wi	tii Aipiia(o	.00)		
Kolmogorov-Smirnov (Detects Only)	0.812	0.740	Detected I	Data appea	r Approvin	aata Camr		
Anderson-Darling (NDs = DL)	0.181	0.746	Detected t	Data appea	ii Appioxiii	iale Gaiiii	<u> </u>	
Kolmogorov-Smirnov (NDs = DL)	0.833		Datastad	Data anna		anta Caman		
Anderson-Darling (NDs = DL/2)	0.181	0.205 0.746	Detected I	Data appea	ıı Appıoxin	iale Gallin	i	
Kolmogorov-Smirnov (NDs = DL/2)	0.768	0.746	Dotootod	Data appea	r Annrasi-	nata Carr	i	
-		0.205	Detected I	oata appea	ıı Appıoxin	iale Gallin	i	
nderson-Darling (Gamma ROS Estimates)	0.833		Dotostad	Doto c====	r Annes:-	anto Com	i	
Kolmogorov-Smirnov (Gamma ROS Est.)	0.181	0.205	Detected I	Data appea	ar Approxin	nate Gamm		
Logi	normal GO	F Test Res	sults					
	No NDs	NDs = DL	NDs = DL/2	Ū			<u> </u>	
Correlation Coefficient R	0.897	0.897	0.898	0.899			<u> </u>	
							<u></u>	
		Crit. (0.05)		nclusion wi	th Alpha(0	.05)	İ	
Shapiro-Wilk (Detects Only)	0.813		Data Not L				İ	
Shapiro-Wilk (NDs = DL)	0.813	0.897	Data Not L	-			İ	
Shapiro-Wilk (NDs = DL/2)	0.816	0.897		-			İ	
Shapiro-Wilk (Lognormal ROS Estimates)	0.818		Data Not L	-			İ	
Lilliefors (Detects Only)	0.2		Data Appe				İ	
Lilliefors (NDs = DL)	0.194		Data Appe		mal		İ	
Lilliefors (NDs = DL/2)	0.215		Data Not L	-			L	
Lilliefors (Lognormal ROS Estimates)	0.216	0.202	Data Not I	_ognormal				
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	nended.					
Arsenic (mw-69)								
	N ~:	L		<b>.</b>		0/ 1:5		
			Num Valid		NDs	% NDs		
Raw Statistics	18	0	18	17	1	5.56%		
	Number	Minim	Mavim	Maca	Modian	SD.		
Statistics (Non-Detects Only)	Number 1	0.01	Maximum 0.01	Mean 0.01	Median 0.01	SD N/A	i	
Statistics (Non-Detects Only)	17	0.0026	0.01	0.00675		0.0023		
Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	18	0.0026		0.00673		0.0023	i	
Statistics (All: NDs treated as DL/2 value)	18	0.0026		0.00693			i	
Statistics (Normal ROS Imputed Data)	18	0.0026	0.011	0.00673				
Statistics (Normal ROS Imputed Data)  Statistics (Gamma ROS Imputed Data)	18	0.0026		0.00673		0.00223		
· · · · · · · · · · · · · · · · · · ·	18						i	
Statistics (Lognormal ROS Imputed Data)	۱۵	0.0026	0.011	0.00671	0.00665	0.00224	ı	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	<u> </u>	
Statistics (Non-Detects Only)	7.554	6.26	8.9314E-4	-5.066	0.403	-0.0796		
Grananca (Non-Detects Offly)	7.004	0.20	0.93 I4E-4	-3.000	0.403	-0.0790		

								,
Statistics (NDs = DL)	7.466		9.2787E-4	-5.041	0.406	-0.0806		
Statistics (NDs = DL/2)	7.733		8.5991E-4	-5.079	0.395	-0.0778		
Statistics (Gamma ROS Estimates)	7.466	6.259	9.2787E-4	-5.041	0.406	-0.0806		
Statistics (Lognormal ROS Estimates)				-5.068	0.391	-0.0772		
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/1	ormal RO				
Correlation Coefficient R	0.982	0.984	0.989	0.98				
	Test value	Crit. (0.05)	Con	clusion witl	h Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)	0.96	0.892	Data Appe	ar Normal				
Shapiro-Wilk (NDs = DL)	0.962	0.897	Data Appe	ar Normal				
Shapiro-Wilk (NDs = DL/2)	0.974	0.897	Data Appe	ar Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.959	0.897	Data Appe	ar Normal				
Lilliefors (Detects Only)	0.188		Data Appe					
Lilliefors (NDs = DL)	0.173		Data Appe					
Lilliefors (NDs = DL/2)	0.161		Data Appe					
Lilliefors (Normal ROS Estimates)	0.2	0.202	Data Appe	ar Normal				
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R	0.961	0.961	0.972	0.961				
		Crit. (0.05)	Con	clusion witl	h Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.631	0.74						
Kolmogorov-Smirnov (Detects Only)	0.239	0.209	Detected D	ata appear	Approxin	nate Gamn		
Anderson-Darling (NDs = DL)	0.613	0.741						
Kolmogorov-Smirnov (NDs = DL)	0.225	0.204	Detected D	ata appear	Approxin	nate Gamn		
Anderson-Darling (NDs = DL/2)	0.471	0.741						
Kolmogorov-Smirnov (NDs = DL/2)	0.211	0.204	Detected D	ata appear	Approxin	nate Gamn		
nderson-Darling (Gamma ROS Estimates)	0.613	0.741						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.225	0.204	Detected D	ata appear	Approxin	nate Gamn		
Logi	normal GO	F Test Res	eulte					
Logi	iorniai GO	i restrice	ouito					
	No NDs	NDs = DI	NDs = DL/2	Log ROS			<u> </u>	
Correlation Coefficient R	0.947	0.947	0.96	0.949				
		1						+
	Test value	Crit. (0.05)	Con	clusion witl	h Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)	0.895		Data Appe			*		+
Shapiro-Wilk (NDs = DL)	0.894		Data Not L					
Shapiro-Wilk (NDs = DL/2)	0.92		Data Appe		nal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.901		Data Appe					<u> </u>
Lilliefors (Detects Only)	0.264		Data Not L					<u> </u>
Lilliefors (NDs = DL)	0.252	0.202	Data Not L	ognormal				
Lilliefors (NDs = DL/2)	0.234	0.202	Data Not L	ognormal				
Lilliefors (Lognormal ROS Estimates)	0.243	0.202	Data Not L	ognormal				
Note: Substitution methods such as DL or	DL/2 are r	ot recomm	ended.					
Arsenic (mw-70)								

	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	16	2	11.11%	
					ļ.		
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	2	0.001	0.01	0.0055	0.0055	0.00636	
Statistics (Non-Detects Only)	16	4.9000E-4	0.0094	0.00549	0.0052	0.00219	
Statistics (All: NDs treated as DL value)	18	4.9000E-4	0.01	0.00549	0.0052	0.00257	
Statistics (All: NDs treated as DL/2 value)	18	4.9000E-4	0.0094	0.00518	0.00505	0.00237	
Statistics (Normal ROS Imputed Data)	18	4.9000E-4	0.0094	0.00524	0.00518	0.00229	
Statistics (Gamma ROS Imputed Data)	18	4.9000E-4	0.01	0.00599	0.00545	0.00252	
Statistics (Lognormal ROS Imputed Data)	18	4.9000E-4	0.0094	0.00521	0.005	0.00226	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	3.778	3.111	0.00145	-5.344	0.679	-0.127	
Statistics (NDs = DL)	2.869	2.428	0.00191	-5.389	0.762	-0.141	
Statistics (NDs = DL/2)	2.605	2.208	0.00199	-5.466	0.831	-0.152	
Statistics (Gamma ROS Estimates)	3.641	3.071	0.00164	-5.261	0.681	-0.129	
Statistics (Lognormal ROS Estimates)				-5.409	0.69	-0.128	
2 22 ( 20 2 112 12 2 2 2 113 13 2 2						- :	
Nr	rmal GOF	Test Resu	lts				
		. 550 . 1000					
	No NDs	NDs = DI	NDs = DL/2	Iormal RO			
Correlation Coefficient R		0.984	0.972	0.98			
Correlation Coefficient N	0.977	0.364	0.572	0.96			
	Toet value	Crit. (0.05)	Cor	olucion wi	th Alpha(0.	05)	
Chamira Wills (Datasta Only)	0.965	` '			ш Аірпа(о.	03)	
Shapiro-Wilk (Detects Only)			Data Appe				
Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2)	0.966 0.945		Data Appe Data Appe				
Shapiro-Wilk (Normal ROS Estimates)							
· · · · · · · · · · · · · · · · · · ·	0.963		Data Appe				
Lilliefors (Detects Only)	0.154		Data Appe				
Lilliefors (NDs = DL)	0.142		Data Appe				
Lilliefors (NDs = DL/2)	0.173		Data Appe				
Lilliefors (Normal ROS Estimates)	0.158	0.202	Data Appe	ar Normal			
Ga	mma GOF	Test Resu	ılts				
	T	T	1				
			NDs = DL/2				
Correlation Coefficient R	0.948	0.947	0.925	0.949			
	I	1	1				
		Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	05)	
Anderson-Darling (Detects Only)	0.927	0.742					
Kolmogorov-Smirnov (Detects Only)	0.249	0.216	Data Not C	Bamma Dis	tributed		
Anderson-Darling (NDs = DL)		0.747					
Kolmogorov-Smirnov (NDs = DL)		0.205	Data Not C	Bamma Dis	tributed		
Anderson-Darling (NDs = DL/2)		0.748					
Kolmogorov-Smirnov (NDs = DL/2)		0.206	Data Not C	Bamma Dis	tributed		
nderson-Darling (Gamma ROS Estimates)	0.765	0.744					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.212	0.205	Data Not C	Bamma Dis	tributed		
					<del>.</del>		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.82	0.873	0.829	0.865			

		Crit. (0.05)			th Alpha(0.	.05)	ļ	
Shapiro-Wilk (Detects Only)	0.701	0.887		-			<u> </u>	
Shapiro-Wilk (NDs = DL)		0.897		-			<u> </u>	
Shapiro-Wilk (NDs = DL/2)		0.897		-			<u> </u>	
Shapiro-Wilk (Lognormal ROS Estimates)		0.897		-			i	
Lilliefors (Detects Only)			Data Not L	-			i	
Lilliefors (NDs = DL)		0.202	Data Not L	-			i	
Lilliefors (NDs = DL/2)	0.33	0.202	Data Not L	ognormal			1	
Lilliefors (Lognormal ROS Estimates)	0.297	0.202	Data Not L	ognormal				
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Barium (background)								
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	46	0	46	44	2	4.35%	i	
Naw Otalistics	40	U	40	77		4.5570		
	Number		Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	2	0.01	0.01	0.01	0.01	0		
Statistics (Non-Detects Only)	44	0.0073	0.051	0.0164	0.012	0.0101	<u> </u>	
Statistics (All: NDs treated as DL value)	46	0.0073	0.051	0.0161	0.0115	0.00996	i	
Statistics (All: NDs treated as DL/2 value)	46	0.005	0.051	0.0159	0.0115	0.0101		
Statistics (Normal ROS Imputed Data)		0.00558	0.051	0.016	0.0115	0.01		
Statistics (Gamma ROS Imputed Data)	46	0.0073	0.051	0.0161	0.0115	0.00996		
Statistics (Lognormal ROS Imputed Data)	46	0.0073	0.051	0.0161	0.0115	0.01		
					<u> </u>			
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	3.415	3.198	0.0048	-4.264	0.54	-0.127		
Statistics (NDs = DL)	3.465	3.253	0.00465	-4.279	0.532	-0.124	·	1
Statistics (NDs = DL/2)	3.137	2.947	0.00507	-4.309	0.569	-0.132		1
Statistics (Gamma ROS Estimates)	3.465	3.253	0.00465	-4.279	0.532	-0.124		
Statistics (Lognormal ROS Estimates)				-4.285	0.538	-0.125		
			<u>I</u>					
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/1	ormal RO				
Correlation Coefficient R	0.9	0.893	0.907	0.9				
		1						1
	Test value	Crit. (0.05)	Con	clusion wi	th Alpha(0.	.05)		1
Shapiro-Wilk (Detects Only)	0.81	0.944	Data Not N	lormal	*			1
Shapiro-Wilk (NDs = DL)	0.799	0.945	Data Not N	lormal				1
Shapiro-Wilk (NDs = DL/2)		0.945						†
Shapiro-Wilk (Normal ROS Estimates)		0.945						+
Lilliefors (Detects Only)	0.223	0.132						+
Lilliefors (NDs = DL)		0.129	Data Not N					+
Lilliefors (NDs = DL/2)		0.129	Data Not N					+
Lilliefors (Normal ROS Estimates)								+
, , , , , , , , , , , , , , , , , , , ,	I	<u> </u>						1
Ga	mma GOF	Test Resu	ilts					+
								+
	No NDs	NDs = DL	NDs = DL/2	amma RO				1
Correlation Coefficient R	0.971	0.967	0.975	0.967				1
	I .	I					·	1
	Test value	Crit. (0.05)	Con	clusion wi	th Alpha(0.	.05)	 I	1
	1	· ' '						

Anderson-Darling (Detects Only)	2.02	0.754						
Kolmogorov-Smirnov (Detects Only)	0.187	0.134	Data Not (	Gamma Dis	stributed			
Anderson-Darling (NDs = DL)	2.297	0.755						
Kolmogorov-Smirnov (NDs = DL)	0.198	0.131	Data Not (	Gamma Dis	stributed		+	
Anderson-Darling (NDs = DL/2)	1.738	0.755					+	
Kolmogorov-Smirnov (NDs = DL/2)	0.177	0.131	Data Not (	Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates)	2.297	0.755					+	-
Kolmogorov-Smirnov (Gamma ROS Est.)	0.198	0.131	Data Not (	Gamma Dis	stributed			1
Tromogorov ommov (damma rroo Est.)	0.100	0.101	Data Not v	Jannina Die	Stributed		+	
Logi	normal GO	F Test Res	ulte					
Logi	iorniai GO	1 163(1163	uito					
	No NDs	NDs = DL	NDe - DI /	Log POS				
Correlation Coefficient R	0.953	0.949	0.969	0.949				
Correlation Coefficient R	0.955	0.949	0.909	0.949			+	
	Toot value	Crit. (0.05)	Co	naluaian wi	th Alpha/C	OE)	+	
				nclusion wi	ш Аірпа(с	1.00)		
Shapiro-Wilk (Detects Only)	0.89		Data Not I	-				
Shapiro-Wilk (NDs = DL)	0.884		Data Not I					
Shapiro-Wilk (NDs = DL/2)	0.929		Data Not I	-				
Shapiro-Wilk (Lognormal ROS Estimates)			Data Not I	-				
Lilliefors (Detects Only)	0.168		Data Not I	-				
Lilliefors (NDs = DL)	0.187		Data Not I	-				
Lilliefors (NDs = DL/2)	0.155	0.129	Data Not I	ognormal				
Lilliefors (Lognormal ROS Estimates)	0.181	0.129	Data Not I	ognormal				
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Barium (mw-66)								
· · · · · · · · · · · · · · · · · · ·								
Raw Statistics								
Number of Valid Ob	servations	18						
Number of Distinct Ob	servations	7						
	Minimum							
	Maximum							
Mean of	Raw Data						+	
Standard Deviation of								
Standard Deviation of								
	Khat							
	Theta hat							
	Kstar	4.012						
	Theta star							
Mean of Log Transfo								
Standard Deviation of Log Transfo	rmed Data	0.656						
Normal GOF Test Resu	lts							
Correlation Co	efficient R	0.794						
Shapiro Wilk Te	st Statistic	0.65						
Shapiro Wilk Critical (0	.05) Value	0.897						
Approximate Shapiro W	ilk P Value	5.5713E-6						
Lilliefors Te	st Statistic	0.325					1	<b>†</b>
Lilliefors Critical (0	.05) Value							+
Data not Normal at (0.05) Significance Lev		1						+
,,								-
Gamma GOF Test Resu	ilts							-
								+
						1		

Correlation Coefficient R	0.683			
A-D Test Statistic	3.57			
A-D Critical (0.05) Value	0.743			
K-S Test Statistic	0.366			
K-S Critical(0.05) Value	0.204			
Data not Gamma Distributed at (0.05) Significance L	evel			
. , ,				
Lognormal GOF Test Results				
Lognomial doi 10001000alio				
Correlation Coefficient R	0.633			
Shapiro Wilk Test Statistic				
Shapiro Wilk Critical (0.05) Value				
Approximate Shapiro Wilk P Value				
Lilliefors Test Statistic				
Lilliefors Critical (0.05) Value	0.202			
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 Si			
Barium (mw-67)				
Raw Statistics				
Number of Valid Observations	18			
Number of Distinct Observations	6			
Minimum	0.017			
Maximum	0.022			
Mean of Raw Data	0.0199			
Standard Deviation of Raw Data	0.00157			
Khat	166.9			
-	1.1914E-4			
Kstar	139.1			
Theta star				
Mean of Log Transformed Data	-3.921			
Standard Deviation of Log Transformed Data	0.0802			
Normal GOF Test Results				
Correlation Coefficient R				
Shapiro Wilk Test Statistic		 		
Shapiro Wilk Critical (0.05) Value				
Approximate Shapiro Wilk P Value	0.068			
Lilliefors Test Statistic	0.195			
Lilliefors Critical (0.05) Value				
Data appear Normal at (0.05) Significance Level				
, , ,				
Gamma GOF Test Results				
Samuel Service and				
Correlation Coefficient R	0.951			
A-D Test Statistic				
A-D Critical (0.05) Value				
K-S Test Statistic				
K-S Critical(0.05) Value	0.203			

	<u> </u>					1	1
Data appear Gamma Distributed at (0.05)	Significand	æ Level					
Lognormal GOF Test Res	ults						
Correlation Co		0.952					
Shapiro Wilk Te							
Shapiro Wilk Critical (0	).05) Value	0.897					
Approximate Shapiro W	ilk P Value	0.0541					
Lilliefors Te	st Statistic	0.209					
Lilliefors Critical (0	.05) Value	0.202					
Data not Lognormal at (0.05) Significance	Level						
Dominum (many 69)							
Barium (mw-68)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
	Number		Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	0.01	0.01	0.01	0.01	N/A	
Statistics (Non-Detects Only)	17	0.0066	0.013	0.00808	0.0075	0.00152	
Statistics (All: NDs treated as DL value)	18	0.0066	0.013	0.00818	0.00765	0.00155	
Statistics (All: NDs treated as DL/2 value)	18	0.005	0.013	0.00791	0.0075	0.00165	
Statistics (Normal ROS Imputed Data)	18	0.0066	0.013	0.00807	0.00765	0.00148	
Statistics (Gamma ROS Imputed Data)	18	0.0066	0.013	0.00818	0.00765	0.00155	
Statistics (Lognormal ROS Imputed Data)	18	0.0066	0.013	0.00806	0.00765	0.00148	
Tallouise (20g.:o::::a::::eo:::::patea 2 ata)		0.000	0.0.0	0.0000	0.007.00	0.001.10	
	K hat	K Star	Theta hat	Log Mean	Log Stdy	Log CV	
Statistics (Non-Detects Only)	36.48	30.08	2.2138E-4	-4.833	0.163	-0.0338	
Statistics (NDs = DL)	35.18		2.3260E-4	-4.82	0.167	-0.0337	
Statistics (NDs = DL/2)	27.56	29.30	2.8688E-4	-4.858	0.107		
						-0.0397	
Statistics (Gamma ROS Estimates)	35.18	29.36	2.3260E-4	-4.82	0.167	-0.0347	
Statistics (Lognormal ROS Estimates)		-		-4.833	0.158	-0.0328	
NI		Tast Dass	14				
No	rmal GOF	lest Resu	its				
	No ND:	NDs - D'	VID DI "	larmal DO			
010 #: :5			NDs = DL/2				1
Correlation Coefficient R	0.847	0.877	0.894	0.844			1
	<b>-</b>	0: /00=	_			05)	
<u> </u>		Crit. (0.05)		clusion wit	n Alpha(0.	U5)	
Shapiro-Wilk (Detects Only)	0.738		Data Not N				
Shapiro-Wilk (NDs = DL)	0.785						
Shapiro-Wilk (NDs = DL/2)	0.83						
Shapiro-Wilk (Normal ROS Estimates)	0.735	0.897	Data Not N	Iormal			
Lilliefors (Detects Only)	0.278	0.207	Data Not N	lormal	-		
Lilliefors (NDs = DL)	0.265	0.202	Data Not N	lormal			
Lilliefors (NDs = DL/2)	0.248	0.202	Data Not N	Iormal			
Lilliefors (Normal ROS Estimates)	0.255	0.202	Data Not N	lormal			
	•						
Ga	mma GOF	Test Resu	ılts				
	No ND-	NDs = D'	VIDo - DI "	omma DO			
0 1 0	No NDs		NDs = DL/2				<u> </u>
Correlation Coefficient R	0.881	0.908	0.919	0.908			
	T	O.:: /0.05	^	alication 2	la Alla L. (O	05)	
	ı est value	Crit. (0.05)	Con	nclusion wit	n Aipha(0.	U5)	

			1					
Anderson-Darling (Detects Only)	1.258	0.737						
Kolmogorov-Smirnov (Detects Only)	0.267	0.209	Data Not (	Gamma Dis	stributed			
Anderson-Darling (NDs = DL)	1.12	0.739						
Kolmogorov-Smirnov (NDs = DL)	0.256	0.203	Data Not (	Gamma Dis	stributed			
Anderson-Darling (NDs = DL/2)	0.967	0.739						
Kolmogorov-Smirnov (NDs = DL/2)	0.225	0.203	Data Not (	Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates)	1.12	0.739						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.256	0.203	Data Not (	Gamma Dis	stributed			
Logr	normal GO	F Test Res	ults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.894	0.917	0.929	0.891				
	Test value	Crit. (0.05)	Co	nclusion wi	ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.817	0.892	Data Not I	ognormal				
Shapiro-Wilk (NDs = DL)	0.852		Data Not I	-			1	1
Shapiro-Wilk (NDs = DL/2)	0.894		Data Not I	-			1	
Shapiro-Wilk (Lognormal ROS Estimates)	0.812		Data Not I	-			+	
Lilliefors (Detects Only)	0.257		Data Not I	-				
Lilliefors (NDs = DL)	0.247		Data Not I	-			+	
Lilliefors (NDs = DL/2)	0.212	0.202	Data Not I	ognormal				
Lilliefors (Lognormal ROS Estimates)	0.256		Data Not I					
,								
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Barium (mw-69)								
							-	
Raw Statistics								
Number of Valid Ob	servations	18					-	
Number of Distinct Ob		7					-	
	Minimum	-					-	
	Maximum	0.019					-	
Mean of	Raw Data						+	
Standard Deviation of								
Standard Deviation of	Khat						-	
		1.5088E-4					-	
	Kstar							
		1.8098E-4						
Mean of Log Transfo								
							_	
Standard Deviation of Log Transfo	med Data	0.101						
Normal GOF Test Resul	lte							
Normal GOF Test Resul	ilo:						-	
Campletia - Ca	officient D	0.06					-	
Correlation Co								
Shapiro Wilk Te								-
Shapiro Wilk Critical (0	,							-
Approximate Shapiro Wi								-
Lilliefors Te								
Lilliefors Critical (0	-							
Data appear Approximate Normal at (0.05)	) Significar	nce Level						
-								<u> </u>
Gamma GOF Test Resu	its							

Correlation Coefficient R	0.96				
A-D Test Statistic	0.778				
A-D Critical (0.05) Value	0.737				
K-S Test Statistic	0.222				
K-S Critical(0.05) Value	0.203				
Data not Gamma Distributed at (0.05) Significance Lo	evel				
Lognormal GOF Test Results					
Correlation Coefficient R	0.957				
Shapiro Wilk Test Statistic	0.917				
Shapiro Wilk Critical (0.05) Value	0.897				
Approximate Shapiro Wilk P Value	0.115				
Lilliefors Test Statistic	0.227				
Lilliefors Critical (0.05) Value	0.202				
Data appear Approximate_Lognormal at (0.05) Signif	icance Lev				
Barium (mw-70)					
Raw Statistics					
Number of Valid Observations	17				
Number of Missing Observations	1				
Number of Distinct Observations	13				
Minimum	0.0073				
Maximum	0.016				
Mean of Raw Data	0.0114				
Standard Deviation of Raw Data	0.00253				
Khat	21.16				
Theta hat	5.4109E-4				
Kstar	17.46				
Theta star	6.5556E-4				
Mean of Log Transformed Data	-4.494				
Standard Deviation of Log Transformed Data	0.228				
Normal GOF Test Results					
Correlation Coefficient R	0.99				
Shapiro Wilk Test Statistic	0.97				
Shapiro Wilk Critical (0.05) Value	0.892				
Approximate Shapiro Wilk P Value	0.848				
Lilliefors Test Statistic	0.128				
Lilliefors Critical (0.05) Value	0.207				
Data appear Normal at (0.05) Significance Level					
Gamma GOF Test Results					
Correlation Coefficient R	0.987				
A-D Test Statistic	0.259				
A-D Critical (0.05) Value	0.738				
K-S Test Statistic	0.144				
K-S Critical(0.05) Value	0.209				
Data appear Gamma Distributed at (0.05) Significance					
., , ,					
Lognormal GOF Test Results					
•			1	1	

Correlation Co	efficient R	0.987						
Shapiro Wilk Te								
Shapiro Wilk Critical (0								
Approximate Shapiro W								
Lilliefors Te								
Lilliefors Critical (0	,	0.207						
Data appear Lognormal at (0.05) Significa	nce Level							
Beryllium (background)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	46	5	41	0	41	100.00%		
Warning: All observations are No	n-Detects (	NDs), there	efore all sta	tistics and	estimates	should also	be NDs!	
Specifically, sample mean, UCLs, U								÷I
· · · · · · · · · · · · · · · · · · ·								
The Project Team may decide to use alter	native site	specific va	ues to estir	nate envir	onmentai	parameters	(e.g., EPC	, віу).
The data set	for variable	Beryllium	(backgroun	id) was not	processe	ed!		
Beryllium (mw-66)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics		1	17	0	17	100.00%		
Naw Statistics	10	'	17	U	17	100.0070		
		NIB V II					. L. NB. I	
Warning: All observations are No		•						
Specifically, sample mean, UCLs, U	PLs, and c	ther statist	ics are also	NDs lying	below the	e largest de	tection limi	
	PLs, and c	ther statist	ics are also	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, U	PLs, and c	ther statist	ics are also	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, U	PLs, and o	other statist	ics are also lues to estir	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter	PLs, and o	other statist	ics are also lues to estir	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter	PLs, and o	other statist	ics are also lues to estir	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter	PLs, and o	other statist	ics are also lues to estir	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s	PLs, and o	other statist	ics are also lues to estir	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter	PLs, and o	other statist	ics are also lues to estir	NDs lying	below the	e largest de	tection limi	
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s	PLs, and conative site	other statist specific va ble Berylliu	ics are also lues to estin m (mw-66)	o NDs lying mate enviro was not p	below the onmental rocessed!	e largest de parameters	tection limi	
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)	PLs, and conative site et for varia	other statist specific va ble Berylliu	ics are also lues to estir m (mw-66)	o NDs lying mate enviro was not p	below the conmental rocessed!	e largest de parameters  % NDs	tection limi	
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s	PLs, and conative site et for varia	other statist specific va ble Berylliu	ics are also lues to estin m (mw-66)	o NDs lying mate enviro was not p	below the onmental rocessed!	e largest de parameters	tection limi	
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)	PLs, and conative site et for varia	other statist specific va ble Berylliu Num Miss	lues to estin m (mw-66) Num Valid	NDs lying mate environment was not properties.  Detects	NDs 16	% NDs 94.12%	tection limi	s, BTV).
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was	PLs, and conative site et for varia	Num Miss 1	lues to estinum (mw-66)  Num Valid 17	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics	PLs, and conative site et for varia	Num Miss 1	lues to estinum (mw-66)  Num Valid 17	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was	PLs, and conative site et for varia	Num Miss 1	lues to estinum (mw-66)  Num Valid 17	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was	PLs, and conative site et for varia  Num Obs 18 s detected!	Num Miss  1  ProUCL (or ed by the F	Num Valid 17 r any other	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value	PLs, and conative site et for varia  Num Obs 18 s detected!	Num Miss  1  ProUCL (or ed by the F	Num Valid 17 r any other	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value	PLs, and conative site et for varia  Num Obs 18 s detected!	Num Miss  1  ProUCL (or ed by the F	Num Valid 17 r any other	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value	PLs, and conative site et for varia  Num Obs 18 s detected!	Num Miss  1  ProUCL (or ed by the F	Num Valid 17 r any other	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value  The data s	PLs, and conative site et for varia  Num Obs 18 s detected!	Num Miss  1  ProUCL (or ed by the F	Num Valid 17 r any other	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value	PLs, and conative site et for varia  Num Obs 18 s detected!	Num Miss  1  ProUCL (or ed by the F	Num Valid 17 r any other	Detects 1 software)	NDs 16 should no	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value  The data s	PLs, and conative site et for varia  Num Obs 18 s detected! s determine	Num Miss  1  ProUCL (or ed by the February ble Berylliu	Num Valid 17 r any other roject Tear	Detects 1 software) mas not properties the software of the sof	NDs 16 should note environmental	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value  The data s  Beryllium (mw-68)	PLs, and conative site et for varia  Num Obs 18 s detected! s determine et for varia	Num Miss  ProUCL (or ed by the F	Num Valid 17 r any other rroject Tear	Detects 1 software) mas not p	NDs 16 should no treessed!	% NDs 94.12% t be used on mental par	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, UThe Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value  The data s	PLs, and conative site et for varia  Num Obs 18 s detected! s determine et for varia	Num Miss  1  ProUCL (or ed by the February ble Berylliu	Num Valid 17 r any other roject Tear	Detects 1 software) mas not properties the software of the sof	NDs 16 should note environmental	% NDs 94.12%	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value  The data s  Beryllium (mw-68)	PLs, and conative site et for varia  Num Obs 18 s detected! s determine et for varia	Num Miss  ProUCL (or ed by the F	Num Valid 17 r any other rroject Tear	Detects 1 software) mas not p	NDs 16 should no tre environ rocessed!	% NDs 94.12% t be used on mental par	tection limi (e.g., EPC	ata set!
Specifically, sample mean, UCLs, U The Project Team may decide to use alter  The data s  Beryllium (mw-67)  Raw Statistics  Warning: Only one distinct data value was ested to use alternative site specific value  The data s  Beryllium (mw-68)	PLs, and conative site et for varia  Num Obs 18  detected! s detected! et for varia  Num Obs 18	Num Miss  ProUCL (o ed by the F  ble Berylliu  Num Miss  1	Num Valid 17 r any other r/roject Tear m (mw-67) Num Valid 17	Detects 1 Detects 1 Detects 1 Detects 1 Detects 1	NDs 16 should note environmental	% NDs 94.12%  % NDs 94.12%	n such a da	eta set!

The data set for variable Beryllium (mw-68) was not processed!											
Beryllium (mw-69)											
	N Ob -	Ni Miss	NI \/_II.d	D-44-	ND-	0/ ND-					
Raw Statistics		Num Miss	Num Valid	Detects 1	NDs 16	% NDs 94.12%					
Naw Statistics	10	'	17	•	10	J4.1270					
Warning: Only one distinct data value was	detected!	ProUCL (o	r any other	software)	should not	be used or	such a	data set!			
ested to use alternative site specific value	s determine	ed by the P	roject Tear	m to estima	ate environ	mental para	ameters (	e.g., EP0			
The date o	at fan vanial	bla Dandlin	( CO)		di						
The data s	et for varia	bie beryillu	m (mw-o9)	was not p	rocesseu!						
_											
Beryllium (mw-70)											
	N O	N	N		ND	O/ NID					
Raw Statistics		Num Miss	Num Valid	Detects 1	NDs 16	% NDs 94.12%					
Raw Statistics	10	ı	17	ı	10	94.12%					
Cadmium (background)											
Cadmium (background)	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs					
Cadmium (background) Raw Statistics		Num Miss 4	Num Valid 42	Detects 6	NDs 36	% NDs 85.71%					
		4		6							
	46 Number	4 Minimum 1.0000E-4	42 Maximum 0.001	6 Mean 4.5000E-4	36 Median 4.0000E-4	85.71% SD 13.0000E-4					
Raw Statistics	46 Number 36	4 Minimum 1.0000E-4	42 Maximum 0.001	6 Mean 4.5000E-4	36 Median 4.0000E-4	85.71% SD					
Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	46 Number 36 6 42	4 Minimum 1.0000E-4 1.1000E-4	42 Maximum 0.001 3.0000E-4 0.001	6 Mean 4.5000E-4 1.8167E-4 4.1167E-4	36 Median 4.0000E-4 1.6000E-4	85.71% SD 3.0000E-4 6.6458E-5 2.9394E-4					
Raw Statistics  Statistics (Non-Detects Only)  Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)  Statistics (All: NDs treated as DL/2 value)	46  Number 36 6 42 42	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5	Maximum 0.001 3.0000E-4 0.001 5.0000E-4	6 Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4	36  Median 4.0000E-4 1.6000E-4 2.0000E-4	85.71% SD 13.0000E-4 16.6458E-5 12.9394E-4 11.4136E-4					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data)	46  Number 36 6 42 42 42	4 Minimum 1.0000E-4 1.1000E-4 5.0000E-5 -9.191E-5	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 3.0000E-4	6 Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5	36  Median 4.0000E-4 1.6000E-4 2.0000E-4 8.4457E-5	85.71% SD 3.0000E-4 6.6458E-5 2.9394E-4 1.4136E-4 9.2017E-5					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	46  Number 36 6 42 42 42 42	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4	42 Maximum 0.001 3.0000E-4 0.001 5.0000E-4 3.0000E-4 0.01	6 Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086	36  Median 4.0000E-4 1.6000E-4 4.0000E-4 2.0000E-4 8.4457E-5 0.01	85.71% SD 3.0000E-4 6.6458E-5 2.9394E-4 11.4136E-4 9.2017E-5 0.00348					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	46  Number 36 6 42 42 42 42	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4	42 Maximum 0.001 3.0000E-4 0.001 5.0000E-4 3.0000E-4 0.01	6 Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086	36  Median 4.0000E-4 1.6000E-4 4.0000E-4 2.0000E-4 8.4457E-5 0.01	85.71% SD 3.0000E-4 6.6458E-5 2.9394E-4 1.4136E-4 9.2017E-5					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	46  Number 36 6 42 42 42 42	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 3.0000E-4 0.01 3.0000E-4	6 Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086	36  Median 4.000E-4 1.6000E-4 2.0000E-4 2.0000E-4 0.01 1.0399E-4	85.71% SD 3.0000E-4 6.6458E-5 2.9394E-4 11.4136E-4 9.2017E-5 0.00348					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	46  Number 36 6 42 42 42 42 42 42 K hat	4 Minimum 1.0000E-4 1.1000E-4 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 0.01 3.0000E-4 Theta hat	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4	36  Median 4.000E-4 1.6000E-4 2.0000E-4 8.4457E-5 0.01 1.0399E-4	85.71%  SD  3.0000E-4   6.6458E-5   2.9394E-4   1.4136E-4   9.2017E-5   0.00348   5.8644E-5					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	46  Number 36 6 42 42 42 42 42 K hat	4 Minimum 1.0000E-4 1.1000E-4 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5 K Star 5.117	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 0.01 3.0000E-4 Theta hat	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4  Log Mean -8.664	36  Median 4.0000E-4 1.6000E-4 2.0000E-4 8.4457E-5 0.01 1.0399E-4	85.71% SD 3.0000E-4 6.6458E-5 2.9394E-4 1.4136E-4 9.2017E-5 0.00348 15.8644E-5					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	46  Number 36 6 42 42 42 42 42 10.01	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5  K Star 5.117 2.018	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 0.01 3.0000E-4 Theta hat 1.8144E-5	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4  Log Mean -8.664 -8.045	36  Median 4.0000E-4 1.6000E-4 2.0000E-4 8.4457E-5 0.01 1.0399E-4 Log Stdv 0.343	85.71%  SD   3.0000E-4    6.6458E-5    2.9394E-4    1.4136E-4    9.2017E-5    0.00348    5.8644E-5    Log CV					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates)	46  Number 36 6 42 42 42 42 42 10.01 2.156	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5  K Star 5.117 2.018	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 0.01 3.0000E-4 1.8144E-5 1.9093E-4	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4  Log Mean -8.664 -8.045 -8.639	36  Median 4.0000E-4 1.6000E-4 4.0000E-4 2.0000E-4 8.4457E-5 0.01 1.0399E-4  Log Stdv 0.343 0.736 0.69 1.443	85.71%  SD   3.0000E-4    6.6458E-5    2.9394E-4    1.4136E-4    9.2017E-5    0.00348    5.8644E-5    Log CV					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2)	46  Number 36 6 42 42 42 42 42 42 5 K hat 10.01 2.156 2.517	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5 K Star 5.117 2.018 2.353	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 0.01 3.0000E-4 Theta hat 1.8144E-5 1.9093E-4 8.6924E-5	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4  Log Mean -8.664 -8.045 -8.639	36  Median 4.0000E-4 1.6000E-4 4.0000E-2 2.0000E-2 8.4457E-5 0.01 1.0399E-4  Log Stdv 0.343 0.736 0.69	85.71%  SD   3.0000E-4    6.6458E-5    2.9394E-4    1.4136E-4    9.2017E-5    0.00348    5.8644E-5    Log CV					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL/2) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	46  Number 36 6 42 42 42 42 42 42 10.01 2.156 2.517 1.308	4 Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5 K Star 5.117 2.018 2.353 1.23	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 3.0000E-4 0.01 3.0000E-4 Theta hat 1.8144E-5 1.9093E-4 8.6924E-5 0.00657	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4  Log Mean -8.664 -8.045 -8.639 -5.185	36  Median 4.0000E-4 1.6000E-4 4.0000E-4 2.0000E-4 8.4457E-5 0.01 1.0399E-4  Log Stdv 0.343 0.736 0.69 1.443	85.71%  SD (3.0000E-4) (6.6458E-5) (2.9394E-4) (1.4136E-4) (9.2017E-5) (0.00348) (5.8644E-5)  Log CV (0.0395) (0.0799) (0.278)					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL/2) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	46  Number 36 6 42 42 42 42 42 10.01 2.156 2.517 1.308	4  Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5  K Star 5.117 2.018 2.353 1.23  Test Resu	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 0.01 3.0000E-4 1.8144E-5 1.9093E-4 8.6924E-5 0.00657	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4  Log Mean -8.664 -8.045 -8.639 -5.185 -9.167	36  Median 4.0000E-4 1.6000E-4 4.0000E-4 2.0000E-4 8.4457E-5 0.01 1.0399E-4  Log Stdv 0.343 0.736 0.69 1.443 0.48	85.71%  SD (3.0000E-4) (6.6458E-5) (2.9394E-4) (1.4136E-4) (9.2017E-5) (0.00348) (5.8644E-5)  Log CV (0.0395) (0.0799) (0.278)					
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	Number   36   6   42   42   42   42   42   42	4  Minimum 1.0000E-4 1.1000E-4 1.0000E-5 5.0000E-5 -9.191E-5 1.1000E-4 4.1445E-5  K Star 5.117 2.018 2.353 1.23  Test Resu	42  Maximum 0.001 3.0000E-4 0.001 5.0000E-4 0.01 3.0000E-4 1.8144E-5 1.9093E-4 8.6924E-5 0.00657	6  Mean 4.5000E-4 1.8167E-4 4.1167E-4 2.1881E-4 8.5343E-5 0.0086 1.1700E-4  Log Mean -8.664 -8.045 -8.639 -5.185	36  Median 4.0000E-4 1.6000E-4 4.0000E-4 2.0000E-4 8.4457E-5 0.01 1.0399E-4  Log Stdv 0.343 0.736 0.69 1.443 0.48	85.71%  SD (3.0000E-4) (6.6458E-5) (2.9394E-4) (1.4136E-4) (9.2017E-5) (0.00348) (5.8644E-5)  Log CV (0.0395) (0.0799) (0.278)					

								Ī
	Test value	Crit. (0.05	Cou	nclusion wi	th Alpha/(	0.05)		
Shapiro-Wilk (Detects Only)	0.897		Data Appe		ш Аірпа(	7.03)		
Shapiro-Wilk (NDs = DL)	0.897		Data Not N					
Shapiro-Wilk (NDs = DL/2)	0.733		Data Not N					
Shapiro-Wilk (Normal ROS Estimates)	0.772		Data Not N					
Lilliefors (Detects Only)	0.236		Data Appe					
Lilliefors (NDs = DL)	0.302							
Lilliefors (NDs = DL/2)	0.291	0.135	Data Not N					
Lilliefors (Normal ROS Estimates)	0.0651		Data Not i					
Emiciola (Normal Neo Estimates)	0.0001	0.100	Data Appe	ar Horrian				
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/2	iamma RO				
Correlation Coefficient R	0.973	0.921	0.922	0.416				
	Test value	Crit. (0.05	Сог	nclusion wi	th Alpha((	0.05)		
Anderson-Darling (Detects Only)	0.302	0.698						
Kolmogorov-Smirnov (Detects Only)	0.207	0.332	Detected [	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	1.963	0.759						
Kolmogorov-Smirnov (NDs = DL)	0.211	0.138	Data Not 0	Gamma Dis	stributed			
Anderson-Darling (NDs = DL/2)	2.099	0.757					<del></del>	
Kolmogorov-Smirnov (NDs = DL/2)	0.209	0.138	Data Not 0	Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates)	13.17	0.771						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.538	0.139	Data Not 0	Gamma Dis	tributed			
Logi	normal GO	F Test Res	sults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.974	0.949	0.941	0.997				
		Crit. (0.05)		nclusion wi		0.05)		
Shapiro-Wilk (Detects Only)	0.96		Data Appe		nal			
Shapiro-Wilk (NDs = DL)	0.846		Data Not L					
Shapiro-Wilk (NDs = DL/2)	0.844		Data Not L	ū				
Shapiro-Wilk (Lognormal ROS Estimates)	0.937		Data Not L	-				
Lilliefors (Detects Only)	0.185		Data Appe		nal			
Lilliefors (NDs = DL)	0.237		Data Not L	•				
Lilliefors (NDs = DL/2)	0.237		Data Not L	•				
Lilliefors (Lognormal ROS Estimates)	0.0652	0.135	Data Appe	ear Lognorr	nal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Cadmium (mw-66)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	1	17	1	16	94.12%		
Worning: Only one distinct data value was	dotostadi	DrollOl /-	r any ather	coffusions)	should se	t be used s	a auch a de	ata acti
Warning: Only one distinct data value was ested to use alternative site specific values		-		-				
			,					
The data se	et for varial	ole Cadmiu	ım (mw-66)	was not p	rocessed!			

Cadmium (mw-67)							
			Num Valid		NDs	% NDs	
Raw Statistics	18	1	17	4	13	76.47%	 <u> </u>
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	13	1.0000E-4	0.001	4.1538E-4	4.0000E-4	2.9396E-4	 1
Statistics (Non-Detects Only)	4	1.5000E-4	1.8000E-4	1.6000E-4	1.5500E-4	1.4142E-5	
Statistics (All: NDs treated as DL value)	17	1.0000E-4	0.001	3.5529E-4	4.0000E-4	2.7805E-4	 +
Statistics (All: NDs treated as DL/2 value)	17	5.0000E-5	5.0000E-4	1.9647E-4	2.0000E-4	1.2913E-4	
Statistics (Normal ROS Imputed Data)	17	1.0708E-4	1.8000E-4	1.4241E-4	1.4247E-4	2.0142E-5	
Statistics (Gamma ROS Imputed Data)	17	1.5000E-4	0.01	0.00768	0.01	0.0043	 +
Statistics (Lognormal ROS Imputed Data)	17	1.1551E-4	1.8000E-4	1.4433E-4	1.4336E-4	1.7764E-5	 +
							 +
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	 +
Statistics (Non-Detects Only)	177.3	44.48	9.0267E-7		0.086	-0.00983	 +
Statistics (NDs = DL)	2.058		1.7266E-4		0.746		+
Statistics (NDs = DL/2)	2.657		7.3953E-5		0.68	-0.0778	 +
Statistics (Gamma ROS Estimates)	0.831	0.724	0.00924		1.81	-0.324	 +
Statistics (Lognormal ROS Estimates)				-8.851	0.123	-0.0139	 +
							 +
No	rmal GOF	Test Resu	lts				 +
							 +
	No NDs	NDs = DL	NDs = DL/2	Jormal RO			+
Correlation Coefficient R	0.912	0.884	0.886	0.995			 +
Consider Commission	0.012	0.001	0.000	0.000			 +
	Test value	Crit (0.05)	Co	nclusion wi	th Alpha(0	05)	 -
Shapiro-Wilk (Detects Only)	0.828	, ,	Data Appe				 +
Shapiro-Wilk (NDs = DL)	0.778		Data Not I				 +
Shapiro-Wilk (NDs = DL/2)	0.787		Data Not I				 +
Shapiro-Wilk (Normal ROS Estimates)	0.984		Data Appe				 +
Lilliefors (Detects Only)	0.26		Data Appe				 +
Lilliefors (NDs = DL)	0.26		Data Not I				 +
Lilliefors (NDs = DL/2)	0.20	0.207	Data Not I				 
Lilliefors (Normal ROS Estimates)	0.0895		Data Not i				 
Limetors (Normal NOS Estimates)	0.0033	0.207	рата Арре	ai Nomiai			
Ga	mma GOF	Test Resu	ılts				
		NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	0.926	0.946	0.93	0.474			
	Test value		Co	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.482	0.657					
Kolmogorov-Smirnov (Detects Only)	0.295	0.394	Detected I	Data Appe	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)	0.808	0.749					
Kolmogorov-Smirnov (NDs = DL)	0.187	0.212	Detected I	Data appea	ar Approxir	nate Gamn	
Anderson-Darling (NDs = DL/2)	0.929	0.747					
Kolmogorov-Smirnov (NDs = DL/2)	0.231	0.211	Data Not 0	Gamma Dis	stributed		
derson-Darling (Gamma ROS Estimates)	4.432	0.773					
deison-Daning (Ganna ROS Estinates)							 +
Kolmogorov-Smirnov (Gamma ROS Est.)	0.495	0.217	Data Not (	Gamma Dis	stributed		
	0.495	0.217	Data Not (	Gamma Dis	stributed		

		GOODINE	33 OF FIT 3	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	00			
	No NDs	NDs = DL	NDs = DL/2 L	₋og ROS				
Correlation Coefficient R	0.917	0.958	0.936	0.995			Ì	
	Test value	Crit. (0.05)			ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.836		Data Appea	_			Ì	
Shapiro-Wilk (NDs = DL)	0.902	0.892	Data Appea	ır Lognorı	mal			
Shapiro-Wilk (NDs = DL/2)	0.872	0.892	Data Not Lo	gnormal				
Shapiro-Wilk (Lognormal ROS Estimates)	0.984	0.892	Data Appea	ır Lognorı	mal			
Lilliefors (Detects Only)	0.264	0.375	Data Appea	ır Lognorı	mal			
Lilliefors (NDs = DL)	0.224	0.207	Data Not Lo	gnormal				
Lilliefors (NDs = DL/2)	0.224	0.207	Data Not Lo	gnormal				
Lilliefors (Lognormal ROS Estimates)	0.0895	0.207	Data Appea	ır Lognorı	mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
							<u> </u>	
Cadmium (mw-68)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	1	17	5	12	70.59%		
Traw Gradistics	10	'	.,		12	, 5.55 /6		-
	Number	Minimum	Maximum	Mean	Median	SD		1
Statistics (Non-Detects Only)	12	1.0000E-4				12.5391E-4		
Statistics (Non-Detects Only)	5		4.6000E-42					
Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	17	1.0000E-4				12.3196E-4		
Statistics (All: NDs treated as DL/2 value)	17		5.0000E-41					
,	17		4.6000E-41					
Statistics (Normal ROS Imputed Data)								
Statistics (Gamma ROS Imputed Data)	17	1.1000E-4		0.00712		0.00459		
Statistics (Lognormal ROS Imputed Data)	17	Z.614ZE-3	4.6000E-41	.Z149E-4	9.1629E-3	1.0540E-4		
	K hat	K Star	Theta hat L	og Mean	Log Stdv	Log CV	·	
Statistics (Non-Detects Only)	3.481		6.3201E-5	-8.572	0.591	-0.0689		
Statistics (NDs = DL)	2.162	1.82	1.4691E-4	-8.303	0.744	-0.0897		
Statistics (NDs = DL/2)	2.324		8.2245E-5	-8.793	0.744	-0.0839		
Statistics (Gamma ROS Estimates)	0.726	0.637	0.00981	-5.772	1.887	-0.327		
Statistics (Lognormal ROS Estimates)		-		-9.28	0.728	-0.0784		
No	rmal GOF	Test Resu	Its					
	No NDs	NDs = DL	NDs = DL/Ao	ormal RO				
Correlation Coefficient R	0.909	0.886	0.917	0.987				
			. "					
	Test value	Crit. (0.05)	Conc	clusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.828	0.762	Data Appea	ır Normal				
Shapiro-Wilk (NDs = DL)	0.795	0.892	Data Not No	ormal				
Shapiro-Wilk (NDs = DL/2)	0.84	0.892	Data Not No	ormal				
Shapiro-Wilk (Normal ROS Estimates)	0.978	0.892	Data Appea	ır Normal				
Lilliefors (Detects Only)	0.26		Data Appea					
Lilliefors (NDs = DL)	0.185		Data Appea					
Lilliefors (NDs = DL/2)	0.237		Data Not No					
Lilliefors (Normal ROS Estimates)	0.0864		Data Appea					
, , , , , , , , , , , , , , , , , , , ,			1-1-50					
Ga	mma GOF	Test Resu	ılts					
	491							
	No NDs	NDs = DI	NDs = DL/2a	mma R∩				
		ı <b></b> -			1		i	1

Correlation Coefficient R								
Constant Coomident	0.981	0.94	0.957	0.516				
		1						
		Crit. (0.05)	) Cor	nclusion wi	th Alpha(0	0.05)		
Anderson-Darling (Detects Only)		0.682						
Kolmogorov-Smirnov (Detects Only)			Detected [	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)		0.749						
Kolmogorov-Smirnov (NDs = DL)			Data Not C	Bamma Dis	stributed			
Anderson-Darling (NDs = DL/2)		0.748						
Kolmogorov-Smirnov (NDs = DL/2)			Detected [	Data appea	ar Approxii	mate Gamn		
nderson-Darling (Gamma ROS Estimates)	3.651	0.778						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.462	0.218	Data Not C	Bamma Dis	stributed			
Log	normal GO	F Test Res	sults					
	T	T	1					
	No NDs		NDs = DL/2					
Correlation Coefficient R	0.959	0.93	0.943	0.992				
		1	I -					
		Crit. (0.05)		nclusion wi		0.05)		
Shapiro-Wilk (Detects Only)			Data Appe		mal			
Shapiro-Wilk (NDs = DL)			Data Not L					
Shapiro-Wilk (NDs = DL/2)			Data Not L	-				
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe					
Lilliefors (Detects Only)			Data Appe		mal			
Lilliefors (NDs = DL)			Data Not L					
Lilliefors (NDs = DL/2)	0.234	0.207	Data Not L	.ognormal				
Note: Substitution methods such as DL or Cadmium (mw-69)	DL/2 are n	ot recomm	enaea.					
	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 ested to use alternative site specific value  The data s	s determine	ed by the P		n to estima	ite enviror			
ested to use alternative site specific value  The data s	s determine	ed by the P	roject Tear	n to estima	ite enviror			
ested to use alternative site specific value	s determine	ed by the P	roject Tear	n to estima	ite enviror			
ested to use alternative site specific value  The data s	s determine	ed by the P	roject Tear	was not p	rocessed!	mental para		
ested to use alternative site specific value  The data s  Cadmium (mw-70)	et for varial	ed by the P	roject Tear im (mw-69) Num Valid	was not p	rocessed!	% NDs		
ested to use alternative site specific value  The data s	s determine et for varial Num Obs	ed by the P	roject Tear	was not p	rocessed!	mental para		
ested to use alternative site specific value  The data s  Cadmium (mw-70)	et for varial  Num Obs	Num Miss	roject Tear im (mw-69) Num Valid	was not p	rocessed!	% NDs		
cested to use alternative site specific value  The data s  Cadmium (mw-70)  Raw Statistics	et for varial  Num Obs  18  Number	Num Miss  Minimum	Num Valid 17 Maximum	was not p  Detects 3  Mean	NDs 14 Median	% NDs 82.35%		
Cadmium (mw-70)  Raw Statistics  Statistics (Non-Detects Only)	Num Obs 18 Number 14	Num Miss  Minimum  1.0000E-4	Num Valid 17 Maximum 0.001	was not p  Detects 3  Mean 3.9286E-4	NDs 14 Median 4.0000E-	% NDs 82.35% SD 42.9473E-4	ameters (	
Cadmium (mw-70)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only)	Num Obs 18  Number 14 3	Num Miss 1 Minimum 1.0000E-4 1.1000E-4	Num Valid 17  Maximum 0.001 2.4000E-4	Detects 3 Mean 3.9286E-4 1.6333E-4	NDs 14 Median 4.0000E	% NDs 82.35% SD 42.9473E-4 46.8069E-5	ameters (	
Cadmium (mw-70)  Raw Statistics  Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value)	Num Obs 18  Number 14 3 17	Num Miss 1 Minimum 1.0000E-4 1.0000E-4	Num Valid 17  Maximum 0.001 2.4000E-4 0.001	Detects 3 Mean 3.9286E-4 1.6333E-4	NDs 14 Median 4.0000E-4.0000E-4.0000E-4	% NDs 82.35% SD 42.9473E-4 6.8069E-5 42.8159E-4	ameters (	
Cadmium (mw-70)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value)	Num Obs 18 Number 14 3 17	Num Miss 1 Minimum 1.0000E-4 1.1000E-4 5.0000E-5	Num Valid 17  Maximum 0.001 2.4000E-4 0.001 5.0000E-4	Detects 3 Mean 3.9286E-4 1.6333E-4 3.5235E-4	NDs 14 Median 4.000E 4.0000E 2.0000E	% NDs 82.35% SD 42.9473E-4 46.8069E-5 42.8159E-4 41.3562E-4	ameters (	
Cadmium (mw-70)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data)	Num Obs 18  Number 14 3 17 17	Num Miss 1 Minimum 1.0000E-4 1.1000E-4 5.0000E-5 -9.816E-5	Num Valid 17  Maximum 0.001 2.4000E-4 2.4000E-4	Detects 3 Mean 3.9286E-4 1.6333E-4 3.5235E-4 1.9059E-4 5.0842E-5	NDs 14 Median 4.000E 4.000E 2.0000E 3.8881E-	% NDs 82.35% SD 42.9473E-4 46.8069E-5 42.8159E-4 41.3562E-4 59.0895E-5	ameters (	
Cadmium (mw-70)  Raw Statistics  Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value)	Num Obs 18 Number 14 3 17 17	Num Miss 1 Minimum 1.0000E-4 1.1000E-4 5.0000E-5 -9.816E-5 1.1000E-4	Num Valid 17  Maximum 0.001 2.4000E-4 0.001 5.0000E-4 2.4000E-4 0.01	Detects 3 Mean 3.9286E-4 1.6333E-4 3.5235E-4 1.9059E-4 5.0842E-5 0.00826	NDs 14 Median 4.000E 4.000E 2.0000E 3.8881E 0.01	% NDs 82.35% SD 42.9473E-4 46.8069E-5 42.8159E-4 41.3562E-4	ameters (	

	K hat	K Star		Log Mean	_	Log CV		
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A		
Statistics (NDs = DL)	1.892		1.8622E-4		0.791	-0.096		
Statistics (NDs = DL/2)	2.208	1.857	8.6329E-5	-8.809	0.749	-0.085		
Statistics (Gamma ROS Estimates)	1.053	0.906	0.00785	-5.341	1.644	-0.308		
Statistics (Lognormal ROS Estimates)	-			-9.435	0.534	-0.0566		
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	lormal RO				+
Correlation Coefficient R	0.955	0.887	0.903	0.993				
		1	1					
		Crit. (0.05)		nclusion wi	th Alpha(0.	05)		
Shapiro-Wilk (Detects Only)	0.912			ear Normal				
Shapiro-Wilk (NDs = DL)	0.782		Data Not I					
Shapiro-Wilk (NDs = DL/2)	0.812		Data Not I					
Shapiro-Wilk (Normal ROS Estimates)	0.984		Data Appe					
Lilliefors (Detects Only)	0.301			ear Normal				
Lilliefors (NDs = DL)	0.256		Data Not I					
Lilliefors (NDs = DL/2)	0.237	0.207	Data Not I	Normal	<del>.</del>	-		
Lilliefors (Normal ROS Estimates)	0.0953	0.207	Data Appe	ear Normal				
Ga	mma GOF	Test Resu	ilts					
	N- ND-	ND DI	VD DI "	DO				
Correlation Coefficient R	No NDs N/A	0.947	0.947	amma RO 0.436				
Correlation Coefficient IV	111/7	0.347	0.347	0.430				_
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	05)		
Anderson-Darling (Detects Only)	N/A	N/A		TICIUSIOTI WI	ui / upila(o.	00)		+
Kolmogorov-Smirnov (Detects Only)	N/A	N/A						+
Anderson-Darling (NDs = DL)	0.864	0.751						_
Kolmogorov-Smirnov (NDs = DL)	0.192	0.212	Detected I	Data appea	ar Annroxin	nate Gamm		_
Anderson-Darling (NDs = DL/2)	0.763	0.749	Detected	Data appec	л трргохііі	iato admin		+
Kolmogorov-Smirnov (NDs = DL/2)	0.205	0.211	Detected I	Data appea	r Δnnrovin	ate Gamm		
derson-Darling (Gamma ROS Estimates)	4.965	0.765	Detected i	Data appea	ii Appioxiii	iate Gaiiiii		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.524		Data Not (	Gamma Dis	stributed			
Logr	normal GO	F Test Res	ults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				+
Correlation Coefficient R	0.977	0.946	0.948	0.994				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alnha(N	05)		
Shapiro-Wilk (Detects Only)	0.954			ear Lognorr	<u> </u>			+
Shapiro-Wilk (NDs = DL)	0.877		Data Not I					+
Shapiro-Wilk (NDs = DL/2)	0.877		Data Not I	-				+
Shapiro-Wilk (Lognormal ROS Estimates)	0.984			ear Lognorr	mal			+
Lilliefors (Detects Only)	0.964			ear Lognorr				
Lilliefors (NDs = DL)	0.203	0.425	Data Not I		nai			
<u> </u>								
Lilliefors (NDs = DL/2)	0.24	0.207	Data Not I		mal			
Lilliefors (Lognormal ROS Estimates)	0.0953	0.207	рака Арре	ear Lognorr	ııdı			
							ļ	

							$\overline{}$
Chromium (background)							-
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	46	4	42	4	38	90.48%	
	Number		Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	38	5.0000E-4		0.00304	0.002	0.00253	
Statistics (Non-Detects Only)	4	6.0000E-4		0.00213		0.00163	
Statistics (All: NDs treated as DL value)		5.0000E-4		0.00295		0.00246	
Statistics (All: NDs treated as DL/2 value)	42	2.5000E-4		0.00158		0.00129	
Statistics (Normal ROS Imputed Data)	42	-0.00557		-0.00185	-0.00192		
Statistics (Gamma ROS Imputed Data)	42	6.0000E-4		0.00925	0.01	0.00238	
Statistics (Lognormal ROS Imputed Data)	42	2.3865E-5	0.0041	4.0660E-4	1./681E-4	7.4610E-4	
	17 15 -4	I/ Ot- ::	Th -4- h -4	l M	1 Otal	1 0\/	
Statistics (Non Datasta Cult.)	K hat 1.993	K Star 0.665	0.00107	Log Mean -6.425	0.891	Log CV -0.139	
Statistics (Non-Detects Only) Statistics (NDs = DL)	1.644	1.542	0.00107	-6.425 -6.159	0.891	-0.139	
Statistics (NDs = DL)  Statistics (NDs = DL/2)	1.643		9.6035E-4	-6.159 -6.786	0.868	-0.14	
Statistics (Gamma ROS Estimates)	5.403	5.033	0.00171	-4.779	0.592	-0.128	
Statistics (Canima NOS Estimates)	3.403	5.055	0.0017	-8.606	1.201	-0.124	
Otatistics (Logitornia 1100 Estimates)				-0.000	1.201	-0.14	
No	rmal GOF	Test Resu	lts				
							-
	No NDs	NDs = DL	NDs = DL/2	Iormal RO			-
Correlation Coefficient R	0.968	0.895	0.911	0.989			
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.922	0.748	Data Appe	ear Normal			
Shapiro-Wilk (NDs = DL)	0.76	0.942	Data Not I	Normal			
Shapiro-Wilk (NDs = DL/2)	0.784	0.942	Data Not I	Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.931	0.942	Data Not I	Normal			
Lilliefors (Detects Only)	0.255	0.375	Data Appe	ear Normal			
Lilliefors (NDs = DL)	0.177		Data Not I				
Lilliefors (NDs = DL/2)	0.196		Data Not I	Normal			
Lilliefors (Normal ROS Estimates)	0.0608	0.135	Data Appe	ear Normal			
Ga	mma GOF	Test Resu	ılts				
	No ND-	NDs = D'	NDs - DI "	omma DO			
Correlation Coefficient D	No NDs			amma RO			
Correlation Coefficient R	0.961	0.957	0.969	0.463			
	Test value	Crit. (0.05)	Ca	nclusion wi	th Alpha/A	05)	
Anderson-Darling (Detects Only)	0.309	0.661	C0	iiciuSiO[] Wi	ıı Aibila(0	.00)	
Kolmogorov-Smirnov (Detects Only)	0.309	0.001	Detected	Data Appea	r Gamma	Dietributed	
Anderson-Darling (NDs = DL)		0.398	Detected I	oala Appea	ıı Ganıllıla	טוווטמופע	
Kolmogorov-Smirnov (NDs = DL)		0.765	Data Not (	Gamma Dis	trihuted		
Anderson-Darling (NDs = DL/2)	0.132	0.765	שמום ואטני (		เมนเ <del>เ</del> น		
Kolmogorov-Smirnov (NDs = DL/2)	0.908	0.703	Data Not (	Gamma Dis	tributed		
iderson-Darling (Gamma ROS Estimates)	13.37	0.752	Sala NOL	aaninia Dis	Dateu		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.533	0.137	Data Not (	Gamma Dis	tributed		
	2.000						
Loa	normal GO	F Test Res	sults				+

		GOODINE	00 01 111	0171110111	50			
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.976	0.968	0.973	0.989			Ī	
	Test value	Crit. (0.05)			th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.937		Data Appe	_	mal		1	
Shapiro-Wilk (NDs = DL)	0.871	0.942	Data Not L	.ognormal				
Shapiro-Wilk (NDs = DL/2)	0.88		Data Not L	-				
Shapiro-Wilk (Lognormal ROS Estimates)	0.928	0.942	Data Not L	.ognormal				
Lilliefors (Detects Only)	0.23	0.375	Data Appe	ar Lognorr	mal			
Lilliefors (NDs = DL)	0.175	0.135	Data Not L	.ognormal			i	
Lilliefors (NDs = DL/2)	0.174	0.135	Data Not L	.ognormal			i	
Lilliefors (Lognormal ROS Estimates)	0.0608	0.135	Data Appe	ar Lognorr	mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
							<del></del>	
Chromium (mw-66)								
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs		1
Raw Statistics	18	2	16	6	10	62.50%	I	
Traw Statistics	10		10	J	10	02.00 /0	<u> </u>	-
	Number	Minimum	Maximum	Mean	Median	SD		-
Statistics (Non-Detects Only)	10	0.001	0.005	0.00295				
Statistics (Non-Detects Only) Statistics (Non-Detects Only)	6	7.4000E-4		0.00293	0.00323	0.00142		
, , , , , , , , , , , , , , , , , , , ,								
Statistics (All: NDs treated as DL value)	16	7.4000E-4		0.00247				
Statistics (All: NDs treated as DL/2 value)	16	5.0000E-4		0.00155		8.5430E-4		
Statistics (Normal ROS Imputed Data)	16	2.7851E-4			9.9939E-4			
Statistics (Gamma ROS Imputed Data)	16	7.4000E-4		0.00688		0.00421		
Statistics (Lognormal ROS Imputed Data)	16	6.0747E-4	0.0031	0.00126	9.6783E-4	7./93/E-4	1	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	2.984		5.5957E-4	-6.572	0.636	-0.0968		
Statistics (NDs = DL)	2.828		8.7355E-4	-6.191	0.661	-0.107		
Statistics (NDs = DL/2)	3.422		4.5241E-4	-6.624	0.588	-0.0887		
Statistics (Gamma ROS Estimates)	1.523	1.279	0.00452	-5.343	1.05	-0.196		
Statistics (Lognormal ROS Estimates)				-6.811	0.49	-0.0719		
Stationes (Logiterman to a Loumates)				0.01.	00	0.07.10		-
No	rmal GOF	Test Resu	lts					
			Lin -: -1	==				
	No NDs		NDs = DL/2					
Correlation Coefficient R	0.878	0.953	0.956	0.919				
	_	la 1	-			A=\		
		Crit. (0.05)			th Alpha(0	.05)		<u> </u>
Shapiro-Wilk (Detects Only)	0.745		Data Not N					
Shapiro-Wilk (NDs = DL)	0.889		Data Appe				<u> </u>	
Shapiro-Wilk (NDs = DL/2)	0.899		Data Appe				<u> </u>	
Shapiro-Wilk (Normal ROS Estimates)	0.841		Data Not N				<u> </u>	
Lilliefors (Detects Only)	0.33	0.325	Data Not N	lormal				
Lilliefors (NDs = DL)	0.188	0.213	Data Appe	ar Normal				
Lilliefors (NDs = DL/2)	0.199	0.213	Data Appe	ar Normal			1	
Lilliefors (Normal ROS Estimates)	0.206	0.213	Data Appe	ar Normal				
							1	
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/2	amma RO				

Correlation Coefficient R	0.905	0.944	0.968	0.68				
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.7	0.701						
Kolmogorov-Smirnov (Detects Only)	0.301	0.335	Detected I	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	0.759	0.745						
Kolmogorov-Smirnov (NDs = DL)	0.184	0.217	Detected I	Data appea	ar Approxin	nate Gamn		
Anderson-Darling (NDs = DL/2)	0.457	0.743						
Kolmogorov-Smirnov (NDs = DL/2)	0.187	0.216	Data Appe	ear Gamma	a Distribute	d		
nderson-Darling (Gamma ROS Estimates)	2.444	0.754						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.401	0.219	Data Not 0	Gamma Dis	stributed			
Logi	normal GO	F Test Res	sults					
	No NDs	NDe - DI	NDs = DL/2	Log POS				
Correlation Coefficient R	0.921	0.952	0.975	0.936				
Correlation Coefficient K	0.921	0.932	0.975	0.930				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.823		Data Appe	_	mal			
Shapiro-Wilk (NDs = DL)	0.886		Data Not L					
Shapiro-Wilk (NDs = DL/2)	0.934	0.887	Data Appe	ear Lognori	mal		-	
Shapiro-Wilk (Lognormal ROS Estimates)	0.871	0.887	Data Not L	ognormal				
Lilliefors (Detects Only)	0.262	0.325	Data Appe	ear Lognori	mal			
Lilliefors (NDs = DL)	0.174	0.213	Data Appe	ear Lognori	mal			
Lilliefors (NDs = DL/2)	0.194	0.213	Data Appe	ear Lognori	mal			
Lilliefors (Lognormal ROS Estimates)	0.197	0.213	Data Appe	ear Lognori	mal			
Chromium (mw-67)								
	Num Ohs		1	r				
Daw Statistics			Num Valid		NDs	% NDs		
Raw Statistics	18	Num Miss 1	Num Valid 17	Detects 4	NDs 13	% NDs 76.47%		
raw Statistics	18	1	17	4	13	76.47%		
	18 Number	1 Minimum	17 Maximum	4 Mean	13 Median	76.47% SD		
Statistics (Non-Detects Only)	18	1 Minimum 5.0000E-4	17 Maximum 0.005	4	13	76.47%		
Statistics (Non-Detects Only) Statistics (Non-Detects Only)	18 Number 13 4	1 Minimum 5.0000E-4 5.8000E-4	17 Maximum 0.005 0.0016	4 Mean 0.0025 9.1250E-4	13 Median 0.002 7.3500E-4	76.47% SD 0.00154 4.6557E-4		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value)	18 Number 13 4 17	1 Minimum 5.0000E-4 5.8000E-4 5.0000E-4	Maximum 0.005 0.0016 0.005	4 Mean 0.0025 9.1250E-4 0.00213	13 Median 0.002 7.3500E-4 0.002	76.47% SD 0.00154 4.6557E-4 0.00152		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value)	18  Number 13 4 17 17	1 Minimum 5.0000E-4 5.8000E-4 5.0000E-4 2.5000E-4	Maximum 0.005 0.0016 0.005 0.0025	4 Mean 0.0025 9.1250E-4 0.00213 0.00117	13 Median 0.002 7.3500E-4 0.002	76.47% SD 0.00154 4.6557E-4 0.00152 7.1255E-4		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data)	Number 13 4 17 17	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 -2.757E-4	Maximum 0.005 0.0016 0.005 0.0025 0.0016	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4	Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4	76.47% SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	18  Number 13 4 17 17 17	1 Minimum 5.0000E-4 5.8000E-4 5.0000E-4 2.5000E-4 5.8000E-4	17  Maximum 0.005 0.0016 0.005 0.0025 0.0016 0.01	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786	13 Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01	76.47% SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	Number 13 4 17 17	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 -2.757E-4	17  Maximum 0.005 0.0016 0.005 0.0025 0.0016 0.01	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786	13 Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01	76.47% SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	18  Number 13 4 17 17 17	1 Minimum 5.0000E-4 5.8000E-4 5.0000E-4 2.5000E-4 5.8000E-4	17  Maximum 0.005 0.0016 0.0025 0.0025 0.0016 0.001	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786	13 Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4	76.47% SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data)	18  Number 13 4 17 17 17 17 17	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 -2.757E-4 5.8000E-4 2.6316E-4	17  Maximum 0.005 0.0016 0.0025 0.0025 0.0016 0.001	4 Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4	13 Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4	76.47% SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	18  Number 13 4 17 17 17 17 17 17 K hat	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 2.757E-4 5.8000E-4 2.6316E-4	17  Maximum 0.005 0.0016 0.0025 0.0016 0.01 0.0016 Theta hat	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4	13 Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4	76.47% SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4 Log CV		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)	18  Number 13 4 17 17 17 17 17 K hat 6.26	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 -2.757E-4 5.8000E-4 2.6316E-4 K Star 1.732 1.635	17  Maximum 0.005 0.0016 0.0025 0.0025 0.0016 0.01 0.0016 Theta hat 1.4577E-4	4  Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4  Log Mean -7.081 -6.433	13 Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4 Log Stdv 0.446	76.47%  SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4  Log CV -0.063		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL)	18  Number 13 4 17 17 17 17 17 17 18  K hat 6.26 1.937	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 -2.757E-4 5.8000E-4 2.6316E-4 K Star 1.732 1.635	17  Maximum 0.005 0.0016 0.0025 0.0016 0.001 0.0016 Theta hat 1.4577E-4 0.0011	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4 Log Mean -7.081 -6.433 -6.963	13  Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4  Log Stdv 0.446 0.806	76.47%  SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4  Log CV -0.063 -0.125		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Lognormal ROS Imputed Data) Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2)	18  Number 13 4 17 17 17 17 17 17 25 19 19 19 19 19 19 19 19 19 19 19 19 19	1 Minimum 5.0000E-4 5.8000E-4 5.0000E-4 2.5000E-4 5.8000E-4 2.6316E-4 K Star 1.732 1.635 2.1	17  Maximum 0.005 0.0016 0.005 0.0025 0.0016 0.01 0.0016 1.4577E-4 0.0011 4.6768E-4	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4 Log Mean -7.081 -6.433 -6.963	13  Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4  Log Stdv 0.446 0.806 0.719	76.47%  SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4  Log CV -0.063 -0.125 -0.103		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	18  Number 13 4 17 17 17 17 17 17 25 18 18 18 18 18 18 18 18 18 18 18 18 18	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 -2.757E-4 5.8000E-4 2.6316E-4 K Star 1.732 1.635 2.1 1.364	17  Maximum 0.005 0.0016 0.0025 0.0016 0.001 0.0016 Theta hat 1.4577E-4 0.0011 4.6768E-4 0.00488	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4 Log Mean -7.081 -6.433 -6.963 -5.188	13  Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4  Log Stdv 0.446 0.806 0.719 1.1	76.47%  SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4  Log CV -0.063 -0.125 -0.103 -0.212		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	18  Number 13 4 17 17 17 17 17 17 25 18 18 18 18 18 18 18 18 18 18 18 18 18	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 2.5000E-4 2.6316E-4 K Star 1.732 1.635 2.1 1.364	17  Maximum 0.005 0.0016 0.0025 0.0016 0.001 0.0016 Theta hat 1.4577E-4 0.0011 4.6768E-4 0.00488	Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4 Log Mean -7.081 -6.433 -6.963 -5.188	13  Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4  Log Stdv 0.446 0.806 0.719 1.1	76.47%  SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4  Log CV -0.063 -0.125 -0.103 -0.212		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	18  Number 13 4 17 17 17 17 17 17 17 2503 1.608  Permal GOF	1  Minimum 5.0000E-4 5.8000E-4 2.5000E-4 2.5000E-4 2.757E-4 5.8000E-4 2.6316E-4  K Star 1.732 1.635 2.1 1.364  Test Resu	17  Maximum 0.005 0.0016 0.0025 0.0016 0.001 0.0016 1.4577E-4 0.0011 4.6768E-4 0.00489	4  Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4  Log Mean -7.081 -6.433 -6.963 -5.188 -7.467	13  Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4  Log Stdv 0.446 0.806 0.719 1.1 0.447	76.47%  SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4  Log CV -0.063 -0.125 -0.103 -0.212		
Statistics (Non-Detects Only) Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value) Statistics (Normal ROS Imputed Data) Statistics (Gamma ROS Imputed Data) Statistics (Lognormal ROS Imputed Data)  Statistics (Non-Detects Only) Statistics (NDs = DL) Statistics (NDs = DL/2) Statistics (Gamma ROS Estimates) Statistics (Lognormal ROS Estimates)	18  Number 13 4 17 17 17 17 17 17 25 18 18 18 18 18 18 18 18 18 18 18 18 18	1 Minimum 5.0000E-4 5.8000E-4 2.5000E-4 2.5000E-4 2.757E-4 5.8000E-4 2.6316E-4  K Star 1.732 1.635 2.1 1.364  Test Resu	17  Maximum 0.005 0.0016 0.0025 0.0016 0.001 0.0016 Theta hat 1.4577E-4 0.0011 4.6768E-4 0.00488	4  Mean 0.0025 9.1250E-4 0.00213 0.00117 5.1818E-4 0.00786 6.3101E-4  Log Mean -7.081 -6.433 -6.963 -5.188 -7.467	13  Median 0.002 7.3500E-4 0.002 0.001 5.1157E-4 0.01 5.6809E-4  Log Stdv 0.446 0.806 0.719 1.1 0.447	76.47%  SD 0.00154 4.6557E-4 0.00152 7.1255E-4 4.5861E-4 0.00398 3.1723E-4  Log CV -0.063 -0.125 -0.103 -0.212		

	Toot value	Crit. (0.05)	Co	naluaian w	ith Alpha/A	0E)	
Shapiro-Wilk (Detects Only)	0.788	` '	Data Appe		ith Alpha(0	.05)	
Shapiro-Wilk (NDs = DL)			Data Not N				
Shapiro-Wilk (NDs = DL/2)							
Shapiro-Wilk (Normal ROS Estimates)			Data Appe				
			Data Appe				
Lilliefors (Detects Only)	0.362		Data Appe				
Lilliefors (NDs = DL)		0.207	• •				
Lilliefors (NDs = DL/2)		0.207					
Lilliefors (Normal ROS Estimates)	0.141	0.207	Data Appe	ear Normal			
Ga	mma GOF	Test Resu	ilts				
	No NDs	NDs = DL	NDs = DL/2	amma RO	)		
Correlation Coefficient R	0.952	0.948	0.956	0.555			
	Tost value	Crit. (0.05)	Col	nolucion w	ith Alpha(0	05)	
Anderson-Darling (Detects Only)	0.5	0.659	Col	ilciusion w	іні Аірпа(о	.03)	
Kolmogorov-Smirnov (Detects Only)		0.396	Detected I	Data Appe	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)		0.75					
Kolmogorov-Smirnov (NDs = DL)		0.212	Data Appe	ear Gamma	a Distribute	ed	
Anderson-Darling (NDs = DL/2)		0.747					
Kolmogorov-Smirnov (NDs = DL/2)		0.211	Data Appe	ear Gamma	a Distribute	ed	
derson-Darling (Gamma ROS Estimates)		0.754	zata / ippo	, a. a	2 2 10 11 10 11		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.483	0.213	Data Not (	Gamma Di	stributed		
,							
Log	normal GO	F Test Res	ults				
					T		
0 1 0 1			NDs = DL/2				
Correlation Coefficient R	0.924	0.964	0.969	0.984			
	T4 · l · -	O::+ (0.0E)	0		: Al- L /O	05)	
Chanina Wills (Data eta Only)		Crit. (0.05)			ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.864		Data Appe				
Shapiro-Wilk (NDs = DL)			Data Appe	_			
Shapiro-Wilk (NDs = DL/2)			Data Appe				
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe	-			
Lilliefors (Detects Only)	0.317		Data Appe	-			
Lilliefors (NDs = DL)							
Lilliefors (NDs = DL/2)		0.207					
Lilliefors (Lognormal ROS Estimates)	0.141	0.207	Data Appe	ear Lognor	mai		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Chromium (mw-68)							
	Num Oha	Num Mico	Num Valid	Detects	NDc	% NDs	
Raw Statistics			17	5	NDs 12	% NDS 70.59%	
raw Statistics	10	1	17	ວ	12	70.09%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	12	5.0000E-4		0.00267			
Statistics (Non-Detects Only)	5	7.2000E-4				2.4712E-4	
Statistics (All: NDs treated as DL value)		5.0000E-4		0.00216		0.00148	
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4		0.00210		6.5452E-4	
Statistics (Normal ROS Imputed Data)		3.8474E-4				2.2251E-4	
- anono (omai 1100 impatoa Data)		3.0 17 TL-T	3.5512	3.0 TO IL-			

Statistics (Gamma ROS Imputed Data)		7.2000E-4		0.00733		0.00426		
Statistics (Lognormal ROS Imputed Data)	17	5.0834E-4	0.0012	8.1108E-4	7.8824E-4	1.9646E-4	ļ	
	K hat	K Star		Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)			5.0682E-5		0.26	-0.0371		
Statistics (NDs = DL)	2.228		9.6811E-4		0.734	-0.115		
Statistics (NDs = DL/2)	3.347	2.796	3.6306E-4	-6.87	0.612	-0.089		
Statistics (Gamma ROS Estimates)	1.407	1.198	0.00521	-5.311	1.135	-0.214		
Statistics (Lognormal ROS Estimates)				-7.144	0.235	-0.0329		
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Jormal RO				
Correlation Coefficient R	0.894	0.934	0.962	0.976				
	Test value	Crit. (0.05)	Co	nclusion w	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.765	0.762	Data Appe	ear Normal				1
Shapiro-Wilk (NDs = DL)	0.859	0.892	Data Not I	Normal				1
Shapiro-Wilk (NDs = DL/2)		0.892	Data Appe	ear Normal				1
Shapiro-Wilk (Normal ROS Estimates)	0.95			ear Normal				1
Lilliefors (Detects Only)				ear Normal				1
Lilliefors (NDs = DL)			Data Not I					
Lilliefors (NDs = DL/2)				ear Normal				
Lilliefors (Normal ROS Estimates)				ear Normal				
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R		0.95	0.964	0.598				
	Test value	Crit. (0.05)	Co	nclusion w	th Alpha(0	.05)		
Anderson-Darling (Detects Only)					1 (-	/		
Kolmogorov-Smirnov (Detects Only)		0.357	Detected	Data Appe	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)		0.749	20.00.00	- u.u., .ppo		2.011.24100		
Kolmogorov-Smirnov (NDs = DL)		0.211	Data Anne	ear Gamma	n Distribute	ď		+
Anderson-Darling (NDs = DL/2)		0.745	Data / tppt	our dumme	, Diotributo			
Kolmogorov-Smirnov (NDs = DL/2)			Data Anne	ear Gamma	n Distribute	d		
nderson-Darling (Gamma ROS Estimates)	3.59	0.758	, pp	- 3. GG//////		-		+
Kolmogorov-Smirnov (Gamma ROS Est.)			Data Not (	Gamma Di	stributed			+
	3.400	3.210	2010 1101					+
Logi	normal GO	F Test Res	sults					+
Logi								+
	No NDs	NDs = DI	NDs = DI /	Log ROS				+
Correlation Coefficient R			0.97	0.978				
Correlation Coefficient N	0.303	0.37	0.37	0.370				-
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha/0	05)		-
Shapiro-Wilk (Detects Only)	0.782	` ′		ear Lognor		.00)		-
Shapiro-Wilk (NDs = DL)				ear Lognon				-
Shapiro-Wilk (NDs = DL/2)				ear Lognori				+
, , ,								-
Shapiro-Wilk (Lognormal ROS Estimates)				ear Lognor				1
Lilliefors (Detects Only)				ear Lognor				1
Lilliefors (NDs = DL)				ear Lognor				
Lilliefors (NDs = DL/2)				ear Lognor				
Lilliefors (Lognormal ROS Estimates)	0.163	0.207	Data Appe	ear Lognor	mai			

							$\overline{}$
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
							+
Chromium (mw-69)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	1	17	3	14	82.35%	
	Number	_	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	14	5.0000E-4		0.00236		0.00157	
Statistics (Non-Detects Only)	3	7.6000E-4	8.3000E-4	8.0000E-4	8.1000E-4	3.6056E-5	
Statistics (All: NDs treated as DL value)		5.0000E-4	0.005	0.00208	0.002	0.00155	
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4	0.0025	0.00111	0.001	7.2501E-4	
Statistics (Normal ROS Imputed Data)		6.4734E-4	8.3000E-4	7.4151E-4	7.4151E-4	5.2676E-5	
Statistics (Gamma ROS Imputed Data)	17	7.6000E-4	0.01	0.00838	0.01	0.00362	
Statistics (Lognormal ROS Imputed Data)	17	6.5981E-4	8.3000E-4	7.4429E-4	7.4276E-4	4.9311E-5	
	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)	1.825	1.543	0.00114	-6.472	0.827	-0.128	
Statistics (NDs = DL/2)	2.223	1.87	5.0021E-4	-7.043	0.766	-0.109	
Statistics (Gamma ROS Estimates)	2.012	1.696	0.00416	-5.051	0.993	-0.197	
Statistics (Lognormal ROS Estimates)				-7.205	0.0663	-0.0092	
			l .				
No	ormal GOF	Test Resu	lts				+
							+
	No NDs	NDs = DL	NDs = DL/2	Iormal RO			+
Correlation Coefficient R	0.971	0.93	0.951	0.992			+
							+
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)	+
Shapiro-Wilk (Detects Only)	0.942	0.767	Data Appe				+
Shapiro-Wilk (NDs = DL)	0.849	0.892	Data Not N	lormal			+
Shapiro-Wilk (NDs = DL/2)	0.89	0.892	Data Not N	lormal			+
Shapiro-Wilk (Normal ROS Estimates)	0.974	0.892	Data Appe	ar Normal			+
Lilliefors (Detects Only)	0.276		Data Appe				+
Lilliefors (NDs = DL)			Data Not N				+
Lilliefors (NDs = DL/2)		0.207	Data Not N	lormal			+
Lilliefors (Normal ROS Estimates)			Data Appe				
,							+
Ga	mma GOF	Test Resu	ılts				+
			-				+
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R		0.943	0.953	0.508			-
2 3 2.23 2002.011611	1		2.300	2.300			+
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)	-
Anderson-Darling (Detects Only)	N/A	N/A			p(0	- /	+
Kolmogorov-Smirnov (Detects Only)		N/A					+
Anderson-Darling (NDs = DL)		0.752					+
Kolmogorov-Smirnov (NDs = DL)		0.212	Detected D	)ata annea	ır Approxin	nate Gamm	+
Anderson-Darling (NDs = DL/2)		0.749		appoo		Gaiiiii	1
					Distributo	ıd	+
	0 176	(1) (2) 11	II)ata ∆nn≏	ar (famma	I I JISHIMINA		
Kolmogorov-Smirnov (NDs = DL/2)		0.211	Data Appe	ar Gamma	Distribute	·u	+
	4.865	0.749	Data Appe			·u	

UR	S PIOUCL	GOODNE	33 OF FII	STATISTIC	J3		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/	Log ROS			
Correlation Coefficient R	0.968	0.957	0.962	0.992			
		Crit. (0.05)		nclusion wi		.05)	
Shapiro-Wilk (Detects Only)	0.938			ear Lognori			
Shapiro-Wilk (NDs = DL)	0.892	0.892	Data Appe	ear Lognori			
Shapiro-Wilk (NDs = DL/2)	0.907	0.892	Data Appe				
Shapiro-Wilk (Lognormal ROS Estimates)	0.974	0.892	Data Appe	ear Lognori	mal		
Lilliefors (Detects Only)	0.28	0.425	Data Appe	ear Lognori	mal		
Lilliefors (NDs = DL)	0.171			ear Lognori			
Lilliefors (NDs = DL/2)	0.155	0.207	Data Appe	ear Lognori	mal		
Lilliefors (Lognormal ROS Estimates)	0.0882	0.207	Data Appe	ear Lognori	mal		
	<b></b>						
Note: Substitution methods such as DL or	טט2 are n	ot recomm	enaed.				 
Observations (many 70)							 
Chromium (mw-70)							 
	Ni Ol	Ni NA	Nicona No. 11	D-4 ·	ND	0/ ND	 
B. 0		Num Miss			NDs	% NDs	 
Raw Statistics	18	1	17	5	12	70.59%	 
	Number		Maximum		Median	SD	
Statistics (Non-Detects Only)	12	5.0000E-4		0.00342			
Statistics (Non-Detects Only)	5	6.0000E-4			8.4000E-4	0.00131	
Statistics (All: NDs treated as DL value)	17	5.0000E-4		0.00284		0.00235	
Statistics (All: NDs treated as DL/2 value)	17	2.5000E-4		0.00164			
Statistics (Normal ROS Imputed Data)	17	-0.00112		7.9383E-4		0.00106	
Statistics (Gamma ROS Imputed Data)	17	6.0000E-4		0.00749		0.00406	
Statistics (Lognormal ROS Imputed Data)	17	2.2603E-4	0.0037	9.2925E-4	6.5926E-4	8.0575E-4	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	2.048	0.952	7.1880E-4	-6.785	0.771	-0.114	
Statistics (NDs = DL)	1.723	1.458	0.00165	-6.18	0.858	-0.139	
Statistics (NDs = DL/2)	2.11	1.777	7.7676E-4	-6.669	0.762	-0.114	
Statistics (Gamma ROS Estimates)	1.565	1.328	0.00479	-5.246	1.094	-0.208	
Statistics (Lognormal ROS Estimates)				-7.205	0.645	-0.0895	
No	rmal GOF	Test Resu	Its				
			ı	I			
	No NDs			lormal RO			
Correlation Coefficient R	0.874	0.897	0.92	0.944			 
	T	T -	T				
		Crit. (0.05)		nclusion wi	. ,	.05)	
Shapiro-Wilk (Detects Only)	0.768			ear Normal			
Shapiro-Wilk (NDs = DL)	0.817		Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.855		Data Not I				
Shapiro-Wilk (Normal ROS Estimates)	0.914			ear Normal			
Lilliefors (Detects Only)	0.285			ear Normal			
Lilliefors (NDs = DL)	0.194	0.207		ear Normal			
Lilliefors (NDs = DL/2)	0.208	0.207	Data Not I	Normal			
Lilliefors (Normal ROS Estimates)	0.189	0.207	Data Appe	ear Normal			
Ga	mma GOF	Test Resu	ılts				

	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R		0.964	0.984	0.611			
	Test value	Crit. (0.05)	Co	nclusion wit	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.49	0.684					
Kolmogorov-Smirnov (Detects Only)	0.288	0.36	Detected [	Data Appea	r Gamma	Distributed	
Anderson-Darling (NDs = DL)		0.753					
Kolmogorov-Smirnov (NDs = DL)		0.212	Data Appe	ear Gamma	Distribute	d	
Anderson-Darling (NDs = DL/2)		0.749					
Kolmogorov-Smirnov (NDs = DL/2)			Data Appe	ear Gamma	Distribute	d	
nderson-Darling (Gamma ROS Estimates)		0.755					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.446	0.213	Data Not (	Gamma Dis	tributed		
Log	normal GO	F Test Res	vulte				
Logi	ioilliai GO	r rest nes	buits				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.938	0.974	0.988	0.966			
	···	0 (0.05)	_		L ALL (2	05)	
Chanina Mills (Data at O. 1.)		Crit. (0.05)		nclusion wit		.05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)	0.87 0.942			ear Lognorn ear Lognorn			
Shapiro-Wilk (NDs = DL/2)	0.942			ear Lognorn			
Shapiro-Wilk (Lognormal ROS Estimates)	0.948			ear Lognorn			
Lilliefors (Detects Only)	0.25			ear Lognorn			
Lilliefors (NDs = DL)	0.162			ear Lognorn			
Lilliefors (NDs = DL/2)	0.136			ear Lognorn			
Lilliefors (Lognormal ROS Estimates)	0.158			ear Lognorn			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Cobalt (background)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	46	1	45	27	18	40.00%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	18	2.0000E-4	0.01	0.00368	0.002	0.0033	
Statistics (Non-Detects Only)	27	0.0012	0.0087	0.00425	0.0034	0.0022	
Statistics (All: NDs treated as DL value)	45	2.0000E-4	0.01	0.00402	0.0026	0.00267	
Statistics (All: NDs treated as DL/2 value)	45	1.0000E-4		0.00328	0.0025	0.00231	
Statistics (Normal ROS Imputed Data)	45	-0.00246		0.00269	0.0024	0.00284	
Statistics (Gamma ROS Imputed Data)	45	0.0012	0.01	0.00655	0.0067	0.00331	
Statistics (Lognormal ROS Imputed Data)	45	6.8746E-4	0.0087	0.00318	0.0024	0.00222	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	3.644	3.263	0.00117	-	0.564	-0.101	
Statistics (NDs = DL)	2.103	1.977	0.00191		0.796	-0.138	
Statistics (NDs = DL/2)	1.656	1.56	0.00198		0.946	-0.156	
Statistics (Gamma ROS Estimates)	2.99	2.805	0.00219	-5.205	0.658	-0.126	
Statistics (Lognormal ROS Estimates)				-5.994	0.717	-0.12	
		Took B	la				
No.	ormai GOF	Test Resu	ITS				

	.00002		33 OF FII 3					
	No NDs	NDs = DL	NDs = DL/Ac	ormal RO				
Correlation Coefficient R	0.948	0.953	0.957	0.986				
			,					
	Test value	Crit. (0.05)	Cond	clusion wit	th Alpha(0.05)	)		
Shapiro-Wilk (Detects Only)	0.887	0.923	Data Not No	ormal				
Shapiro-Wilk (NDs = DL)	0.893	0.945	Data Not No	ormal				
Shapiro-Wilk (NDs = DL/2)	0.9	0.945	Data Not No	ormal				
Shapiro-Wilk (Normal ROS Estimates)	0.957	0.945	Data Appea	r Normal				
Lilliefors (Detects Only)	0.217	0.167	Data Not No	ormal				
Lilliefors (NDs = DL)	0.214	0.131	Data Not No	ormal				
Lilliefors (NDs = DL/2)		0.131	Data Not No	ormal				
Lilliefors (Normal ROS Estimates)	0.128	0.131	Data Appea	r Normal				
,								
Ga	mma GOF	Test Resu	ilts					
	No NDs	NDs = DL	NDs = DL/aa	mma RO				
Correlation Coefficient R		0.973	0.958	0.845				
	<u>I</u>	1						
	Test value	Crit. (0.05)	Cond	clusion wit	h Alpha(0.05)	)		
Anderson-Darling (Detects Only)	1.193	0.75			, , (2.20)			
Kolmogorov-Smirnov (Detects Only)		0.169	Data Not Ga	amma Dis	tributed			
Anderson-Darling (NDs = DL)		0.76						
Kolmogorov-Smirnov (NDs = DL)		0.133	Data Not Ga	amma Dis	tributed			
Anderson-Darling (NDs = DL/2)	0.907	0.766	Data Not Gt		inbatea			
Kolmogorov-Smirnov (NDs = DL/2)	0.146	0.134	Data Not Ga	amma Dis	tributed			
nderson-Darling (Gamma ROS Estimates)	3.052	0.756	Data Not Gt		inbatea			
Kolmogorov-Smirnov (Gamma ROS Est.)			Data Not Ga	amma Dis	tributed			
Tromogerev emmer (demme 1100 Est.)	0.200	0.100	Data Hot Ge		inbutou			
Log	normal GO	F Test Res	uilte					
	normal ac							
	No NDs	NDs = DI	NDs = DL/2 L	og ROS				
Correlation Coefficient R		0.959	0.951	0.98				
	0.000	0.000	0.001	0.00				
	Test value	Crit. (0.05)	Conc	clusion wit	h Alpha(0.05)	١		
Shapiro-Wilk (Detects Only)	0.901		Data Not Lo		, «pria(0.00)	'	-	
Shapiro-Wilk (NDs = DL)			Data Not Lo					
Shapiro-Wilk (NDs = DL/2)			Data Not Lo					
Shapiro-Wilk (Lognormal ROS Estimates)			Data Not Lo	U				
Lilliefors (Detects Only)			Data Not Lo	-				
Lilliefors (Detects Only)  Lilliefors (NDs = DL)			Data Not Lo					
Lilliefors (NDs = DL/2)			Data Not Lo	-				
,					201			
Lilliefors (Lognormal ROS Estimates)	0.099	0.131	Data Appea	ıı Lognorn	ıaı			
Note: Substitution methods such as DL or	DI /2	ot rece===	onded					
INOIGE. Substitution methods such as DL or	ש⊔∠ are n	or recomm	enueu.	Г				
Coholt (my 66)								
Cobalt (mw-66)								
David Ohakis il								
Raw Statistics		10						
Number of Valid Ob								
Number of Distinct Ob		17						
	Minimum	0.0029						
	Maximum	0.01						
	Raw Data	0.00708						
Standard Deviation of	Raw Data	0.00149	1					

	Khat							
	Theta hat	3.8431E-4						
	Kstar	15.38						
	Theta star	4.6006E-4						
Mean of Log Transfor	med Data	-4.978						
Standard Deviation of Log Transfor	med Data	0.261						
Normal GOF Test Result	ts							
Correlation Co	efficient R	0.933						
Shapiro Wilk Tes	st Statistic	0.898						
Shapiro Wilk Critical (0.	.05) Value	0.897						
Approximate Shapiro Wil	lk P Value	0.0409						
Lilliefors Tes	st Statistic	0.175						
Lilliefors Critical (0.	.05) Value	0.202						
Data appear Normal at (0.05) Significance	Level							
, , ,								
Gamma GOF Test Resul	its							
Correlation Co	officient P	0.914						
	st Statistic	1.181						
A-D res								
`	st Statistic							
K-S Critical(0.0								
Data not Gamma Distributed at (0.05) Sign	ITICANCE L	evel						
Lognormal GOF Test Resi	ults							
Correlation Co		0.863						
Shapiro Wilk Tes								
Shapiro Wilk Critical (0.								
Approximate Shapiro Wil								
Lilliefors Tes		0.225						
Lilliefors Critical (0.	,	0.202						
Data not Lognormal at (0.05) Significance I	Level							
Cobalt (mw-67)								
		-	I		'	04		
			Num Valid		NDs	% NDs		
Raw Statistics	18	0	18	17	1	5.56%		
				-1	·r	_		
	Number		Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	1	0.01	0.01	0.01	0.01	N/A		
Statistics (Non-Detects Only)	17	0.0025	0.0078	0.00541	0.0057	0.00142		
Statistics (All: NDs treated as DL value)	18	0.0025	0.01	0.00566	0.00575	0.00175		
Statistics (All: NDs treated as DL/2 value)	18	0.0025	0.0078	0.00538	0.0055	0.00138		
Statistics (Normal ROS Imputed Data)	18	0.0025	0.0078	0.00541	0.00555	0.00137		
Statistics (Gamma ROS Imputed Data)	18	0.0025	0.01	0.00566	0.00575	0.00175		
Statistics (Lognormal ROS Imputed Data)	18	0.0025	0.0078	0.00539	0.0055	0.00137	-	
				'	,			
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	12.78	10.56	4.2306E-4	-5.26	0.308	-0.0585		
Statistics (NDs = DL)	10.29	8.608	5.5039E-4	-5.224	0.336	-0.0644		
Statistics (NDs = DL/2)	13.46	11.26	3.9981E-4	-5.262	0.299	-0.0568		
· · · · · · · · · · · · · · · · · · ·								

0	10.00	0.000	E 50005 d	5.004	0.000	0.0044	 
Statistics (Gamma ROS Estimates)	10.29		5.5039E-4	-5.224	0.336	-0.0644	
Statistics (Lognormal ROS Estimates)				-5.26	0.299	-0.0568	
No	rmal GOF	Test Resu	lts				
	No NDs	NDc - DI	NDs = DL/2	Iormal DO			
Correlation Coofficient D		0.972	0.978	0.977			1
Correlation Coefficient R	0.977	0.972	0.978	0.977			
	Tootyolyo	C-:+ (0.0E)	Con		th Almha/A	OE)	
OL : W(II (D O I )		Crit. (0.05)			th Alpha(0.	.05)	
Shapiro-Wilk (Detects Only)			Data Appe				
Shapiro-Wilk (NDs = DL)			Data Appe				
Shapiro-Wilk (NDs = DL/2)			Data Appe				
Shapiro-Wilk (Normal ROS Estimates)			Data Appe				
Lilliefors (Detects Only)			Data Appe				
Lilliefors (NDs = DL)			Data Appe				
Lilliefors (NDs = DL/2)			Data Appe				
Lilliefors (Normal ROS Estimates)	0.102	0.202	Data Appe	ar Normal			_
		T4 D	-la-				
Ga	mma GOF	rest Rest	IITS				
	No NDc	NDe - Di	NDs = DL/2	amma PO			-
Correlation Coefficient R		0.976	0.959	0.976			
Correlation Coefficient N	0.930	0.970	0.555	0.970			
	Toct value	Crit. (0.05)	Cor	olucion wi	th Alpha(0.	05)	-
Anderson-Darling (Detects Only)		0.739	Coi	iciusion wi	iii Aipiia(0.	.03)	
Kolmogorov-Smirnov (Detects Only)		0.739	Detected F	Ooto Anno	ar Camma	Diatributas	
Anderson-Darling (NDs = DL)		0.209	Detected [	лата Аррес	ai Gaillilla	Distributed	-
Kolmogorov-Smirnov (NDs = DL)		0.739	Data Appe	or Commo	Dictributo	d	
Anderson-Darling (NDs = DL/2)	0.606	0.203	рата Арре	ai Gaiiiiia	Distribute	u	
Kolmogorov-Smirnov (NDs = DL/2)		0.739	Data Anna	or Commo	Diatributa	4	
nderson-Darling (Gamma ROS Estimates)		0.203	Data Appe	ai Gaiiiiia	Distribute	u	
Kolmogorov-Smirnov (Gamma ROS Est.)			Data Appe	ar Camma	Distributs	۵	
Kollilogolov-Sillililov (Gallilla ROS Est.)	0.122	0.203	рата Арре	ai Gaiiiiia	Distribute	u	-
Log	normal GO	F Test Res	sults				-
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.933	0.957	0.933	0.932			
	l .	<u> </u>	<u> </u>		<u> </u>		
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	.05)	
Shapiro-Wilk (Detects Only)	0.873	, ,	Data Not L	.ognormal	. ,		
Shapiro-Wilk (NDs = DL)	0.926	0.897	Data Appe	-	mal		1
Shapiro-Wilk (NDs = DL/2)		0.897	Data Not L	-			1
Shapiro-Wilk (Lognormal ROS Estimates)		0.897	Data Not L				
Lilliefors (Detects Only)		0.207	Data Appe		mal		1
Lilliefors (NDs = DL)		0.202					1
Lilliefors (NDs = DL/2)		0.202		_			1
Lilliefors (Lognormal ROS Estimates)			Data Appe				+
/	1	I	1				
Note: Substitution methods such as DL or	DL/2 are r	ot recomm	ended.				
0.1.1.7.20							
Cobalt (mw-68)							
	Num Oho	Num Mico	Num Valid	Detects	NDs	% NDs	
Raw Statistics		0	18	15	3	% NDS	
Haw Statistics	10	U	10	ເນ	J	10.07%	

	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	3	0.002	0.01	0.00467	0.002	0.00462	
Statistics (Non-Detects Only)	15	0.002	0.0053	0.00467		9.7541E-4	
Statistics (All: NDs treated as DL value)		0.0017	0.0053	0.0027			
Statistics (All: NDs treated as DL/2 value)	18	0.0017	0.0053	0.00303	0.00245		
<u>'</u>							
Statistics (Normal ROS Imputed Data)	18	0.00122		0.00255		9.7655E-4	
Statistics (Gamma ROS Imputed Data)	18	0.0017	0.01	0.00392	0.00255		
Statistics (Lognormal ROS Imputed Data)	18	0.00153	0.0053	0.00257	0.00242	9.4787E-4	
	161 .	14.00				. 01/	
	K hat	K Star		Log Mean		Log CV	
Statistics (Non-Detects Only)	9.996			-5.965	0.318	-0.0533	
Statistics (NDs = DL)	4.413		6.8610E-4	-5.917	0.444	-0.075	
Statistics (NDs = DL/2)	5.391		4.8954E-4	-6.033	0.457	-0.0758	
Statistics (Gamma ROS Estimates)	2.704	2.291	0.00145	-5.739	0.596	-0.104	
Statistics (Lognormal ROS Estimates)				-6.017	0.322	-0.0535	
No	rmal GOF	Test Resu	lts				
	No NDs	NDs = DL	NDs = DL/2	Normal RO			
Correlation Coefficient R	0.915	0.774	0.954	0.93			
				· ·			
	Test value	Crit. (0.05)	Coi	nclusion wit	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.845	0.881	Data Not N	Normal			
Shapiro-Wilk (NDs = DL)	0.623	0.897	Data Not N	Normal			
Shapiro-Wilk (NDs = DL/2)	0.908	0.897	Data Appe	ar Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.878	0.897	Data Not N				
Lilliefors (Detects Only)		0.22	Data Appe	ar Normal			
Lilliefors (NDs = DL)		0.202	Data Not N				
Lilliefors (NDs = DL/2)		0.202	Data Appe	ar Normal			
Lilliefors (Normal ROS Estimates)			Data Not N				
,							
Ga	mma GOF	Test Resu	ilts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	0.958	0.875	0.98	0.91			
	Test value	Crit. (0.05)	Cor	nclusion wit	th Alpha(0	.05)	 1
Anderson-Darling (Detects Only)	0.481	0.737					 <u> </u>
Kolmogorov-Smirnov (Detects Only)	0.172	0.222	Detected [	Data Appea	ır Gamma	Distributed	 1
Anderson-Darling (NDs = DL)	1.426	0.743		1,1,30			 +
Kolmogorov-Smirnov (NDs = DL)		0.204	Data Not (	Gamma Dis	tributed		
Anderson-Darling (NDs = DL/2)	0.337	0.743					+
Kolmogorov-Smirnov (NDs = DL/2)	0.123	0.204	Data Anne	ar Gamma	Distribute	hd	 1
nderson-Darling (Gamma ROS Estimates)		0.204	Data Appe	ar adminid	Distribute		 <del>                                     </del>
Kolmogorov-Smirnov (Gamma ROS Est.)	0.25		Data Not (	Gamma Dis	tributed		 -
Tomogorov-ornimov (Garillia NOS ESt.)	0.23	0.203	Data NUL	Janina DIS	uibuieu		
Log	normal CO	F Test Res	ulte				
Logi	ioiniai GO	1 1691 1768	uito				
	No NDs	NDc - Di	NDc - DL /	Log BOS			 -
Com-1-1: C#: :			NDs = DL/2				 -
Correlation Coefficient R	0.969	0.907	0.979	0.971			 <del> </del>
	T·	O-: 10 05	_	a altered to the state of the s	.L. A.L. /^	05)	 -
01 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Crit. (0.05)		nclusion wit		.05)	 1
Shapiro-Wilk (Detects Only)	0.938	0.881	Data Appe	ar Lognorn	nal		

Shapiro-Wilk (NDs = DL)		0.897	Data Not I	ognormal			
Shapiro-Wilk (NDs = DL/2)	0.955			ear Lognorn			
Shapiro-Wilk (Lognormal ROS Estimates)	0.944	0.897	Data Appe	ear Lognorn	nal		
Lilliefors (Detects Only)	0.15	0.22	Data Appe	ear Lognorn	nal		
Lilliefors (NDs = DL)	0.198	0.202	Data Appe	ear Lognorn	nal		
Lilliefors (NDs = DL/2)	0.115	0.202	Data Appe	ear Lognorn	nal		
Lilliefors (Lognormal ROS Estimates)	0.143	0.202	Data Appe	ear Lognorn	nal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Cobalt (mw-69)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
	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)	17	0.0027	0.0054	0.00414		6.9647E-4	
Statistics (All: NDs treated as DL value)	18	0.0027	0.0034	0.00414	0.0042		
Statistics (All: NDs treated as DL/2 value)	18	0.0027	0.0054	0.00447		7.0535E-4	
Statistics (Normal ROS Imputed Data)	18	0.0027	0.0054	0.00419		6.7568E-4	
Statistics (Gamma ROS Imputed Data)	18	0.0027	0.01	0.00447	0.00425		
Statistics (Lognormal ROS Imputed Data)	18	0.0027	0.0054	0.00414	0.0042	6.7582E-4	
	K hat	K Star		Log Mean		Log CV	
Statistics (Non-Detects Only)	34.67	28.59	1.1946E-4	-5.501	0.18	-0.0327	
Statistics (NDs = DL)	12.55	10.49	3.5593E-4	-5.451	0.274	-0.0503	
Statistics (NDs = DL/2)	34.24	28.57	1.2233E-4	-5.49	0.181	-0.033	
Statistics (Gamma ROS Estimates)	12.55	10.49	3.5593E-4	-5.451	0.274	-0.0503	
Statistics (Lognormal ROS Estimates)				-5.501	0.174	-0.0317	
No	rmal GOF	Test Resu	lts				
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.978	0.804	0.98	0.974			
	Test value	Crit. (0.05)	Co	nclusion wit	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.959	` ,	Data Appe		1 - (*	,	
Shapiro-Wilk (NDs = DL)	0.679		Data Not N				
Shapiro-Wilk (NDs = DL/2)	0.961						
Shapiro-Wilk (Normal ROS Estimates)	0.954						
Lilliefors (Detects Only)	0.934						1
Lilliefors (NDs = DL)			Data Not N				
Lilliefors (NDs = DL/2)			Data Appe				
Lilliefors (Normal ROS Estimates)	0.198	0.202	Data Appe	ear ivormai			
Ga	mma GOF	Test Resu	ılts				
	NI NIS	ND S:	/ID - 51 "	. 50			
Correlation Coefficient R	No NDs 0.97	NDs = DL 0.85	NDs = DL/2 0.97	amma RO 0.85			
Correlation Coefficient R	0.97	0.65	0.97	0.00			
	Toet value	Crit (0.05)	0	nolucio = ····	th Alaba/A	05)	
Anderson Davling (Detects Cally)		Crit. (0.05) 0.737	C01	nclusion wit	ıı Aibila(0	.00)	
Anderson-Darling (Detects Only)	0.501		Data : ::	D-4- A	0-:	Distant : '	
Kolmogorov-Smirnov (Detects Only)	0.205	0.209	Detected I	Data Appea	ıı Gamma	טוstributed	

		1					
Anderson-Darling (NDs = DL)							
Kolmogorov-Smirnov (NDs = DL)	0.206	0.203	Data Not (	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)		0.739					
Kolmogorov-Smirnov (NDs = DL/2)	0.195	0.203	Data Appe	ear Gamma	Distributed	d	
nderson-Darling (Gamma ROS Estimates)	1.193	0.739					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.206	0.203	Data Not (	Gamma Dis	stributed		
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.958	0.906	0.959	0.956			
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	0.923	0.892	Data Appe	ear Lognorr	mal		
Shapiro-Wilk (NDs = DL)	0.85	0.897	Data Not I	ognormal			
Shapiro-Wilk (NDs = DL/2)	0.923	0.897	Data Appe	ear Lognorr	mal		
Shapiro-Wilk (Lognormal ROS Estimates)	0.92	0.897	Data Appe	ear Lognorr	mal		
Lilliefors (Detects Only)	0.216	0.207	Data Not I	ognormal			
Lilliefors (NDs = DL)	0.185	0.202	Data Appe	ear Lognorr	nal		
Lilliefors (NDs = DL/2)	0.207		Data Not I	-			
Lilliefors (Lognormal ROS Estimates)	0.222		Data Not I				
,	I	I	<u>I</u>	-			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Cobalt (mw-70)							
,							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	16	2	11.11%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	2	0.005	0.01	0.0075	0.0075	0.00354	
Statistics (Non-Detects Only)	16	0.0022	0.0077	0.00516		0.00179	
Statistics (All: NDs treated as DL value)	18	0.0022	0.01	0.00542	0.00545	0.00203	
Statistics (All: NDs treated as DL/2 value)	18	0.0022	0.0077	0.005	0.00535	0.00179	
Statistics (Normal ROS Imputed Data)	18	0.0022	0.0077	0.00504	0.00535	0.00174	
Statistics (Gamma ROS Imputed Data)	18	0.0022	0.01	0.00569	0.0056	0.00229	
Statistics (Lognormal ROS Imputed Data)		0.0022	0.0077	0.00503	0.00535	0.00223	
Causies (Lognormal NOS impated Data)	10	0.0022	0.0077	0.00002	0.00000	0.00174	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	7.484		6.8893E-4	· ·	0.403	-0.0755	
Statistics (NDs = DL)	6.839		7.9199E-4		0.403	-0.0785	
,							-
Statistics (NDs = DL/2)	7.121		7.0218E-4 9.5711E-4		0.409 0.446	-0.0762	-
Statistics (Gamma ROS Estimates)	5.95					-0.0849	
Statistics (Lognormal ROS Estimates)				-5.361	0.392	-0.073	
		Table C	14				
No.	rmai GOF	Test Resu	ITS				
		N.D:	lin :				
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.969	0.977	0.97	0.973			
	T	T =	ı				
		Crit. (0.05)		nclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	0.923	0.887		ear Normal			
Shapiro-Wilk (NDs = DL)	0.955	0.897	Data Appe	ear Normal			
Shapiro-Wilk (NDs = DL/2)				ear Normal			

Shapiro-Wilk (Normal ROS Estimates)	0.931			ear Normal			
Lilliefors (Detects Only)	0.175			ear Normal			
Lilliefors (NDs = DL)	0.167			ear Normal			
Lilliefors (NDs = DL/2)	0.167			ear Normal			
Lilliefors (Normal ROS Estimates)	0.166	0.202	Data Appe	ear Normal			
Ga	mma GOF	Test Resu	ılts				
	No NDs			amma RO			
Correlation Coefficient R	0.942	0.976	0.948	0.974			
	Tootyjolija	O-it (0.0E)	0-	nalusian w	ام ماملد الم	OE)	
		Crit. (0.05)	Co	nclusion w	itn Aipna(u	.05)	
Anderson-Darling (Detects Only)	0.698	0.74	5				
Kolmogorov-Smirnov (Detects Only)	0.224		Detected	Data appea	ar Approxin	nate Gamn	
Anderson-Darling (NDs = DL)	0.491	0.742	<b>.</b>		B		
Kolmogorov-Smirnov (NDs = DL)	0.191		Data App	ear Gamma	a Distribute	d	
Anderson-Darling (NDs = DL/2)	0.724	0.741	_				
Kolmogorov-Smirnov (NDs = DL/2)	0.217	0.204	Detected	Data appea	ar Approxin	nate Gamn	
nderson-Darling (Gamma ROS Estimates)	0.431	0.742					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.172	0.204	Data Appe	ear Gamma	a Distribute	d	
Loar	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/	Log ROS			
Correlation Coefficient R	0.945	0.965	0.951	0.959			
	Test value	Crit. (0.05)	Со	nclusion w	ith Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.88	0.887	Data Not I	Lognormal			
Shapiro-Wilk (NDs = DL)	0.928	0.897	Data Appe	ear Lognor	mal		
Shapiro-Wilk (NDs = DL/2)	0.889		Data Not I	_			
Shapiro-Wilk (Lognormal ROS Estimates)	0.907	0.897	Data Appe	ear Lognor	mal		
Lilliefors (Detects Only)	0.244	0.213	Data Not I	Lognormal			
Lilliefors (NDs = DL)	0.217	0.202	Data Not I	Lognormal			
Lilliefors (NDs = DL/2)	0.236	0.202	Data Not I	Lognormal			
Lilliefors (Lognormal ROS Estimates)	0.195	0.202	Data Appe	ear Lognor	mal		
Note: Substitution methods such as DL or	DI /2 are n	ot recomm	ended				
Note: Substitution methods such as DE of	DD2 dic ii	ot recomm	criaca.				
Lead (background)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	46	4	42	2	40	95.24%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	40	1.0000E-4	0.005	0.00207	0.002	0.00163	
Statistics (Non-Detects Only)	2	7.3000E-4	0.0011	9.1500E-4	9.1500E-4	2.6163E-4	
Statistics (All: NDs treated as DL value)	42	1.0000E-4	0.005	0.00201	0.002	0.00161	
Statistics (All: NDs treated as DL/2 value)	42	5.0000E-5	0.0025	0.00103	0.001	7.9506E-4	
Statistics (Normal ROS Imputed Data)	42	-0.00106	0.0011	-6.430E-5	-5.791E-5	5.1369E-4	
Statistics (Gamma ROS Imputed Data)	42	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Imputed Data)	42	1.0048E-4	0.0011	3.5565E-4	3.0491E-4	2.1834E-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)	1.475	1.386	0.00136	-6.584	0.982	-0.149	
Statistics (NDs = DL/2)	1.518		6.7713E-4	-7.244	0.978	-0.135	
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Estimates)				-8.103	0.569	-0.0703	
 	rmal GOF	Test Resu	lts				
	No NDs	NDs = DL	NDs = DL/2	lormal RO			
Correlation Coefficient R	1	0.894	0.897	0.997			
		Crit. (0.05)			th Alpha(0.	.05)	
Shapiro-Wilk (NDs = DL)	0.75	0.942	Data Not N	Normal			
Shapiro-Wilk (NDs = DL/2)	0.758	0.942	Data Not N	Vormal			
Shapiro-Wilk (Normal ROS Estimates)	0.939	0.942	Data Not N	Vormal			
Lilliefors (Detects Only)	N/A	N/A					
Lilliefors (NDs = DL)	0.313	0.135	Data Not N	Normal			
Lilliefors (NDs = DL/2)	0.3	0.135	Data Not N	Vormal			
Lilliefors (Normal ROS Estimates)	0.0488	0.135	Data Appe	ar Normal			
			•				
Ga	mma GOF	Test Resu	ılts				
		ND	l				
	No NDs		NDs = DL/2				
Correlation Coefficient R	N/A	0.908	0.907	0.366			
<u> </u>		Crit. (0.05)	) Cor	nclusion wi	th Alpha(0.	.05)	
Anderson-Darling (Detects Only)	N/A	N/A					
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)	1.824	0.767					
Kolmogorov-Smirnov (NDs = DL)	0.203	0.139	Data Not C	Bamma Dis	stributed		
Anderson-Darling (NDs = DL/2)	1.944	0.766					
Kolmogorov-Smirnov (NDs = DL/2)	0.214		Data Not C	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	N/A	0.747					
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.136					
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	1	0.939	0.932	N/A			
			,				
		Crit. (0.05)			th Alpha(0.	.05)	
Shapiro-Wilk (NDs = DL)	0.837		Data Not L	-			
Shapiro-Wilk (NDs = DL/2)	0.829		Data Not L				
Shapiro-Wilk (Lognormal ROS Estimates)	0.939	0.942	Data Not L	.ognormal			
Lilliefors (Detects Only)	N/A	N/A					
Lilliefors (NDs = DL)	0.242	0.135	Data Not L	.ognormal			
Lilliefors (NDs = DL/2)	0.254	0.135	Data Not L	.ognormal			
Lilliefors (Lognormal ROS Estimates)	0.0488	0.135	Data Appe	ar Lognorr	mal		
Note: Substitution methods such as DL or	DI /2 ara -	ot rocom	ondod				
note. Substitution methods such as DL of	ט⊔∠ are n	or recomm	ienaea.				
Lead (mw-66)							-
( <del></del> )							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	1	17	2	15	88.24%	<u> </u>

0 (1 0.1.)	Number	_	Maximum		Median	SD	
Statistics (Non-Detects Only)	15	1.0000E-4			5.0000E-4		
Statistics (Non-Detects Only)	2					3.8184E-4	
Statistics (All: NDs treated as DL value)	17	1.0000E-4			5.0000E-4		
Statistics (All: NDs treated as DL/2 value)	17	5.0000E-5				7.5013E-4	
Statistics (Normal ROS Imputed Data)	17					3.4367E-4	
Statistics (Gamma ROS Imputed Data)	17	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Imputed Data)	17	2.5859E-5	7.2000E-4	1.5846E-4	1.0615E-4	1.6793E-4	
		14.0					
	K hat	K Star		Log Mean		Log CV	
Statistics (Non-Detects Only)	N/A	N/A	N/A	N/A	N/A	N/A	
Statistics (NDs = DL)	1.111	0.954	0.0013	-7.056	1.088	-0.154	
Statistics (NDs = DL/2)	1.208		6.1833E-4		1.041	-0.136	
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Estimates)				-9.134	0.882	-0.0966	
No	rmal GOF	Test Resu	lts				
	No NDs		NDs = DL/2				
Correlation Coefficient R	1	0.856	0.862	0.987			
		•	•				
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha(0	.05)	
Shapiro-Wilk (NDs = DL)	0.732	0.892	Data Not I	Normal			
Shapiro-Wilk (NDs = DL/2)	0.742	0.892	Data Not I	Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.973	0.892	Data Appe	ear Normal			
Lilliefors (Detects Only)	N/A	N/A					
Lilliefors (NDs = DL)	0.271	0.207	Data Not I	Normal			
Lilliefors (NDs = DL/2)	0.276	0.207	Data Not I	Normal			
Lilliefors (Normal ROS Estimates)	0.128	0.207	Data Appe	ear Normal			
							+
Ga	mma GOF	Test Resu	ilts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	N/A	0.944	0.944	0.424			
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha(0	.05)	
Anderson-Darling (Detects Only)	N/A	N/A			. (-	,	+
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					1
Anderson-Darling (NDs = DL)	1.039	0.764					
Kolmogorov-Smirnov (NDs = DL)	0.259	0.215	Data Not (	Gamma Di	stributed		+
Anderson-Darling (NDs = DL/2)	1.079	0.762	22.2.100				
Kolmogorov-Smirnov (NDs = DL/2)	0.285	0.702	Data Not (	Gamma Dis	stributed		-
nderson-Darling (Gamma ROS Estimates)	N/A	0.736	Data NOT	Garrina Di	Juliouteu		
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A N/A	0.736					
Tomogorov-Ominiov (Gairina NOS ESL.)	19/74	0.200					
Lam	ormel GO	F Test Res	uite				1
Logi	iorniai GO	ı ı <del>c</del> əl Res	uito				-
	No NDo	NDs = Di	NDe - DI "	Log BOS			_
Correlation Coefficient D	No NDs		NDs = DL/2 0.944	N/A			
Correlation Coefficient R	ı	0.952	0.944	N/A			
	T: '	O-: 10 05	_		: A     /^	05)	
01 . 11/11/4/25 511		Crit. (0.05)			ith Alpha(0	.05)	 
Shapiro-Wilk (NDs = DL)	0.905		Data Appe				 
Shapiro-Wilk (NDs = DL/2)	0.893	0.892	Data Appe	ear Lognor	mal		

	3 PIOUCL	GOODINE	00 01 111	0171110111	-		
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe	ear Lognori	mal		
Lilliefors (Detects Only)	N/A	N/A	_				
Lilliefors (NDs = DL)	0.221		Data Not I				
Lilliefors (NDs = DL/2)	0.256	0.207	Data Not I	-			
Lilliefors (Lognormal ROS Estimates)	0.128	0.207	Data Appe	ear Lognori	mal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Lead (mw-67)							
	NI OI	N	N	<b>.</b>	ND	0/ ND	
Dow Statistics	Num Obs	Num Miss	Num Valid	Detects 1	NDs	% NDs	
Raw Statistics	10	ı	17	ı	16	94.12%	
Warning: Only one distinct data value was ested to use alternative site specific values  The data	s determine	ed by the P	roject Tea		ite environ		
_ead (mw-68)							
	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	1.0000E-4	0.005	0.00167	0.002	0.00155	
Statistics (Non-Detects Only)	2	1.9000E-4	5.2000E-4	3.5500E-4	3.5500E-4	2.3335E-4	
Statistics (All: NDs treated as DL value)	17	1.0000E-4			5.2000E-4		
Statistics (All: NDs treated as DL/2 value)	17	5.0000E-5	0.0025	7.8000E-4	5.2000E-4	7.4335E-4	
Statistics (Normal ROS Imputed Data)	17	-2.561E-4	5.2000E-4	7.1580E-5	7.3376E-5	2.1432E-4	
Statistics (Gamma ROS Imputed Data)	17	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Imputed Data)	17	4.8715E-5	5.2000E-4	1.6312E-4	1.3311E-4	1.1936E-4	†
, , , , , , , , , , , , , , , , , , ,						l.	†
	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)	1.138	0.976	0.00133	-6.99	1.099	-0.157	T
Statistics (NDs = DL/2)	1.263	1.08	6.1746E-4	-7.602	1.036	-0.136	T
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A	1
Statistics (Lognormal ROS Estimates)		-		-8.93	0.654	-0.0732	
No	rmal GOF	Test Resu	lts				
	No NDs	NDe - Di	NDe = DI /	lormal RO			-
Correlation Coefficient R	1	0.868	0.872	0.991			+
2.	<u> </u>	1	1	1	<u> </u>		+
	Test value	Crit. (0.05)	Со	nclusion wi	th Alpha(0	.05)	†
Shapiro-Wilk (NDs = DL)	0.751	0.892	Data Not I	Normal			1
Shapiro-Wilk (NDs = DL/2)	0.76	0.892	Data Not I	Normal			1
Shapiro-Wilk (Normal ROS Estimates)	0.976	0.892	Data Appe	ear Normal			
Lilliefors (Detects Only)	N/A	N/A					T
Lilliefors (NDs = DL)	0.275	0.207	Data Not I	Normal			
Lilliefors (NDs = DL/2)	0.266	0.207	Data Not I	Normal			
Lilliefors (Normal ROS Estimates)	0.0814	0.207	Data Appe	ear Normal			

Г							
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	N/A	0.939	0.941	0.419			
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0.	05)	
Anderson-Darling (Detects Only)	N/A	N/A					
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)	1.06	0.763					
Kolmogorov-Smirnov (NDs = DL)	0.267	0.214	Data Not 0	Gamma Dis	stributed		
Anderson-Darling (NDs = DL/2)	0.956	0.761					
Kolmogorov-Smirnov (NDs = DL/2)	0.246	0.214	Data Not 0	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	N/A	0.736					
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.208					
	I.		li				
Logi	normal GO	F Test Res	sults				
	No NDs	NDs = DI	NDs = DL/2	Log ROS			
Correlation Coefficient R	1	0.947	0.947	N/A			
Sandation Obstitution in		0.047	3.547	14//1			
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (NDs = DL)	0.894		Data Appe	ear Lognori	mal		
Shapiro-Wilk (NDs = DL/2)	0.899		Data Appe	-			
Shapiro-Wilk (Lognormal ROS Estimates)	0.976		Data Appe	-			
Lilliefors (Detects Only)	N/A	N/A					
Lilliefors (NDs = DL)	0.23	0.207	Data Not L	ognormal			
Lilliefors (NDs = DL/2)	0.219	0.207	Data Not L	ognormal			
Lilliefors (Lognormal ROS Estimates)	0.0814	0.207	Data Appe	ear Lognori	mal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Lead (mw-69)							
Lead (IIIW-00)							
	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	1.0000E-4			5.0000E-4	0.00157	
Statistics (Non-Detects Only)	2	2.1000E-4		0.00311		0.00409	
Statistics (All: NDs treated as DL value)	17	1.0000E-4			5.0000E-4	0.00186	
Statistics (All: NDs treated as DL/2 value)	17	5.0000E-5		0.00106	2.5000E-4	0.00148	
Statistics (Normal ROS Imputed Data)	17	-0.00721		-0.00201		0.00339	
Statistics (Gamma ROS Imputed Data)	17	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Imputed Data)	17	2.8561E-6			4.5481E-5	0.00143	
	1		1		<u>.                                    </u>		
	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)	1.002	0.865	0.00175	-6.922	1.17	-0.169	
Statistics (NDs = DL/2)	0.86	0.748	0.00123		1.202	-0.159	
Statistics (Gamma ROS Estimates)	N/A	N/A	N/A	N/A	N/A	N/A	
Statistics (Lognormal ROS Estimates)		-		-9.752	1.964	-0.201	
No	rmal GOF	Test Resu	its				

5	00002						
		1					
	No NDs		NDs = DL/alormal RO				
Correlation Coefficient R	1	0.875	0.783 0.981				
		T					
		Crit. (0.05)		th Alpha(	0.05)		
Shapiro-Wilk (NDs = DL)	0.76		Data Not Normal				
Shapiro-Wilk (NDs = DL/2)	0.634		Data Not Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.966		Data Appear Normal				
Lilliefors (Detects Only)	N/A	N/A					
Lilliefors (NDs = DL)	0.279		Data Not Normal				
Lilliefors (NDs = DL/2)	0.34		Data Not Normal				
Lilliefors (Normal ROS Estimates)	0.107	0.207	Data Appear Normal				
Ga	mma GOF	Test Resu	ılts				
		,					
			NDs = DL/aamma RO				
Correlation Coefficient R	N/A	0.953	0.953 0.436				
		I	-				
		Crit. (0.05	Conclusion wi	th Alpha(	).05)		
Anderson-Darling (Detects Only)	N/A	N/A					
Kolmogorov-Smirnov (Detects Only)	N/A	N/A					
Anderson-Darling (NDs = DL)	1.014						
Kolmogorov-Smirnov (NDs = DL)	0.282		Data Not Gamma Dis	stributed			
Anderson-Darling (NDs = DL/2)	1.17	0.772					
Kolmogorov-Smirnov (NDs = DL/2)	0.286		Data Not Gamma Dis	stributed			
nderson-Darling (Gamma ROS Estimates)	N/A	0.736					
Kolmogorov-Smirnov (Gamma ROS Est.)	N/A	0.208					
<u> </u>							
Logr	normal GO	F Test Res	sults				
	No NDs	NDs = DI	NDs = DL/2 Log ROS				
Correlation Coefficient R	1	0.953	0.946 N/A				
Controllation Committee 11	•	0.000	0.010				
	Test value	Crit. (0.05	Conclusion wi	th Alpha((	05)		
Shapiro-Wilk (NDs = DL)	0.904		Data Appear Lognorr		3.00)		
Shapiro-Wilk (NDs = DL/2)	0.902		Data Appear Lognorr				
Shapiro-Wilk (Lognormal ROS Estimates)	0.966		Data Appear Lognorr				
Lilliefors (Detects Only)	N/A	N/A	- a.appoar Lognon			+	
Lilliefors (NDs = DL)	0.249		Data Not Lognormal			+	
Lilliefors (NDs = DL/2)	0.245	0.207	Data Not Lognormal				
Lilliefors (Lognormal ROS Estimates)	0.200	0.207	_	mal		+	
Emicrois (Esgnormal New Estimates)	0.107	0.207	Data Appear Logitori	nui -			
Note: Substitution methods such as DL or	DI /2 are n	ot recomm	ended				
						+	
Lead (mw-70)							
						1	
	Num Ohe	Num Miss	Num Valid Detects	NDs	% NDs		
Raw Statistics	18	1	17 1	16	94.12%		
naw clausius			., ,		J 1. 12 /0		L
Warning: Only one distinct data value was	detected	ProUCL (n	r any other software)	should no	t be used o	n such a d:	ita set!
ested to use alternative site specific values							
		, <del></del>	,				
The data	set for var	iable Lead	(mw-70) was not prod	cessed!			
			,, pro-	· · · · · · · · · · · · · · · · · · ·			

1911							
Lithium (background)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	46	1	45	39	6	13.33%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	6	0.2	8.0	0.367	0.3	0.234	
Statistics (Non-Detects Only)	39	0.21	0.45	0.337	0.35	0.0605	
Statistics (All: NDs treated as DL value)	45	0.2	8.0	0.341	0.35	0.0973	
Statistics (All: NDs treated as DL/2 value)	45	0.1	0.45	0.316	0.34	0.0866	
Statistics (Normal ROS Imputed Data)	45	0.184	0.45	0.327	0.34	0.0661	
Statistics (Gamma ROS Imputed Data)	45	0.206	0.45	0.328	0.34	0.0639	
Statistics (Lognormal ROS Imputed Data)	45	0.205	0.45	0.327	0.34	0.0642	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	28.8	26.6	0.0117	-1.105	0.195	-0.176	1
Statistics (NDs = DL)	14.55	13.59	0.0234	-1.111	0.263	-0.237	
Statistics (NDs = DL/2)	9.638	9.011	0.0328	-1.203	0.365	-0.303	
Statistics (Gamma ROS Estimates)	24.62	23	0.0133	-1.136	0.21	-0.185	
Statistics (Lognormal ROS Estimates)		-		-1.137	0.211	-0.186	
No	rmal GOF	Test Resu	lts				
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.975	0.881	0.95	0.976			
	Test value	Crit. (0.05)	Cor	nclusion wit	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	0.94		Data Appe			,	
Shapiro-Wilk (NDs = DL)	0.807		Data Not N				
Shapiro-Wilk (NDs = DL/2)	0.893	0.945	Data Not N	Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.941	0.945	Data Not N	Normal			
Lilliefors (Detects Only)	0.133	0.14	Data Appe	ar Normal			
Lilliefors (NDs = DL)	0.172	0.131	Data Not N	Normal			
Lilliefors (NDs = DL/2)	0.183	0.131	Data Not N	Normal			
Lilliefors (Normal ROS Estimates)	0.148	0.131	Data Not N	Normal			
Ga	mma GOF	Test Resu	ılts				
		7000000					
	No NDs	NDs = DL	NDs = DL/2	amma RO			1
Correlation Coefficient R	0.96	0.899	0.903	0.962			
		Crit. (0.05)	Сог	nclusion wit	th Alpha(0.	05)	
Anderson-Darling (Detects Only)	1.231	0.746					
Kolmogorov-Smirnov (Detects Only)	0.16	0.141	Data Not 0	Gamma Dis	tributed		
Anderson-Darling (NDs = DL)	1.421	0.748		<del>-</del>			
Kolmogorov-Smirnov (NDs = DL)	0.151	0.132	Data Not (	Gamma Dis	tributed		
Anderson-Darling (NDs = DL/2)	2.61	0.749	D-t-N-1	) D:	antha e e		
Kolmogorov-Smirnov (NDs = DL/2)	0.223	0.132	Data Not (	Gamma Dis	tributed		
derson-Darling (Gamma ROS Estimates)	1.326	0.748	Data Net C	Dament - D'	ا - د د دانسه		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.168	0.132	Data Not (	Gamma Dis	uriduted		

							T
	N. N.	ND 5:	lin 5: 1 <sup>1</sup>	. 500			
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.955	0.945	0.878	0.96			
	T4	O:::+ (0.0E)	0		4b. Al-ab/0	05)	
Shapiro-Wilk (Detects Only)	0.903	Crit. (0.05)	Data Not L		th Alpha(0	.05)	
Shapiro-Wilk (NDs = DL)	0.905		Data Not L	-			
Shapiro-Wilk (NDs = DL/2)	0.905		Data Not L	-			
Shapiro-Wilk (Lognormal ROS Estimates)	0.709		Data Not L				
Lilliefors (Detects Only)	0.903	0.943	Data Not L				
Lilliefors (NDs = DL)	0.174		Data Not L				
Lilliefors (NDs = DL/2)	0.236		Data Not L				
Lilliefors (Lognormal ROS Estimates)	0.185		Data Not L	•			
Emiciois (Eognormal 1100 Estimates)	0.100	0.101	Data Not E	ognomiai			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Total Capatitation mountain action at 22 or							
Lithium (mw-66)							
, ,							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
		I .					
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	0.8	0.8	0.8	0.8	N/A	
Statistics (Non-Detects Only)	17	0.24	0.5	0.321	0.32	0.0574	
Statistics (All: NDs treated as DL value)	18	0.24	8.0	0.348	0.32	0.126	
Statistics (All: NDs treated as DL/2 value)	18	0.24	0.5	0.326	0.32	0.0587	
Statistics (Normal ROS Imputed Data)	18	0.24	0.5	0.321	0.32	0.0557	
Statistics (Gamma ROS Imputed Data)	18	0.24	0.5	0.321	0.319	0.0557	
Statistics (Lognormal ROS Imputed Data)	18	0.24	0.5	0.321	0.318	0.0557	
	K hat	K Star	Theta hat	-	_	Log CV	
Statistics (Non-Detects Only)	38.28	31.56	0.00839	-1.149	0.162	-0.141	
Statistics (NDs = DL)	12.28	10.27	0.0283	-1.097	0.269	-0.245	
Statistics (NDs = DL/2)	36.56	30.5	0.00891	-1.136	0.167	-0.147	
Statistics (Gamma ROS Estimates)	40.52	33.8	0.00792	-1.149	0.157	-0.137	
Statistics (Lognormal ROS Estimates)				-1.149	0.157	-0.137	
No	rmal GOF	Test Resu	lts				
		ND -	lin =: '	= -			
			NDs = DL/2				
Correlation Coefficient R	0.901	0.765	0.928	0.896			
	T4	O-it (0.05			Ale Ale L /A	05)	
		Crit. (0.05)			th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.837		Data Not N				
Shapiro-Wilk (NDs = DL)	0.613		Data Not N				
Shapiro-Wilk (NDs = DL/2)	0.88	0.897	Data Not N				
Shapiro-Wilk (Normal ROS Estimates)	0.83	0.897	Data Not N				
Lilliefors (Detects Only)	0.214	0.207	Data Not N				
Lilliefors (NDs = DL)	0.302		Data Not N				
Lilliefors (NDs = DL/2)	0.204		Data Not N				
Lilliefors (Normal ROS Estimates)	0.222	0.202	Data Not N	vormai			
00	mma COF	Test Resu	ılte				
Ga	illilia GUF	i est rest	nro				
							1

	No NDs		NDs = DL/2					
Correlation Coefficient R	0.925	0.827	0.95	0.919				
		Crit. (0.05)	Coi	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)		0.737						
Kolmogorov-Smirnov (Detects Only)		0.209	Detected [	Data Appea	r Gamma	Distributed		
Anderson-Darling (NDs = DL)		0.739						
Kolmogorov-Smirnov (NDs = DL)	0.271	0.203	Data Not 0	Gamma Dis	tributed			
Anderson-Darling (NDs = DL/2)	0.491	0.739						
Kolmogorov-Smirnov (NDs = DL/2)	0.186	0.203	Data Appe	ear Gamma	Distribute	d		
nderson-Darling (Gamma ROS Estimates)	0.694	0.739						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.21	0.203	Detected [	Data appea	r Approxin	nate Gamm		
Log	normal GO	F Test Res	sults					
	No NDs	NDs = DL	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.945	0.86	0.963	0.94				
	Test value	Crit. (0.05	Coi	nclusion wi	th Alpha(0	.05)		+
Shapiro-Wilk (Detects Only)	0.914			ear Lognorr		,		+
Shapiro-Wilk (NDs = DL)	0.763		Data Not L					
Shapiro-Wilk (NDs = DL/2)				ear Lognorr	nal			
Shapiro-Wilk (Lognormal ROS Estimates)				ear Lognorr				
Lilliefors (Detects Only)				ear Lognorr				
Lilliefors (NDs = DL)			Data Not L	_				
Lilliefors (NDs = DL/2)				ear Lognorr	nal			
Lilliefors (Lognormal ROS Estimates)				ear Lognorr				
,								
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
inclor cuboutduoi mounous suom de B1 o.	<b>DD1</b> 0.0	0.100011111	ionaoa.					
Lithium (mw-67)								
								-
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics		0	18	17	1	5.56%		
Naw Glatistics	10	U	10	17	'	3.30 /0		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non Detects Only)								-
Statistics (Non-Detects Only)		0.8	0.8	0.8	0.8	N/A		
Statistics (Non-Detects Only)		0.25	0.55	0.396	0.4	0.0807		-
Statistics (All: NDs treated as DL value)		0.25	0.8	0.419	0.41	0.123		
Statistics (All: NDs treated as DL/2 value)		0.25	0.55	0.397	0.4	0.0783		
Statistics (Normal ROS Imputed Data)		0.25	0.55	0.396	0.398	0.0783		
Statistics (Gamma ROS Imputed Data)		0.25	0.55	0.396	0.396	0.0783		-
Statistics (Lognormal ROS Imputed Data)	18	0.25	0.55	0.396	0.394	0.0783		
	K hat	K Star		Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)		20.57	0.0159	-0.945	0.21	-0.222		
Statistics (NDs = DL)	14.42	12.06	0.029	-0.905	0.265	-0.293		
Statistics (NDs = DL/2)	26.39	22.03	0.015	-0.944	0.203	-0.216		
Statistics (Gamma ROS Estimates)	26.38	22.02	0.015	-0.945	0.203	-0.215		
Statistics (Lognormal ROS Estimates)				-0.945	0.203	-0.215		
No	ormal GOF	Test Resu	lts					
I	No NDs	NDc - DI	NDs = DL/2	Iormal PO			1	1

Correlation Coefficient R	0.995	0.921	0.996	0.996			
	Test value	Crit. (0.05)			th Alpha(0	05)	
Shapiro-Wilk (Detects Only)	0.987	0.892	Data Appe				
Shapiro-Wilk (NDs = DL)	0.868	0.897					
Shapiro-Wilk (NDs = DL/2)	0.991	0.897	Data Appe	ar Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.991	0.897	Data Appe	ar Normal			
Lilliefors (Detects Only)	0.0861	0.207	Data Appe	ar Normal			
Lilliefors (NDs = DL)	0.154	0.202	Data Appe	ar Normal			
Lilliefors (NDs = DL/2)	0.0725	0.202	Data Appe	ar Normal			
Lilliefors (Normal ROS Estimates)	0.0682	0.202	Data Appe	ar Normal			
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs - DI	NDs = DL/2	amma PO			
Correlation Coefficient R	0.993	0.951	0.994	0.995			
Correlation Coefficient R	0.993	0.951	0.994	0.995			
		Crit. (0.05)	Con	clusion wi	th Alpha(0	05)	
Anderson-Darling (Detects Only)	0.153	0.738					
Kolmogorov-Smirnov (Detects Only)	0.11	0.209	Detected D	ata Appea	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)	0.314	0.739					
Kolmogorov-Smirnov (NDs = DL)	0.114	0.203	Data Appe	ar Gamma	Distribute	d	
Anderson-Darling (NDs = DL/2)	0.135	0.739					
Kolmogorov-Smirnov (NDs = DL/2)	0.0985	0.203	Data Appe	ar Gamma	Distribute	d	
nderson-Darling (Gamma ROS Estimates)	0.12	0.739					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.0876	0.203	Data Appe	ar Gamma	Distribute	d	
Logi	normal GO	F Test Res	sults				
		1					
	No NDs	NDs = DL	NDs = DL/2	Log ROS			
Correlation Coefficient R	0.992	0.976	0.992	0.993			
	Test value	Crit. (0.05)	Con	ıclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	Test value 0.981	Crit. (0.05)	Con Data Appe	ıclusion wi ar Lognorı	mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)	Test value	Crit. (0.05) 0.892 0.897	Con Data Appe Data Appe	iclusion wi ar Lognori ar Lognori	nal nal	05)	
Shapiro-Wilk (Detects Only)	Test value 0.981	Crit. (0.05) 0.892 0.897	Con Data Appe	iclusion wi ar Lognori ar Lognori	nal nal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates)	Test value 0.981 0.966 0.984 0.986	Crit. (0.05) 0.892 0.897 0.897	Con Data Appe Data Appe Data Appe Data Appe	iclusion wi ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only)	Test value 0.981 0.966 0.984 0.986 0.115	Crit. (0.05) 0.892 0.897 0.897 0.897 0.207	Con Data Appe Data Appe Data Appe Data Appe Data Appe	iclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL)	Test value 0.981 0.966 0.984 0.986 0.115 0.101	0.897 0.897 0.897 0.897 0.207	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr	mal mal mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only)	Test value 0.981 0.966 0.984 0.986 0.115	Crit. (0.05) 0.892 0.897 0.897 0.897 0.207	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr	mal mal mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL)	Test value 0.981 0.966 0.984 0.986 0.115 0.101	Crit. (0.05) 0.892 0.897 0.897 0.897 0.207 0.202	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936	Crit. (0.05) 0.892 0.897 0.897 0.897 0.207 0.202 0.202	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936	Crit. (0.05) 0.892 0.897 0.897 0.897 0.207 0.202 0.202	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936	Crit. (0.05) 0.892 0.897 0.897 0.897 0.207 0.202 0.202	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936	Crit. (0.05) 0.892 0.897 0.897 0.897 0.207 0.202 0.202	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal	05)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe ended.	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal		
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936  DL/2 are n	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe ended.	aclusion wi ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr	mal mal mal mal mal mal mal	05) % NDs	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe ended.	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal mal		
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or Lithium (mw-68)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936  DL/2 are n	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202  ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe	aclusion wi ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori ar Lognori	mal mal mal mal mal mal mal mal mal mal	% NDs 5.56%	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or Lithium (mw-68)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936  DL/2 are n  Num Obs 18	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe In It I I I I I I I I I I I I I I I I I	nclusion wi ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr ar Lognorr	mal mal mal mal mal mal mal mal mal mal	% NDs 5.56%	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or Lithium (mw-68)  Raw Statistics  Statistics (Non-Detects Only)	Test value	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe ended.  Num Valid 18  Maximum 0.8	Detects 17  Mean 0.8	mal mal mal mal mal mal mal mal mal mal	% NDs 5.56% SD N/A	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or Lithium (mw-68)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936  DL/2 are n  Num Obs 18  Number 1 17	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe data Appe Data Appe Data Appe Maximum 0.8 0.4	Detects 17  Mean 0.8 0.336	mal mal mal mal mal mal mal mal mal mal	% NDs 5.56% SD N/A 0.0468	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates)  Note: Substitution methods such as DL or  Lithium (mw-68)  Raw Statistics  Statistics (Non-Detects Only) Statistics (All: NDs treated as DL value)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936  DL/2 are n  Num Obs 18  Number 1 17 18	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202  ot recomm  Num Miss 0  Minimum 0.8 0.22 0.22	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe data Appe Data Appe Data Appe Maximum 0.8 0.4 0.8	Detects 17  Mean 0.336 0.336 0.362	mal mal mal mal mal mal mal mal mal mal	% NDs 5.56% SD N/A 0.0468 0.118	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates) Lilliefors (Detects Only) Lilliefors (NDs = DL/2) Lilliefors (NDs = DL/2) Lilliefors (Lognormal ROS Estimates) Note: Substitution methods such as DL or Lithium (mw-68)  Raw Statistics  Statistics (Non-Detects Only) Statistics (Non-Detects Only)	Test value 0.981 0.966 0.984 0.986 0.115 0.101 0.109 0.0936  DL/2 are n  Num Obs 18  Number 1 17	Crit. (0.05) 0.892 0.897 0.897 0.207 0.202 0.202 0.202 ot recomm	Con Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe Data Appe data Appe Data Appe Data Appe Maximum 0.8 0.4	Detects 17  Mean 0.8 0.336	mal mal mal mal mal mal mal mal mal mal	% NDs 5.56% SD N/A 0.0468	

Statistics (Normal ROS Imputed Data)							
` '	18	0.22	0.4	0.336	0.338	0.0454	
Statistics (Gamma ROS Imputed Data)	18	0.22	0.4	0.336	0.337	0.0454	
Statistics (Lognormal ROS Imputed Data)	18	0.22	0.4	0.336	0.337	0.0454	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	49.37	40.7	0.00682	-1.099	0.151	-0.138	
Statistics (NDs = DL)	14.36	12	0.0252	-1.051	0.253	-0.241	
Statistics (NDs = DL/2)	48.13	40.15	0.00706	-1.089	0.153	-0.141	
Statistics (Gamma ROS Estimates)	52.26	43.59	0.00644	-1.099	0.147	-0.134	
Statistics (Lognormal ROS Estimates)				-1.099	0.147	-0.134	
Nor	mal GOF	Test Resu	lts				
	No NDs	NDs = DL	NDs = DL/2	lormal RO			
Correlation Coefficient R	0.959	0.765	0.961	0.96			
la la la la la la la la la la la la la l	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	0.923		Data Appe			-	
Shapiro-Wilk (NDs = DL)	0.622		Data Not N				
Shapiro-Wilk (NDs = DL/2)	0.923		Data Appe				
Shapiro-Wilk (Normal ROS Estimates)	0.927		Data Appe				
Lilliefors (Detects Only)	0.175		Data Appe				
Lilliefors (NDs = DL)	0.329		Data Not N				
Lilliefors (NDs = DL/2)	0.179		Data Appe				
Lilliefors (Normal ROS Estimates)	0.159		Data Appe				
Emiciois (Normal Neo Estimates)	0.100	0.202	Data Appe	ai i voiinai			
Gor	nma GOE	Test Resu	ilte				
Gai	IIIIIa GOF	rest nesu	iilo				
	Na NDa	NDs - DI	VD DL /	amma DO			
Correlation Coefficient R	No NDs 0.943	0.809	NDs = DL/2 0.944	0.945			
Correlation Coefficient R	0.943	0.809	0.944	0.945			
<u></u>	Took value	C=i+ (0.0E)	Con		th Δ1mha/Ω	OE)	
		Crit. (0.05) 0.737	Cor	iciusion wi	th Alpha(0.	05)	
Anderson-Darling (Detects Only)	0.594		Datastad	Data Anna	Camma	Diatributad	
Kolmogorov-Smirnov (Detects Only)	0.178		Detected [	рата Арреа	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)	1.543	0.739	D N	D.			
Kolmogorov-Smirnov (NDs = DL)	0.282		Data Not C	amma Dis	stributed		
Anderson-Darling (NDs = DL/2)	0.592	0.738	D-+ 1		District :	_	
Kolmogorov-Smirnov (NDs = DL/2)	0.184		Data Appe	ar Gamma	Distribute	α	
nderson-Darling (Gamma ROS Estimates)	0.583	0.738	<b>.</b>		<b>D</b>		
Kolmogorov-Smirnov (Gamma ROS Est.)	0.161	0.203	Data Appe	ar Gamma	Distribute	α	
Logn	ormal GO	F Test Res	ults				
Logn							
	No NDs	NDs = DL	NDs = DL/2	- U			
Logno Correlation Coefficient R				Log ROS 0.935			
Correlation Coefficient R	No NDs 0.935	NDs = DL 0.871	NDs = DL/2 0.936	0.935			
Correlation Coefficient R	No NDs 0.935 Test value	NDs = DL 0.871 Crit. (0.05)	NDs = DL/2 0.936 Cor	0.935	th Alpha(0.	05)	
Correlation Coefficient R  Shapiro-Wilk (Detects Only)	No NDs 0.935 Test value 0.882	NDs = DL 0.871 Crit. (0.05) 0.892	NDs = DL/2 0.936 Cor Data Not L	0.935 nclusion wi		05)	
Correlation Coefficient R  Shapiro-Wilk (Detects Only)  Shapiro-Wilk (NDs = DL)	No NDs 0.935 Test value 0.882 0.795	NDs = DL 0.871 Crit. (0.05) 0.892 0.897	NDs = DL/2 0.936 Cor Data Not L	0.935 nclusion wi ognormal		05)	
Correlation Coefficient R  Shapiro-Wilk (Detects Only)  Shapiro-Wilk (NDs = DL)  Shapiro-Wilk (NDs = DL/2)	No NDs 0.935 Test value 0.882 0.795 0.883	NDs = DL 0.871 Crit. (0.05) 0.892 0.897	NDs = DL/2 0.936 Cor Data Not L Data Not L	0.935 nclusion wi ognormal ognormal		05)	
Correlation Coefficient R  Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates)	No NDs 0.935 Test value 0.882 0.795 0.883 0.883	NDs = DL 0.871 Crit. (0.05) 0.892 0.897 0.897	NDs = DL/2 0.936 Cor Data Not L Data Not L Data Not L Data Not L	0.935  nclusion wi ognormal ognormal ognormal	th Alpha(0.	05)	
Correlation Coefficient R  Shapiro-Wilk (Detects Only)  Shapiro-Wilk (NDs = DL)  Shapiro-Wilk (NDs = DL/2)	No NDs 0.935 Test value 0.882 0.795 0.883	NDs = DL 0.871 Crit. (0.05) 0.892 0.897 0.897	NDs = DL/2 0.936 Cor Data Not L Data Not L	0.935  nclusion wi ognormal ognormal ognormal	th Alpha(0.	05)	
Correlation Coefficient R  Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2) Shapiro-Wilk (Lognormal ROS Estimates)	No NDs 0.935 Test value 0.882 0.795 0.883 0.883	NDs = DL 0.871 Crit. (0.05) 0.892 0.897 0.897 0.897 0.207	NDs = DL/2 0.936 Cor Data Not L Data Not L Data Not L Data Not L	0.935  nclusion wi .ognormal .ognormal .ognormal .ognormal	th Alpha(0.	05)	

Lilliefors (Lognormal ROS Estimates)	0.17	0.202	Data Appe	ear Lognori	mal			<del></del>
Emicrora (Eognormal 1100 Estimates)	0.17	0.202	Data Appe	ar Lognon	iidi			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Lithium (mw-69)								
· · ·								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	0	18	17	1	5.56%		
		l .	J					
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	1	8.0	8.0	8.0	8.0	N/A		
Statistics (Non-Detects Only)	17	0.27	0.52	0.398	0.4	0.0784		
Statistics (All: NDs treated as DL value)	18	0.27	8.0	0.42	0.42	0.122		
Statistics (All: NDs treated as DL/2 value)	18	0.27	0.52	0.398	0.4	0.076		
Statistics (Normal ROS Imputed Data)	18	0.27	0.52	0.398	0.399	0.076		
Statistics (Gamma ROS Imputed Data)	18	0.27	0.52	0.397	0.397	0.0761		
Statistics (Lognormal ROS Imputed Data)	18	0.27	0.52	0.397	0.395	0.0761		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	25.9	21.37	0.0154	-0.942	0.207	-0.219		
Statistics (NDs = DL)	14.78	12.36	0.0284	-0.902	0.262	-0.291		
Statistics (NDs = DL/2)	27.41	22.88	0.0145	-0.94	0.201	-0.213		
Statistics (Gamma ROS Estimates)	27.41	22.88	0.0145	-0.941	0.2	-0.213		
Statistics (Lognormal ROS Estimates)				-0.942	0.2	-0.213		
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Normal RO				
Correlation Coefficient R	0.981	0.912	0.984	0.985				
	Test value	Crit. (0.05)	Coi	nclusion wi	th Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)	0.947	0.892	Data Appe	ear Normal				
Shapiro-Wilk (NDs = DL)	0.849		Data Not N					
Shapiro-Wilk (NDs = DL/2)	0.956	0.897	Data Appe	ear Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.956	0.897	Data Appe	ear Normal				
Lilliefors (Detects Only)	0.176	0.207	Data Appe	ear Normal				
Lilliefors (NDs = DL)	0.15	0.202	Data Appe	ear Normal				
Lilliefors (NDs = DL/2)	0.155	0.202	Data Appe	ear Normal				
Lilliefors (Normal ROS Estimates)	0.156	0.202	Data Appe	ear Normal				
Ga	mma GOF	Test Resu	ılts					
	No NDs		NDs = DL/2					
Correlation Coefficient R	0.972	0.94	0.976	0.976				
		Crit. (0.05)	Coi	nclusion wi	th Alpha(0.	.05)		
Anderson-Darling (Detects Only)	0.424	0.738						
Kolmogorov-Smirnov (Detects Only)		0.209	Detected [	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)		0.739						
Kolmogorov-Smirnov (NDs = DL)		0.203	Data Appe	ear Gamma	Distribute	d		
Anderson-Darling (NDs = DL/2)		0.739						
Kolmogorov-Smirnov (NDs = DL/2)		0.203	Data Appe	ear Gamma	Distribute	d		
nderson-Darling (Gamma ROS Estimates)		0.739						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.172	0.203	Data Appe	ear Gamma	a Distribute	d	_	

							_
Logi	normal GO	F Test Res	ults				-
· · · · · · · · · · · · · · · · · · ·							+
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.972	0.965	0.974	0.975			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	0.93		Data Appe				+
Shapiro-Wilk (NDs = DL)	0.94		Data Appe				+
Shapiro-Wilk (NDs = DL/2)	0.937		Data Appe				
Shapiro-Wilk (Lognormal ROS Estimates)	0.938		Data Appe				+
Lilliefors (Detects Only)	0.191		Data Appe				+
Lilliefors (NDs = DL)	0.121		Data Appe				
Lilliefors (NDs = DL/2)	0.168	0.202	Data Appe	ar Lognorr	nal		+
Lilliefors (Lognormal ROS Estimates)	0.171	0.202	Data Appe	ar Lognorr	nal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Lithium (mw-70)							
	Num Ob	Niuma B4:-	Nium V-1:	Dotosta	NDs	0/ NID=	
D 04-4" 1"	Num Obs		Num Valid	Detects 17	NDs 1	% NDs 5.56%	
Raw Statistics	18	0	18	17	I	5.56%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	0.8	0.8	0.8	0.8	N/A	
Statistics (Non-Detects Only)	17	0.28	0.35	0.315	0.32	0.0207	+
Statistics (All: NDs treated as DL value)	18	0.28	0.8	0.342	0.32	0.116	-
Statistics (All: NDs treated as DL/2 value)	18	0.28	0.4	0.32	0.32	0.0283	+
Statistics (Normal ROS Imputed Data)	18	0.28	0.35	0.315	0.318	0.02	
Statistics (Gamma ROS Imputed Data)	18	0.28	0.35	0.315	0.317	0.02	+
Statistics (Lognormal ROS Imputed Data)	18	0.28	0.35	0.315	0.317	0.02	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV	
Statistics (Non-Detects Only)	246.1	202.7	0.00128	-1.156	0.0659	-0.057	
Statistics (NDs = DL)	15.72	13.14	0.0218	-1.104	0.229	-0.207	
Statistics (NDs = DL/2)	142.4	118.7	0.00225	-1.143	0.0853	-0.0747	
Statistics (Gamma ROS Estimates)	260.6	217.2	0.00121	-1.156	0.0639	-0.0553	
Statistics (Lognormal ROS Estimates)				-1.156	0.0639	-0.0553	
No	rmal GOF	Test Resu	its				
	No ND:	NDo - Di	ND0 - D1 4	lormal DO			
Correlation Coefficient R	No NDs 0.974	0.614	NDs = DL/2 0.941	0.972			-
Coneiation Coefficient R	0.974	0.014	0.941	0.972			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	05)	+
Shapiro-Wilk (Detects Only)	0.94		Data Appe		,	,	+
Shapiro-Wilk (NDs = DL)	0.409	0.897	Data Not N				+
Shapiro-Wilk (NDs = DL/2)	0.898	0.897	Data Appe				+
Shapiro-Wilk (Normal ROS Estimates)	0.938	0.897	Data Appe				+
Lilliefors (Detects Only)	0.175	0.207	Data Appe				+
Lilliefors (NDs = DL)		0.202	Data Not N				+
Lilliefors (NDs = DL/2)		0.202	Data Not N				+
Lilliefors (Normal ROS Estimates)			Data Appe	ar Normal			+
<u> </u>	1	1					+

No NDs 0.972 Test value 0.461 0.168	NDs = DL 0.676 Crit. (0.05)	NDs = DL/2 0.95	amma RO 0.971				
0.972 Test value 0.461 0.168	0.676	-					
0.972 Test value 0.461 0.168	0.676	-					
Test value 0.461 0.168		0.93	0.371				
0.461 0.168	Crit. (0.05)						
0.461 0.168	J (0.00)	Cor	nclusion wi	th Alpha((	05)		
0.168	0.736	,			,		
	0.208	Detected D	Data Appea	ır Gamma	Distributed		
3.523	0.739		•				
0.376	0.203	Data Not C	Gamma Dis	tributed			
0.562	0.737						
0.211	0.203	Detected D	Data appea	r Approxii	mate Gamn		
0.503	0.737						
0.179	0.203	Data Appe	ar Gamma	Distribute	ed		
	I	l .					
normal GO	F Test Res	sults					
No NDs	NDs = DL	NDs = DL/2	Log ROS				
0.972	0.694	0.955	0.971				
					).05)		
				nal			
			-				
				nal			
			•				
0.186	0.202	Data Appe	ar Lognorr	nal			-
DI /2 oro n	ot rocomm	ondod					
DD2 ale II	ot recomm	ieriueu.					
Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
46	4	42	0	42	100.00%		
							.1
-Detects (I	NDs), there	efore all sta	tistics and	estimates	should also	be NDs!	
PLs, and o	ther statist	ics are also	NDs lying	below the	largest det	ection lim	it!
native site :	specific val	lues to estir	nate enviro	nmental <sub>l</sub>	parameters	(e.g., EP0	, BTV)
for variable	Mercury (	background	d) was not	processed	<u>i!</u>		
	1	,					
				NDs	% NDs		
18	1	17	0	17	100.00%		
· ·	•						
		ics are also lues to estir			largest det		
	0.503 0.179 normal GO No NDs 0.972 Test value 0.937 0.514 0.936 0.175 0.35 0.206 0.186  DL/2 are n  Num Obs 46  PLs, and onative site states of the control	0.503	0.503	0.503	0.503	0.503   0.737   0.179   0.203   Data Appear Gamma Distributed	0.503

The data s	et for varia	ıble Mercur	ry (mw-66) v	was not pr	ocessed!	·	·	·
_	-	-						
Mercury (mw-67)	-	-						
								<u> </u>
			Num Valid		NDs	% NDs		<u> </u>
Raw Statistics	18	1	17	0	17	100.00%		<u> </u>
Warning: All observations are Non Specifically, sample mean, UCLs, U The Project Team may decide to use altern	JPLs, and o	other statisti specific val	ics are also	NDs lying mate enviro	g below the conmental p	e largest det	tection limi	
III data o	et ioi vai.a	DIG WIGIGA	y (IIIW 07, 1	Mao not pr			·	
Mercury (mw-68)								
	T	T	T				<del></del> -	
Dow Otatiation			Num Valid		NDs	% NDs		
Raw Statistics	18	1	17	0	17	100.00%		
Mariner All checurations are No.	· Detecte /	AIDal Abam	forma all ata	****** a mad		يمام امانيخان	- Sa AlDal	
Warning: All observations are Non Specifically, sample mean, UCLs, U								
The data s	et for varia	ble Mercur	ry (mw-68) v	was not pro	ocessed!			
Mercury (mw-69)								
	The Oba	Thi Mino	\/alid	Dittorto	NDa	0/ NDe		<u> </u>
Dow Statistics		Num Miss			NDs	% NDs		<del> </del>
Raw Statistics	18	2	16	0	16	100.00%		
Warning: All observations are Non Specifically, sample mean, UCLs, U								itl
The Project Team may decide to use altern								
The data s	et for varia	ıble Mercur	ry (mw-69) v	was not pr	ocessed!			
Mercury (mw-70)								
-	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	1	17	0	17	100.00%		
						-		-
Warning: All observations are Non Specifically, sample mean, UCLs, U The Project Team may decide to use altern	JPLs, and o	other statisti	ics are also	NDs lying	g below the	e largest det	tection limi	
The data s	set for varia	able Mercur	ry (mw-70) v	was not pr	ocessed!			
			<u> </u>					

							 L	
Molybdenum (background)								
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	46	1	45	23	22	48.89%		+
			.0			10.0070		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	22	0.001	0.005	0.00286	0.002	0.00152		
Statistics (Non-Detects Only)	23	6.2000E-4	0.011	0.00416	0.0025	0.00363		
Statistics (All: NDs treated as DL value)	45	6.2000E-4	0.011	0.00352	0.002	0.00285	· I	
Statistics (All: NDs treated as DL/2 value)	45	5.0000E-4	0.011	0.00282	0.0018	0.00296		
Statistics (Normal ROS Imputed Data)	45	-0.00375	0.011	0.00237	0.0018	0.0035		
Statistics (Gamma ROS Imputed Data)	45	6.2000E-4	0.011	0.00701	0.01	0.00391	<u> </u>	
Statistics (Lognormal ROS Imputed Data)	45	3.0133E-4	0.011	0.00271	0.00146	0.00301		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		_
Statistics (Non-Detects Only)	1.436	1.278	0.00289	_	0.921	-0.157		
Statistics (NDs = DL)	1.944	1.83	0.00203		0.746	-0.126		
Statistics (NDs = DL/2)	1.406	1.327	0.00201		0.849	-0.135		
Statistics (Gamma ROS Estimates)	1.863	1.754	0.00376		0.913	-0.174		
Statistics (Lognormal ROS Estimates)				-6.377	0.937	-0.147		
· · · · · · · · · · · · · · · · · · ·								
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Normal RO				
Correlation Coefficient R	0.903	0.888	0.826	0.945				
		I						
		Crit. (0.05)		nclusion wi	th Alpha(0.	05)		
Shapiro-Wilk (Detects Only)	0.8		Data Not N					
Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2)	0.779		Data Not N					
Shapiro-Wilk (Normal ROS Estimates)	0.675 0.888		Data Not Not Not Not Not Not Not Not Not Not					_
Lilliefors (Detects Only)	0.000	0.945	Data Not N					
Lilliefors (NDs = DL)			Data Not N					
Lilliefors (NDs = DL/2)			Data Not N					
Lilliefors (Normal ROS Estimates)			Data Not N					
Ga	mma GOF	Test Resu	ilts					
	T	1	T.					
	No NDs		NDs = DL/2					
Correlation Coefficient R	0.934	0.958	0.935	0.719				
	Tost value	Crit (0.05)	000	nclusion wi	h Alpha/A	05)		
Anderson-Darling (Detects Only)	0.866	Crit. (0.05) 0.761	COI	iciusion Wi	ıı Aipria(U.	us)		_
Kolmogorov-Smirnov (Detects Only)	0.800		Detected F	Data appea	r Annroxim	ate Gamm		
Anderson-Darling (NDs = DL)	1.789	0.761	Doileoted I	zata appea	. , wpioxiii	ale Gaiiii		
Kolmogorov-Smirnov (NDs = DL)	0.204	0.701	Data Not (	Gamma Dis	tributed			
Anderson-Darling (NDs = DL/2)	2.901	0.134	20.0 NOT	III DIS				
Kolmogorov-Smirnov (NDs = DL/2)	0.22	0.134	Data Not (	Gamma Dis	tributed			-
derson-Darling (Gamma ROS Estimates)	5.807	0.763						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.352	0.134	Data Not (	Gamma Dis	tributed			
<u> </u>				<i></i>				
Loa	normal GO	F Test Res	ults					

	011000L	GOODINE		017(11011				
1	N. ND	ND DI	lin ni	41 800	T			
Correlation Coefficient R	No NDs 0.973	0.973	NDS = DL/ 0.95	Log ROS 0.98				
Correlation Coefficient R	0.973	0.973	0.95	0.98				
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha/(	1.05)		
Shapiro-Wilk (Detects Only)	0.93			ear Lognor		7.03)		
Shapiro-Wilk (NDs = DL)	0.932			Lognormal	indi			
Shapiro-Wilk (NDs = DL/2)	0.887		Data Not					
Shapiro-Wilk (Lognormal ROS Estimates)	0.945			Lognormal				
Lilliefors (Detects Only)	0.148	0.18		ear Lognor	mal			
Lilliefors (NDs = DL)	0.161			Lognormal				
Lilliefors (NDs = DL/2)	0.197			Lognormal				
Lilliefors (Lognormal ROS Estimates)	0.0962			ear Lognor	mal			
, ,								
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Molybdenum (mw-66)								
Raw Statistics								
Number of Valid Obs	servations	18						
Number of Distinct Obs	servations	10						
	Minimum	0.01						
	Maximum	0.039						
Mean of	Raw Data	0.0205						
Standard Deviation of	Raw Data	0.00627						
	Khat	11.57						
	Theta hat	0.00177						
	Kstar	9.679						
	Theta star	0.00212						
Mean of Log Transfor		-3.931						
Standard Deviation of Log Transfor	med Data	0.309						
Normal GOF Test Resul	ts							
		2 22 4						
Correlation Co		0.891						
Shapiro Wilk Te								
Shapiro Wilk Critical (0								
Approximate Shapiro Wi Lilliefors Te								
Lilliefors Tes								
Data not Normal at (0.05) Significance Lev		0.202						
Data not Normal at (0.05) Significance Lev	GI							
Gamma GOF Test Resul	lte							
Gaillilla GOF Test Resu	J							
Correlation Co	efficient R	0.898						
	st Statistic							
A-D Critical (0.								
	st Statistic							
K-S Critical(0.								
Data not Gamma Distributed at (0.05) Sign	•							
= = = = = = = = = ( = = = ) = .g.		-						
Lognormal GOF Test Res	ults							
<u> </u>								
Correlation Co	efficient R	0.918						
				1		1	1	1

	GOODINE	 	 		
Shapiro Wilk Test Statistic		 			
Shapiro Wilk Critical (0.05) Value					
Approximate Shapiro Wilk P Value	0.0101				
Lilliefors Test Statistic					
Lilliefors Critical (0.05) Value	0.202				
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 Si				
Molybdenum (mw-67)					
Raw Statistics	T				
Number of Valid Observations					
Number of Distinct Observations					
Minimum					
Maximum		 			
Mean of Raw Data					
Standard Deviation of Raw Data					
Khat					
	6.9594E-4				
Kstar					
	8.3453E-4				
Mean of Log Transformed Data					
Standard Deviation of Log Transformed Data	0.127				
N 10057 18 1					
Normal GOF Test Results					
Correlation Coefficient R	0.867				
Shapiro Wilk Test Statistic					
Shapiro Wilk Critical (0.05) Value					
Approximate Shapiro Wilk P Value					
Lilliefors Test Statistic					
Lilliefors Critical (0.05) Value					
Data not Normal at (0.05) Significance Level	0.202				
Data Not Normal at (0.05) Significance Level					
Gamma GOF Test Results					
Gamma GOT Test Nesults					
Correlation Coefficient R	0.891				
A-D Test Statistic					
A-D Critical (0.05) Value					
K-S Test Statistic					
K-S Critical(0.05) Value					
Data follow Appr. Gamma Distribution at (0.05) Signi					
.,					
Lognormal GOF Test Results					
Correlation Coefficient R	0.906				
Shapiro Wilk Test Statistic					
Shapiro Wilk Critical (0.05) Value					
Approximate Shapiro Wilk P Value					
Lilliefors Test Statistic					
Lilliefors Critical (0.05) Value					
	0.202		1	1	

Data appear Approximate_Lognormal at (	0.05) Signi	ficance Lev					
pata appeal / pproximate_registimal at (	5.00) O.g						
Molybdenum (mw-68)							
,							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
					,		
	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)	17	0.0051	0.012	0.00775	0.0073	0.00196	
Statistics (All: NDs treated as DL value)	18	0.0051	0.012	0.00787	0.0074	0.00198	
Statistics (All: NDs treated as DL/2 value)	18	0.005	0.012	0.00759	0.00705	0.00201	
Statistics (Normal ROS Imputed Data)	18	0.0051	0.012	0.00771	0.0072	0.00191	
Statistics (Gamma ROS Imputed Data)	18	0.0051	0.012	0.00787	0.0074	0.00198	
Statistics (Lognormal ROS Imputed Data)	18	0.0051	0.012	0.0077	0.0071	0.00192	
etatione (Logitorma 1100 impator Bata)	.0	0.0001	0.012	0.0077	0.00711	0.00102	
	K hat	K Star	Theta hat	Log Mean	Loa Stdv	Log CV	
Statistics (Non-Detects Only)	17.29	14.27	4.4817E-4	-4.89	0.247	-0.0506	
Statistics (NOI-Detects Offly) Statistics (NDs = DL)	17.16	14.33	4.5885E-4	-4.874	0.247	-0.0500	
Statistics (NDs = DL/2)	15.78	13.19	4.8114E-4	-4.912	0.249	-0.0511	
Statistics (Gamma ROS Estimates)	17.16	14.33	4.5885E-4	-4.874	0.239	-0.0527	
Statistics (Lognormal ROS Estimates)				-4.894	0.241	-0.0492	
otatistics (Eognormal NOO Estimates)				-4.004	0.241	-0.0432	
Ne	rmal GOF	Teet Pecu	lte				
NC	illiai GOI	rest nesu	ilo				
	No NDs	NDc - DI	NDs = DL/2	Iormal DO			
Correlation Coefficient R	0.969	0.969	0.969	0.967			
Correlation Coefficient 10	0.303	0.505	0.505	0.507			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(N	05)	
Shapiro-Wilk (Detects Only)	0.932		Data Appe		iii / iipiia(o.	00)	
Shapiro-Wilk (NDs = DL)	0.931		Data Appe				
Shapiro-Wilk (NDs = DL/2)	0.93		Data Appe				
Shapiro-Wilk (Normal ROS Estimates)	0.931		Data Appe				
Lilliefors (Detects Only)	0.156		Data Appe				
Lilliefors (NDs = DL)	0.151		Data Appe				
Lilliefors (NDs = DL/2)	0.153		Data Appe				
Lilliefors (Normal ROS Estimates)	0.155		Data Appe				
Elimoiolo (Normal Noo Estimates)	0.100	0.202	Data / tppo	ar rtormar			
Ga	mma GOF	Test Resi	ılts				
Ga		. 551 1 1631					
	No NDs	NDs = DI	NDs = DL/2	amma RO			
Correlation Coefficient R	0.981	0.975	0.981	0.975			
Conclusion Coemicient 1	0.001	0.570	0.501	0.570			
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	05)	
Anderson-Darling (Detects Only)	0.387	0.738	001	iciasion wi	iii / iipiia(o.	00)	
Kolmogorov-Smirnov (Detects Only)	0.387	0.738	Detected D	)ata Annes	ır Gamma	Distributed	+
Anderson-Darling (NDs = DL)	0.469	0.739		- ara / ippec	Gamina	_ 1041104104	+
Kolmogorov-Smirnov (NDs = DL)	0.409	0.733	Data Appe	ar Gamma	Distributo	d	
Anderson-Darling (NDs = DL/2)	0.143	0.203	Data Appe	ar Gaillilla	שומוווטנופ	u	
Kolmogorov-Smirnov (NDs = DL/2)	0.378	0.739	Data Appe	ar Gamma	Distribute	d	+
derson-Darling (Gamma ROS Estimates)	0.133	0.203	Data Appe	ar Gaillilla	שומוווטנופ	u	
acison-paining (dannina nos Estillates)		0.739	Data Anna	C	Distributo	d	
Kolmogorov-Smirnov (Camma DOS Eat )							
Kolmogorov-Smirnov (Gamma ROS Est.)	0.145	0.203	Data Appe	ar Gamma	Distribute	u	

					П			
Correlation Coefficient R	0.983	0.98	NDs = DL/2 0.983	Log ROS 0.983				
Correlation Coefficient R	0.963	0.98	0.963	0.963				
Tes	st value	Crit. (0.05)	Co	nclusion wi	th Alpha(	0.05)		
Shapiro-Wilk (Detects Only)	0.958			ear Lognori				
Shapiro-Wilk (NDs = DL)	0.949			ear Lognori				
Shapiro-Wilk (NDs = DL/2)	0.955	0.897	Data Appe	ear Lognori	mal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.959	0.897	Data Appe	ear Lognori	mal			
Lilliefors (Detects Only)	0.129			ear Lognori				
Lilliefors (NDs = DL)	0.142			ear Lognori				
Lilliefors (NDs = DL/2)	0.119			ear Lognori				
Lilliefors (Lognormal ROS Estimates)	0.128	0.202	Data Appe	ear Lognori	mal			
Note: Substitution methods such as DL or DL	/2 are n	ot recomm	ended.					
Molybdenum (mw-69)								
Raw Statistics								
Number of Valid Obser	vations	18						
Number of Distinct Obser		5						
	inimum	0.013						
	ıximum	0.017						
Mean of Ra Standard Deviation of Ra		0.0152						
Statidard Deviation of Ra	W Data Khat	200.4						
Th	-	7.5687E-5						
	Kstar	167						
The	eta star	9.0804E-5						
Mean of Log Transforme	ed Data	-4.191						
Standard Deviation of Log Transforme	ed Data	0.0729						
	•							
Normal GOF Test Results								
Correlation Coeffi		0.966						
Shapiro Wilk Test S Shapiro Wilk Critical (0.05		0.93 0.897						
Approximate Shapiro Wilk F		0.897					1	
Lilliefors Test S		0.212						
Lilliefors Critical (0.05		0.202					_	
Data appear Normal at (0.05) Significance Le								
							1	
Gamma GOF Test Results								
Correlation Coeffi		0.965						
A-D Test S		0.654						
A-D Critical (0.05 K-S Test S		0.737					1	
K-S Test S K-S Critical(0.05)		0.173					1	
Data appear Gamma Distributed at (0.05) Sig							1	
							1	
Lognormal GOF Test Results	3						1	
<del></del>								
Correlation Coeffi	cient R	0.965						

-							T
Shapiro Wilk Te							
Shapiro Wilk Critical (0	,						
Approximate Shapiro W							
Lilliefors Te							
Lilliefors Critical (0	,	0.202					
Data appear Lognormal at (0.05) Significa	nce Level						
Molybdenum (mw-70)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
	Numahar	Minima	Massinassna	Maan	Madian	CD	
Ctatistics (Nam Datasta Only)	Number		Maximum	Mean 0.005	Median 0.005	SD N/A	
Statistics (Non-Detects Only)	1 17	0.005	0.005 0.027	0.005	0.005	0.00556	
Statistics (Non-Detects Only)		0.0026		0.00759	0.0062		
Statistics (All: NDs treated as DL value) Statistics (All: NDs treated as DL/2 value)	18	0.0026	0.027			0.00543	
,	18	0.0025	0.027	0.00731	0.0061	0.00553	
Statistics (Normal ROS Imputed Data)	18	0.00257		0.00731	0.0061	0.00553	
Statistics (Gamma ROS Imputed Data)	18	0.0026	0.027	0.00773	0.00625	0.00543	
Statistics (Lognormal ROS Imputed Data)	18	0.0026	0.027	0.00736	0.0061	0.00549	
	IZ la -4	I/ Ot-::	Th -4- h -4	Log Mean	L Ot-l-	1 0\/	
Chatiatian (Nam Data da Onla)	K hat	K Star		-		Log CV	
Statistics (Non-Detects Only)	3.11	2.6	0.00244	-5.05	0.569	-0.113	
Statistics (NDs = DL)	3.207	2.709	0.00232	-5.064	0.555	-0.11	
Statistics (NDs = DL/2)	2.878	2.436	0.00254	-5.102	0.595	-0.117	
Statistics (Gamma ROS Estimates)	3.242	2.739	0.00238	-5.025	0.561	-0.112 -0.112	
Statistics (Lognormal ROS Estimates)				-5.084	0.571	-0.112	
No	rmal GOF	Test Resu	lts				
	N. ND	ND DI	UD DIW				
0 1 0			NDs = DL/2				
Correlation Coefficient R	0.808	0.803	0.813	0.812			
	Tootwalus	O-:+ (0.0E)	Con	نبر معنورياه	th Almha/A	0E\	
OL : W/II (D O I )		Crit. (0.05)		nclusion wi	tn Alpha(u.	05)	
Shapiro-Wilk (Detects Only)	0.68		Data Not N				
Shapiro-Wilk (NDs = DL)	0.672		Data Not N				
Shapiro-Wilk (NDs = DL/2)	0.686		Data Not N				
Shapiro-Wilk (Normal ROS Estimates)	0.685	0.897	Data Not N				
Lilliefors (Detects Only)	0.274		Data Not N				
Lilliefors (NDs = DL)	0.264		Data Not N				
Lilliefors (NDs = DL/2) Lilliefors (Normal ROS Estimates)	0.258 0.258		Data Not Not Not Not Not Not Not Not Not Not				
Lillelois (Notified NOS Esufficies)	0.238	0.202	Data NULI	volilidi			
Ga	mma GOF	Test Resu	ilts				
		T	I '	Т			
	No NDs		NDs = DL/2				
Correlation Coefficient R	0.891	0.887	0.898	0.893			
	Tootyjelije	Crit /0.05	0	aduais a · · ·	th Alpha/A	OE)	
Anderson-Darling (Detects Only)	0.599	Crit. (0.05) 0.745	Cor	nclusion wi	и Аірпа(О.	uo)	
0 \ 77			Dotostad F	Tata Annas	r Commo	Dictributed	
Kolmogorov-Smirnov (Detects Only)	0.185	0.211	Derected F	Data Appea	ıı Garrima	บารนามนัย0	
Anderson-Darling (NDs = DL)  Kolmogorov-Smirnov (NDs = DL)	0.624 0.175	0.745	Data Ass	or Comm-	Dictribut-	d	
, ,		0.205	Data Appe	ai Gaillina	שטוווטונפים	u	
Anderson-Darling (NDs = DL/2)	0.572	0.747					

			T= -				 
Kolmogorov-Smirnov (NDs = DL/2)	0.17		Data Appe	ar Gamma	Distribute	d	
nderson-Darling (Gamma ROS Estimates)	0.595	0.745					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.197	0.205	Data Appe	ar Gamma	Distribute	d	
Logi	normal GO	F Test Res	ults				-
	No NDs	NDe - DI	NDs = DL/2	Log POS			-
Correlation Coefficient R	0.962	0.962	0.964	0.964			-
Correlation Coefficient IV	0.302	0.302	0.304	0.304			_
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(A	05)	
Shapiro-Wilk (Detects Only)	0.936		Data Appe			.00)	1
Shapiro-Wilk (NDs = DL)	0.937		Data Appe				-
Shapiro-Wilk (NDs = DL/2)	0.935		Data Appe				-
Shapiro-Wilk (Lognormal ROS Estimates)	0.936		Data Appe				
Lilliefors (Detects Only)	0.350		Data Appe				_
Lilliefors (NDs = DL)	0.158		Data Appe				
Lilliefors (NDs = DL/2)	0.149		Data Appe	-			
Lilliefors (Lognormal ROS Estimates)	0.146		Data Appe				+
Lillelois (Logiloitilai ROS Estifilates)	0.145	0.202	рата Арре	ai Logilorr	ııaı		1
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Selenium (background)							
						0/ 1/5	
			Num Valid	Detects	NDs	% NDs	
Raw Statistics	46	1	45	44	1	2.22%	
						0.0	
	Number		Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	0.003	0.003	0.003	0.003	N/A	
Statistics (Non-Detects Only)	44	0.011	0.39	0.147	0.125	0.101	
Statistics (All: NDs treated as DL value)	45	0.003	0.39	0.144	0.12	0.103	
Statistics (All: NDs treated as DL/2 value)	45	0.0015	0.39	0.144	0.12	0.103	
Statistics (Normal ROS Imputed Data)	45	-0.113	0.39	0.141	0.12	0.107	
Statistics (Gamma ROS Imputed Data)	45	0.011	0.39	0.144	0.12	0.102	
Statistics (Lognormal ROS Imputed Data)	45	0.00793	0.39	0.144	0.12	0.102	
	162	14.6:	<b>-</b>				
	K hat	K Star		Log Mean		Log CV	1
Statistics (Non-Detects Only)	1.441	1.358	0.102	-2.303	1.043	-0.453	1
Statistics (NDs = DL)	1.274	1.204	0.113	-2.381	1.156	-0.485	1
Statistics (NDs = DL/2)	1.236	1.168	0.116	-2.397	1.206	-0.503	1
Statistics (Gamma ROS Estimates)	1.391	1.313	0.104	-2.338	1.056	-0.452	 1
Statistics (Lognormal ROS Estimates)				-2.36	1.098	-0.465	 
NI		Tool Date	la.				
NO.	ımaı GOF	Test Resu	IIS				-
	No NDs	NDe = Di	NDs = DL/2	lormal PO			1
Correlation Coefficient R	0.975	0.974	0.974	0.984			-
Correlation Coefficient R	0.313	0.374	0.374	0.304			1
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alnha(N	05)	
Shapiro-Wilk (Detects Only)	0.933		Data Not N		an Aipina(0	.00)	-
Shapiro-Wilk (NDs = DL)	0.933						
Shapiro-Wilk (NDs = DL/2)	0.932	0.945	Data Not N				+
					1		
Shapiro-Wilk (Normal ROS Estimates)	0.968	0.945	Data Appe				-
Lilliefors (Detects Only)	0.108	0.132	Data Appe				-
Lilliefors (NDs = DL)	0.114	0.131	Data Appe	ar ivormal			

			33 OF FIT		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
Lilliefors (NDs = DL/2)	0.113	0.131	Data Appe	ar Normal			
Lilliefors (Normal ROS Estimates)	0.0957	0.131	Data Appe	ar Normal			
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	0.952	0.947	0.945	0.952			
	Test value	Crit. (0.05)	Cor	clusion wi	th Alpha(0.	05)	
Anderson-Darling (Detects Only)		0.769					
Kolmogorov-Smirnov (Detects Only)		0.136	Data Not G	amma Dis	tributed		
Anderson-Darling (NDs = DL)		0.772					
Kolmogorov-Smirnov (NDs = DL)	0.179	0.135	Data Not G	amma Dis	tributed		
Anderson-Darling (NDs = DL/2)	1.422	0.773					
Kolmogorov-Smirnov (NDs = DL/2)	0.184	0.135	Data Not G	amma Dis	tributed		
nderson-Darling (Gamma ROS Estimates)		0.77					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.166	0.134	Data Not G	amma Dis	tributed		
		•					
Log	normal GO	F Test Res	sults				
	No NDs		NDs = DL/2	•			
Correlation Coefficient R	0.935	0.934	0.924	0.938			
		Crit. (0.05)		nclusion wi	th Alpha(0.	05)	
Shapiro-Wilk (Detects Only)	0.857	0.944	Data Not L	ognormal			
Shapiro-Wilk (NDs = DL)		0.945	Data Not L	ognormal			
Shapiro-Wilk (NDs = DL/2)			Data Not L	-			
Shapiro-Wilk (Lognormal ROS Estimates)			Data Not L				
Lilliefors (Detects Only)			Data Not L	-			
Lilliefors (NDs = DL)			Data Not L	-			
Lilliefors (NDs = DL/2)			Data Not L	-			
Lilliefors (Lognormal ROS Estimates)	0.232	0.131	Data Not L	ognormal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Selenium (mw-66)							
	T	T <sub>-</sub> .	I "				
			Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	11	7	38.89%	
	T	T	1 "				
<u> </u>	Number		Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)		0.002	0.01	0.00314	0.002	0.00302	
Statistics (Non-Detects Only)		0.0016	0.11	0.0118	0.0021	0.0326	
Statistics (All: NDs treated as DL value)		0.0016	0.11	0.00844		0.0254	
Statistics (All: NDs treated as DL/2 value)		0.001	0.11	0.00783		0.0255	
Statistics (Normal ROS Imputed Data)		-0.0205	0.11	0.00587	0.002	0.0268	
Statistics (Gamma ROS Imputed Data)		0.0016	0.11	0.0111	0.0022	0.025	
Statistics (Lognormal ROS Imputed Data)	18	7.4540E-4	0.11	0.00785	0.00196	0.0255	
	T		T '				
	K hat	K Star	Theta hat	ŭ	·	Log CV	
Statistics (Non-Detects Only)	0.454	0.391	0.026	-5.86	1.216	-0.208	
Statistics (NDs = DL)	0.552	0.497	0.0153	-5.908	1.002	-0.17	
Statistics (NDs = DL/2)	0.481	0.438	0.0163	-6.178	1.081	-0.175	
Statistics (Gamma ROS Estimates)	0.694	0.615	0.016	-5.372	1.125	-0.209	

	.0110002	GOODNE	00 01 111	0171110111				
Statistics (Lognormal ROS Estimates)				-6.107	1.017	-0.167		
N		Toot Door	la.					
No	ormai GOF	Test Resu	ITS					
	No NDs	NDe - DI	NDe - DI	/Jormal RO				
Correlation Coefficient R		0.505	0.499					
Correlation Coefficient N	0.505	0.505	0.433	0.04			-	
	Test value	Crit. (0.05)	Co	onclusion wi	th Alpha(0	05)		-
Shapiro-Wilk (Detects Only)		0.85	Data Not		ит лирпи (о	.00)		-
Shapiro-Wilk (NDs = DL)								-
Shapiro-Wilk (NDs = DL/2)		0.897						
Shapiro-Wilk (Normal ROS Estimates)		0.897						
Lilliefors (Detects Only)								+
Lilliefors (NDs = DL)		0.202						+
Lilliefors (NDs = DL/2)		0.202	Data Not	Normal				+
Lilliefors (Normal ROS Estimates)		0.202	Data Not	Normal				+
Ga	mma GOF	Test Resu	ılts				<u> </u>	1
		NDs = DL	NDs = DL	/amma RO				
Correlation Coefficient R	0.853	0.789	0.79	0.812				
				•				
	Test value	Crit. (0.05)	) Co	onclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	3.511	0.79						
Kolmogorov-Smirnov (Detects Only)		0.271	Data Not	Gamma Dis	stributed			
Anderson-Darling (NDs = DL)		0.796						
Kolmogorov-Smirnov (NDs = DL)		0.214	Data Not	Gamma Dis	stributed			
Anderson-Darling (NDs = DL/2)		0.804						
Kolmogorov-Smirnov (NDs = DL/2)		0.216	Data Not	Gamma Dis	stributed			
derson-Darling (Gamma ROS Estimates)		0.783						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.318	0.212	Data Not	Gamma Dis	stributed			
Log	normal GO	F Test Res	sults					_
	No NDs	NDs - DI	UDa - DI	// Laz DOC				
Correlation Coefficient R		0.643	0.751	Log ROS 0.685			<del>                                     </del>	-
Correlation Coefficient R	0.027	0.043	0.751	0.000				
	Test value	Crit. (0.05)	· ·	onclusion wi	th Alpha(A	05)	<del> </del>	-
Shapiro-Wilk (Detects Only)		0.85		Lognormal	ar / apria(0.	,	-	-
Shapiro-Wilk (NDs = DL)		0.897		Lognormal			-	-
Shapiro-Wilk (NDs = DL/2)		0.897		Lognormal				-
Shapiro-Wilk (Lognormal ROS Estimates)		0.897		Lognormal				-
Lilliefors (Detects Only)				Lognormal			-	-
Lilliefors (NDs = DL)		0.202		Lognormal			-	-
Lilliefors (NDs = DL/2)		0.202		Lognormal			1	+
Lilliefors (Lognormal ROS Estimates)				Lognormal				-
	1	l .	1					-
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
								1
Selenium (mw-67)								1
	Num Obs	Num Miss	Num Vali	d Detects	NDs	% NDs		
Raw Statistics	18	0	18	17	1	5.56%		

Number   Number   Minimum   Maximum   Mean   Median   SD
Statistics (Non-Detects Only)   17
Statistics (All: NDs treated as DL value)   18
Statistics (All: NDs treated as DL/2 value)
Statistics (Normal ROS Imputed Data)   18
Statistics (Gamma ROS Imputed Data)   18
Normal GOF Test Results   Normal GOF Test
Statistics (Non-Detects Only)   2,009   2,188   0,0144   3,488   0,756   -0,217
Statistics (Non-Detects Only)   2.609   2.188   0.0144   -3.488   0.756   -0.217
Statistics (Non-Detects Only)   2.609   2.188   0.0144   -3.488   0.756   -0.217
Statistics (NDs = DL)   2.384   2.023   0.0151   -3.55   0.779   -0.219
Statistics (NDs = DL/2)   2.113   1.798   0.0169   -3.589   0.848   -0.236
Statistics (Gamma ROS Estimates)   2.441   2.071   0.0148   -3.543   0.768   -0.217
Normal GOF Test Results
Normal GOF Test Results
No NDs   NDs = DL NDs = DL/\$lormal RO
No NDs   NDs = DL NDs = DL/4ormal RO
Test value
Test value   Crit. (0.05   Conclusion with Alpha(0.05)
Test value   Crit. (0.05)   Conclusion with Alpha(0.05)
Shapiro-Wilk (Detects Only)   0.957   0.892   Data Appear Normal
Shapiro-Wilk (Detects Only)   0.957   0.892   Data Appear Normal
Shapiro-Wilk (NDs = DL)   0.951   0.897   Data Appear Normal
Shapiro-Wilk (NDs = DL/2)   0.946   0.897   Data Appear Normal
Shapiro-Wilk (Normal ROS Estimates)  Lilliefors (Detects Only)  Lilliefors (NDs = DL)  Lilliefors (NDs = DL)  Lilliefors (NDs = DL)  Lilliefors (NDs = DL)  Lilliefors (NDs = DL)  Lilliefors (NDs = DL)  Lilliefors (NDs = DL)  Lilliefors (Normal ROS Estimates)  Lilliefors (Normal ROS Estimates)  O.1  O.202  Data Appear Normal  Lilliefors (Normal ROS Estimates)  Lilliefors (Normal ROS Estimates)  No NDs  NDs = DL  Data Appear Normal  Data Appear Normal  Correlation Coefficient R  O.943  O.945  Data Appear Normal  Correlation Coefficient R  O.943  O.945  Conclusion with Alpha(0.05)  Anderson-Darling (Detects Only)  Anderson-Darling (NDs = DL)  Kolmogorov-Smirnov (Detects Only)  Anderson-Darling (NDs = DL)  Kolmogorov-Smirnov (NDs = DL)  Anderson-Darling (NDs = DL)  Anderson-Darling (NDs = DL)  Anderson-Darling (NDs = DL)  O.385  O.305  Data Appear Gamma Distributed  Anderson-Darling (NDs = DL)  Anderson-Darling (NDs = DL)  O.385  O.752  Kolmogorov-Smirnov (NDs = DL)  O.397  O.75  Kolmogorov-Smirnov (NDs = DL)  O.397  O.75  Kolmogorov-Smirnov (Gamma ROS Estimates)  O.397  O.75  Kolmogorov-Smirnov (Gamma ROS Estimates)  O.397  O.206  Data Appear Gamma Distributed
Lilliefors (Detects Only) 0.103 0.207 Data Appear Normal Lilliefors (NDs = DL) 0.11 0.202 Data Appear Normal Lilliefors (NDs = DL/2) 0.101 0.202 Data Appear Normal Lilliefors (Normal ROS Estimates) 0.1 0.202 Data Appear Normal Lilliefors (Normal ROS Estimates) 0.1 0.202 Data Appear Normal  Gamma GOF Test Results    No NDs   NDs = DL   NDs = DL/2   NDs = DL/2
Lilliefors (NDs = DL)
Lilliefors (NDs = DL/2) 0.101 0.202 Data Appear Normal  Lilliefors (Normal ROS Estimates) 0.1 0.202 Data Appear Normal  Gamma GOF Test Results    No NDs
Correlation Coefficient R   No NDs   NDs = DL   NDs = DL   Amma RO
Correlation Coefficient R   No NDs   NDs = DL   NDs = DL   Amma RO
Correlation Coefficient R 0.943 0.945 0.936 0.947  Test value Crit. (0.05) Conclusion with Alpha(0.05)  Anderson-Darling (Detects Only) 0.463 0.747  Kolmogorov-Smirnov (Detects Only) 0.138 0.211 Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL) 0.424 0.75  Kolmogorov-Smirnov (NDs = DL) 0.136 0.206 Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Correlation Coefficient R 0.943 0.945 0.936 0.947  Test value Crit. (0.05) Conclusion with Alpha(0.05)  Anderson-Darling (Detects Only) 0.463 0.747  Kolmogorov-Smirnov (Detects Only) 0.138 0.211 Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL) 0.424 0.75  Kolmogorov-Smirnov (NDs = DL) 0.136 0.206 Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Correlation Coefficient R 0.943 0.945 0.936 0.947  Test value Crit. (0.05) Conclusion with Alpha(0.05)  Anderson-Darling (Detects Only) 0.463 0.747  Kolmogorov-Smirnov (Detects Only) 0.138 0.211 Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL) 0.424 0.75  Kolmogorov-Smirnov (NDs = DL) 0.136 0.206 Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Correlation Coefficient R 0.943 0.945 0.936 0.947  Test value Crit. (0.05) Conclusion with Alpha(0.05)  Anderson-Darling (Detects Only) 0.463 0.747  Kolmogorov-Smirnov (Detects Only) 0.138 0.211 Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL) 0.424 0.75  Kolmogorov-Smirnov (NDs = DL) 0.136 0.206 Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Test value Crit. (0.05) Conclusion with Alpha(0.05)  Anderson-Darling (Detects Only) 0.463 0.747  Kolmogorov-Smirnov (Detects Only) 0.138 0.211 Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL) 0.424 0.75  Kolmogorov-Smirnov (NDs = DL) 0.136 0.206 Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Anderson-Darling (Detects Only)  No.463  No.211  Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL)  No.224  No.25  Kolmogorov-Smirnov (NDs = DL)  No.26  Anderson-Darling (NDs = DL/2)  No.275  Kolmogorov-Smirnov (NDs = DL/2)  No.285  No.206  Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2)  No.206  No.206  Data Appear Gamma Distributed  Detected Data Appear Gamma Distributed  No.206  No.206  No.206  No.206  Data Appear Gamma Distributed  Detected Data Appear Gamma Distributed  No.206  No.206  No.206  No.206  No.206  Data Appear Gamma Distributed  No.206
Anderson-Darling (Detects Only)  No.463  No.211  Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL)  No.224  No.25  Kolmogorov-Smirnov (NDs = DL)  No.26  Anderson-Darling (NDs = DL/2)  No.275  Kolmogorov-Smirnov (NDs = DL/2)  No.285  No.206  Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2)  No.206  No.206  Data Appear Gamma Distributed  Detected Data Appear Gamma Distributed  No.206  No.206  No.206  No.206  Data Appear Gamma Distributed  Detected Data Appear Gamma Distributed  No.206  No.206  No.206  No.206  No.206  Data Appear Gamma Distributed  No.206
Kolmogorov-Smirnov (Detects Only)  O.138  O.211  Detected Data Appear Gamma Distributed  Anderson-Darling (NDs = DL)  O.424  O.75  Kolmogorov-Smirnov (NDs = DL)  O.136  O.206  Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2)  Kolmogorov-Smirnov (NDs = DL/2)  O.139  O.206  Data Appear Gamma Distributed  D.206  Data Appear Gamma Distributed  O.206  Data Appear Gamma Distributed  O.206  Data Appear Gamma Distributed  O.206  Data Appear Gamma Distributed  O.206  Data Appear Gamma Distributed
Anderson-Darling (NDs = DL) 0.424 0.75  Kolmogorov-Smirnov (NDs = DL) 0.136 0.206 Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Kolmogorov-Smirnov (NDs = DL) 0.136 0.206 Data Appear Gamma Distributed  Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Anderson-Darling (NDs = DL/2) 0.585 0.752  Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Kolmogorov-Smirnov (NDs = DL/2) 0.139 0.206 Data Appear Gamma Distributed  nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
nderson-Darling (Gamma ROS Estimates) 0.397 0.75  Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Kolmogorov-Smirnov (Gamma ROS Est.) 0.135 0.206 Data Appear Gamma Distributed
Lognormal GOF Test Results
Lognormal GOF Test Results
No NDs   NDs = DL/2 Log ROS
Correlation Coefficient R 0.933 0.949 0.932 0.948
Test value Crit. (0.05) Conclusion with Alpha(0.05)
Test value Crit. (0.05) Conclusion with Alpha(0.05)  Shapiro-Wilk (Detects Only) 0.866 0.892 Data Not Lognormal  Shapiro-Wilk (NDs = DL) 0.891 0.897 Data Not Lognormal

						T	T
Shapiro-Wilk (NDs = DL/2)	0.856			Lognormal			
Shapiro-Wilk (Lognormal ROS Estimates)	0.888 0.145			Lognormal			
Lilliefors (Detects Only)			ear Lognor				
Lilliefors (NDs = DL)	0.142 0.151			ear Lognor			
Lilliefors (NDs = DL/2)			ear Lognor				
Lilliefors (Lognormal ROS Estimates)	0.202	Data App	ear Lognor	mal			
Note: Substitution methods such as DL or D	L/2 are no	ot recomm	ended.				
Selenium (mw-68)							
Raw Statistics							
Number of Valid Obse		18					
Number of Distinct Obse	ervations	14					
I	Vinimum	0.045					
N	1aximum	0.37					
Mean of F	aw Data	0.219					
Standard Deviation of F	aw Data	0.0858					
	Khat	5.017					
1	heta hat	0.0437					
	Kstar	4.218					
Т	heta star	0.052					
Mean of Log Transforn	ned Data	-1.621					
Standard Deviation of Log Transform		0.521					
Normal GOF Test Results	,						
Correlation Coe	fficient R	0.973					
Shapiro Wilk Test		0.946					
Shapiro Wilk Critical (0.0		0.897					
Approximate Shapiro Wilk		0.386					
Lilliefors Test		0.168					
Lilliefors Critical (0.0		0.202					
Data appear Normal at (0.05) Significance L	-	0.202					
Data appoar Normara: (0.00) Digimicanoo E	.0701						
Gamma GOF Test Result:	S						
Correlation Coe	fficient R	0.932					
A-D Test	Statistic	0.779					
A-D Critical (0.0	5) Value	0.743					
K-S Test	•	0.194					
K-S Critical(0.0		0.204					
Data follow Appr. Gamma Distribution at (0.	,						
	, , ,						
Lognormal GOF Test Resu	lts						
•							
Correlation Coe	fficient R	0.917					
Shapiro Wilk Test		0.852					
Shapiro Wilk Critical (0.0		0.897					
Approximate Shapiro Wilk	,	0.0074					
Lilliefors Test		0.0074					
Lilliefors Critical (0.0		0.202					
Data appear Approximate_Lognormal at (0.0	,						
Data appear Approximate_Lognormal at (0.9	oo, aignit	icalice Le\					

elenium (mw-69)					
Raw Statistics					
Number of Valid Observations	18				
Number of Distinct Observations	-				
Minimum	-				
Maximum					
Mean of Raw Data					
Standard Deviation of Raw Data					
Khat					
Theta hat	7.4958E-4				
Kstar	16.22				
Theta star	8.9744E-4				
Mean of Log Transformed Data	-4.256				
Standard Deviation of Log Transformed Data					
	00				
Normal GOF Test Results					
Normal GOL Test Nesults					
0 1 0	0.000			1	
Correlation Coefficient R					
Shapiro Wilk Test Statistic					
Shapiro Wilk Critical (0.05) Value					
Approximate Shapiro Wilk P Value	0.225				
Lilliefors Test Statistic	0.174				
Lilliefors Critical (0.05) Value	0.202				
ata appear Normal at (0.05) Significance Level					
· · · · · ·					
Gamma GOF Test Results					
Correlation Coefficient R	0.982				
A-D Test Statistic					
A-D Critical (0.05) Value					
K-S Test Statistic					
K-S Critical(0.05) Value					
ata appear Gamma Distributed at (0.05) Significand	ce Level				
Lognormal GOF Test Results					
Correlation Coefficient R	0.984				
Shapiro Wilk Test Statistic	0.962				
Shapiro Wilk Critical (0.05) Value	0.897				
Approximate Shapiro Wilk P Value					
Lilliefors Test Statistic					
Lilliefors Critical (0.05) Value					
• ,	0.202				
ata appear Lognormal at (0.05) Significance Level					
elenium (mw-70)					
Raw Statistics					
Number of Valid Observations	18				
Number of Distinct Observations	9				
Minimum	0.13				
Maximum			+	+	
Mean of Raw Data			1	1	
			1		
Standard Deviation of Raw Data	0.0323		1		1

	Khat	37.87						
	Theta hat	0.00509						
	Kstar	31.6						
7	Theta star	0.0061						
Mean of Log Transfor	med Data	-1.659						
Standard Deviation of Log Transfor	med Data	0.168						
-								
Normal GOF Test Result	ts							
Correlation Co	efficient R	0.977						
Shapiro Wilk Tes								
Shapiro Wilk Critical (0.								
Approximate Shapiro Wil								
Lilliefors Tes								
Lilliefors Critical (0.								
•	•	0.202						
Data appear Normal at (0.05) Significance	Levei							
0	4							
Gamma GOF Test Resul	ts							
Correlation Coe								
	st Statistic							
A-D Critical (0.	-							
K-S Tes	st Statistic	0.142						
K-S Critical(0.0	05) Value	0.203						
Data appear Gamma Distributed at (0.05) \$	Significand	e Level						
Lognormal GOF Test Resu	ults							
Correlation Coe	efficient R	0.979						
Shapiro Wilk Tes	st Statistic	0.966						
Shapiro Wilk Critical (0.	05) Value	0.897						
Approximate Shapiro Wil	k P Value	0.686						
Lilliefors Tes	st Statistic	0.129						
Lilliefors Critical (0.	05) Value	0.202						
Data appear Lognormal at (0.05) Significan	,							
Thallium (background)								
- Hamain (2001 <b>g</b> ) outlay								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	46	1	45	25	20	44.44%		
Naw Statistics		'						
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	20	4.0000E-4				5.8334E-4		
, ,,								
Statistics (Non-Detects Only)	25	2.0000E-4				3.2636E-4		
Statistics (All: NDs treated as DL value)	45	2.0000E-4				4.5775E-4		
Statistics (All: NDs treated as DL/2 value)	45	2.0000E-4				3.3242E-4		
Statistics (Normal ROS Imputed Data)	45	-4.429E-5				3.0372E-4		
Statistics (Gamma ROS Imputed Data)	45	2.0000E-4		0.0048	0.001	0.00471		
Statistics (Lognormal ROS Imputed Data)	45	1.4920E-4	0.0011	5.0560E-4	I3.9301E-∠	2.9262E-4		
	K hat	K Star		Log Mean	_	Log CV		
Statistics (Non-Detects Only)	3.272	2.906	1.9304E-4		0.61	-0.0811		
Statistics (NDs = DL)	2.812	2.639	2.4570E-4		0.613	-0.0821		
Statistics (NDs = DL/2)	2.492	2.341	2.0901E-4	-7.774	0.67	-0.0861		
	_	_	_	_	_	_	_	_

Statistics (Gamma ROS Estimates)	0.682	0.652	0.00703		1.536	-0.247		
Statistics (Lognormal ROS Estimates)				-7.75	0.571	-0.0737		
No	rmal GOF	Test Resu	lts					
	No NDs			lormal RO				
Correlation Coefficient R	0.934	0.895	0.906	0.966				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)	0.85	0.918	Data Not I	Normal				
Shapiro-Wilk (NDs = DL)	0.796	0.945	Data Not I	Normal				
Shapiro-Wilk (NDs = DL/2)	0.793	0.945	Data Not I	Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.917	0.945	Data Not I	Normal				
Lilliefors (Detects Only)	0.207	0.173	Data Not I	Normal				
Lilliefors (NDs = DL)	0.205	0.131	Data Not I	Normal				
Lilliefors (NDs = DL/2)	0.223	0.131	Data Not I	Normal				
Lilliefors (Normal ROS Estimates)	0.124	0.131	Data Appe	ear Normal				
	I .	I .					+	
Ga	mma GOF	Test Resu	ilts				1	
							1	
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R		0.951	0.913	0.714				
	0.007	0.00.	0.0.0	0.7.1				
	Test value	Crit. (0.05)	Co	nclusion wi	th Alnha(0	05)		
Anderson-Darling (Detects Only)	1.521	0.751		TICIUSIOTI WI	ui / upila(o.	.00)		
Kolmogorov-Smirnov (Detects Only)	0.226		Data Not (	Gamma Dis	etributed			
Anderson-Darling (NDs = DL)	1.801	0.757	Data Not V	Janina Dis	Silibuted			
Kolmogorov-Smirnov (NDs = DL)		0.133	Data Not (	Gamma Dis	etributed			
Anderson-Darling (NDs = DL/2)	2.998	0.758	Data NOT	Janina Dis	stributeu			
Kolmogorov-Smirnov (NDs = DL/2)	0.199		Data Not (	Gamma Dis	stributod			
nderson-Darling (Gamma ROS Estimates)	5.045	0.133	Data NOT	Janina Dis	siributeu			
			Data Nati	2 Di-	اد د د داند			
Kolmogorov-Smirnov (Gamma ROS Est.)	0.304	0.138	Data Not (	Gamma Dis	stributed			
Logi	normal GO	F Test Res	SUITS					
		NDs = DL						
Correlation Coefficient R	0.933	0.965	0.918	0.97				
	<u></u>	I	T					
		Crit. (0.05)		nclusion wi	th Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)	0.85		Data Not I					
Shapiro-Wilk (NDs = DL)			Data Not I					
Shapiro-Wilk (NDs = DL/2)			Data Not I					
Shapiro-Wilk (Lognormal ROS Estimates)	0.919	0.945	Data Not I	ognormal				
Lilliefors (Detects Only)	0.229	0.173		-				
Lilliefors (NDs = DL)	0.187	0.131	Data Not I	ognormal	-			
Lilliefors (NDs = DL/2)	0.178	0.131	Data Not I	ognormal				
Lilliefors (Lognormal ROS Estimates)	0.135	0.131	Data Not I	ognormal				
		1	1					
Note: Substitution methods such as DL or	DL/2 are r	ot recomm	ended.					
Thallium (mw-66)								
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	0	18	14	4	22.22%	1	
			_					1

	Number		Maximum		Median	SD		
Statistics (Non-Detects Only)	4	4.0000E-4				3.0000E-4		
Statistics (Non-Detects Only)	14	3.3000E-4				5.5021E-4		
Statistics (All: NDs treated as DL value)	18	3.3000E-4				4.9986E-4	<u> </u>	
Statistics (All: NDs treated as DL/2 value)	18	2.0000E-4				5.1333E-4		
Statistics (Normal ROS Imputed Data)	18	-8.554E-5				15.3141E-4		
Statistics (Gamma ROS Imputed Data)	18	3.3000E-4			6.1000E-4			
Statistics (Lognormal ROS Imputed Data)	18	2.4087E-4	0.0025	5.9492E-4	4.5481E-4	5.0226E-4		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	3.175	2.542	2.0993E-4	-7.479	0.517	-0.0691		
Statistics (NDs = DL)	3.451	2.913	1.8559E-4	-7.505	0.494	-0.0658		
Statistics (NDs = DL/2)	2.587	2.193	2.2401E-4	-7.659	0.601	-0.0785		
Statistics (Gamma ROS Estimates)	0.649	0.578	0.00422	-6.841	1.31	-0.191		
Statistics (Lognormal ROS Estimates)		-		-7.596	0.519	-0.0684		
No	rmal GOF	Test Resu	lts					1
	No NDs	NDs = DL	NDs = DL/2	lormal RO				
Correlation Coefficient R		0.735	0.749	0.789				+
								+
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.554		Data Not I			,		
Shapiro-Wilk (NDs = DL)			Data Not I					+
Shapiro-Wilk (NDs = DL/2)	0.59		Data Not I					+
Shapiro-Wilk (Normal ROS Estimates)	0.658							-
Lilliefors (Detects Only)			Data Not I					
Lilliefors (NDs = DL)			Data Not I					
Lilliefors (NDs = DL/2)	0.296		Data Not I					
Lilliefors (Normal ROS Estimates)	0.230		Data Not I					-
Lillielois (Normal NOS Estimates)	0.207	0.202	Data NOT	Normal				
Go	mmo GOE	Test Resu	ilto					
Ga Ga	illilla GOI	163111630	1110					
	No NDo	NDs = DI	ND DI /	amma RO				
O	No NDs							
Correlation Coefficient R	0.839	0.849	0.859	0.868				
	T·	O-it (0.05)	_		:4L A L L /^	05)		1
Andre D. P. (D. C. C.)		Crit. (0.05)	Co	nclusion w	ıtn Aipha(0	.05)		1
Anderson-Darling (Detects Only)	1.285	0.742	D	<u> </u>				
Kolmogorov-Smirnov (Detects Only)	0.25	0.23	Data Not (	Gamma Di	stributed			-
Anderson-Darling (NDs = DL)		0.744	<b>D</b>	_ =				1
Kolmogorov-Smirnov (NDs = DL)		0.205	Data Not (	Gamma Di	stributed			1
Anderson-Darling (NDs = DL/2)		0.749						
Kolmogorov-Smirnov (NDs = DL/2)	0.199	0.206	Detected	Data appea	ar Approxir	nate Gamn		
nderson-Darling (Gamma ROS Estimates)	2.696	0.787						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.352	0.213	Data Not	Gamma Di	stributed			
Logi	normal GO	F Test Res	ults					
	No NDs	NDs = DL	NDs = DL/	Log ROS				
Correlation Coefficient R	0.893	0.898	0.946	0.919				
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha(0	.05)		1
Shapiro-Wilk (Detects Only)	0.815	0.874	Data Not I	_ognormal				

Shapiro-Wilk (NDs = DL)	0.819			Lognormal				
Shapiro-Wilk (NDs = DL/2)	0.908			ear Lognor	mal		İ	
Shapiro-Wilk (Lognormal ROS Estimates)	0.865	0.897	Data Not I	Lognormal			1	
Lilliefors (Detects Only)	0.202			ear Lognor			i	
Lilliefors (NDs = DL)	0.191	0.202	Data Appe	ear Lognor	mal			
Lilliefors (NDs = DL/2)	0.148	0.202	Data Appe	ear Lognor	mal			
Lilliefors (Lognormal ROS Estimates)	0.165	0.202	Data Appe	ear Lognor	mal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Thallium (mw-67)								
	Num Ohs	Num Miss	Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	0	18	14	4	22.22%		-
Traw clausies	10	· ·	10		-	ZZ.ZZ 70	i	
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	4	4.0000E-4			7.5000E-4			
Statistics (Non-Detects Only)	14					1.3001E-4		
Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	18	3.1000E-4				1.3001E-4 3.8897E-4	i	-
Statistics (All: NDs treated as DL value)  Statistics (All: NDs treated as DL/2 value)	18	3.1000E-4				3.8897E-4 1.9122E-4	i	
,					4.6978E-4			
Statistics (Normal ROS Imputed Data)	18							
Statistics (Gamma ROS Imputed Data)	18	3.1000E-4			5.5000E-4			
Statistics (Lognormal ROS Imputed Data)	18	3.1000E-4	7.4000E-4	4.6939E-4	4.5426E-4	1.19//E-4		
		T -	T	1				
	K hat	K Star		Log Mean	_	Log CV		
Statistics (Non-Detects Only)	15.07	11.89	3.2238E-5	-7.663	0.27	-0.0352	<u> </u>	
Statistics (NDs = DL)	4.378	3.685	1.3578E-4	-7.546	0.447	-0.0593	1	
Statistics (NDs = DL/2)	7.168	6.01	6.7820E-5	-7.7	0.393	-0.051		
Statistics (Gamma ROS Estimates)	0.599	0.536	0.00434	-6.984	1.329	-0.19		
Statistics (Lognormal ROS Estimates)				-7.694	0.248	-0.0323	i .	
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DI	NDs = DI /	Jormal RO	1			
Correlation Coefficient R		0.774	0.965	0.976			<u> </u>	
Consider Commission	0.001	0.771	0.000	0.070			1	
	Test value	Crit. (0.05)	Co	nclusion w	ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.952	, ,		ear Normal		/		
Shapiro-Wilk (NDs = DL)	0.624		Data Not I				1	-
Shapiro-Wilk (NDs = DL/2)	0.024			ear Normal			1	-
Shapiro-Wilk (Normal ROS Estimates)	0.941			ear Normal				
Lilliefors (Detects Only)	0.946			ear Normal				
Lilliefors (Detects Only)  Lilliefors (NDs = DL)			Data Not I				i	
							i	
Lilliefors (NDs = DL/2)				ear Normal				
Lilliefors (Normal ROS Estimates)	0.141	0.202	рага Арре	ear Normal			i	+
Ga	mma GOF	Test Resu	ilts					
	N- ND	ND- 5'	VID D: "	<u>ا</u>	1			
Correlation Coefficient D	No NDs			amma RC	1			
Correlation Coefficient R	0.987	0.869	0.988	0.852				
	- · ·	0 :	_			05)		
A 1 B 1 7 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		Crit. (0.05)	Со	nciusion w	ith Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.288	0.734	_					
Kolmogorov-Smirnov (Detects Only)	0.126	0.228	Detected	Data Appe	ar Gamma	Distributed		

							ı
Anderson-Darling (NDs = DL)		0.743					
Kolmogorov-Smirnov (NDs = DL)	0.222	0.204	Data Not (	Gamma Di	stributed		
Anderson-Darling (NDs = DL/2)		0.741					
Kolmogorov-Smirnov (NDs = DL/2)	0.0872		Data Appe	ear Gamma	a Distribute	ed	
nderson-Darling (Gamma ROS Estimates)	3.383	0.791					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.413	0.214	Data Not (	Gamma Di	stributed		
Logi	normal GO	F Test Res	sults				
	I	ı	I	1	I		
	No NDs			Log ROS			
Correlation Coefficient R	0.985	0.923	0.992	0.988			
	<b>-</b>	la : (2.25)				<b>~=</b> `	
		Crit. (0.05)		nclusion w		.05)	
Shapiro-Wilk (Detects Only)	0.956			ear Lognor	mal		
Shapiro-Wilk (NDs = DL)	0.865		Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.989			ear Lognor			
Shapiro-Wilk (Lognormal ROS Estimates)	0.966			ear Lognor			
Lilliefors (Detects Only)	0.126			ear Lognor			
Lilliefors (NDs = DL)				ear Lognor			
Lilliefors (NDs = DL/2)	0.1			ear Lognor			
Lilliefors (Lognormal ROS Estimates)	0.124	0.202	Data Appe	ear Lognor	mal		
	D. 10						
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Thallium (mw-68)							
	T	T	T	_	T		
		Num Miss			NDs	% NDs	
Raw Statistics	18	0	18	15	3	16.67%	
	I	ı	I	1	I	1	
	Number		Maximum		Median	SD	
Statistics (Non-Detects Only)	3	5.0000E-4		0.00117		7.6376E-4	
Statistics (Non-Detects Only)	15					1.2510E-4	
Statistics (All: NDs treated as DL value)	18	4.8000E-4				3.3750E-4	
Statistics (All: NDs treated as DL/2 value)	18	2.5000E-4				1.7876E-4	
Statistics (Normal ROS Imputed Data)	18					1.2666E-4	
Statistics (Gamma ROS Imputed Data)	18	4.8000E-4			6.8500E-4		
Statistics (Lognormal ROS Imputed Data)	18	4.8000E-4	9.3000E-4	6.8299E-4	6.7186E-4	1.2391E-4	
			T	T		T	
<u> </u>	K hat	K Star		Log Mean	_	Log CV	
Statistics (Non-Detects Only)	33.55	26.88	2.0785E-5		0.179	-0.0246	
Statistics (NDs = DL)	8.679	7.27	8.9360E-5		0.322	-0.0446	
Statistics (NDs = DL/2)	12.57	10.51	5.3957E-5		0.313	-0.0426	
Statistics (Gamma ROS Estimates)	0.803	0.706	0.0028	-6.837	1.04	-0.152	
Statistics (Lognormal ROS Estimates)				-7.305	0.182	-0.0249	
		_					
No	rmal GOF	Test Resu	Its				
	ı	T	T	ı	T		
	No NDs			lormal RO			
Correlation Coefficient R	0.982	0.792	0.981	0.982			
	ı	T -	T				
		Crit. (0.05)		nclusion w		.05)	
Shapiro-Wilk (Detects Only)	0.962			ear Normal			
Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2)		0.897 0.897	Data Not I	Normal ear Normal			

							1	
Shapiro-Wilk (Normal ROS Estimates)	0.962			ear Normal				
Lilliefors (Detects Only)	0.19	0.22		ear Normal				
Lilliefors (NDs = DL)	0.214		Data Not I					
Lilliefors (NDs = DL/2)	0.141	0.202	Data Appe	ear Normal				
Lilliefors (Normal ROS Estimates)	0.199	0.202	Data Appe	ear Normal				
Ga	mma GOE	Test Resu	ılte					
G	IIIIIa GOF	Test nest	iito					
	No NDs	NDs = DL	NDs = DL/	amma RO				
Correlation Coefficient R	0.986	0.857	0.969	0.856				
	<b>-</b>	0 : (0.05)				05)		
		Crit. (0.05)	Co	nclusion w	ith Alpha(U	.05)		
Anderson-Darling (Detects Only)	0.272	0.735			_			
Kolmogorov-Smirnov (Detects Only)	0.168	0.221	Detected	Data Appe	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	1.065	0.74						
Kolmogorov-Smirnov (NDs = DL)	0.199	0.204	Detected	Data appea	ar Approxin	nate Gamn		
Anderson-Darling (NDs = DL/2)	0.441	0.739						
Kolmogorov-Smirnov (NDs = DL/2)	0.135		Data App	ear Gamma	a Distribute	ed		
nderson-Darling (Gamma ROS Estimates)	4.065	0.776						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.449	0.211	Data Not	Gamma Di	stributed			
l and	normal 00	E Toot Dag	vulto.					
Logr	iormai GO	F Test Res	SUITS					
	No NDs	NDs = DI	NDs = DL/	Log ROS				
Correlation Coefficient R	0.987	0.914	0.924	0.981				
	0.007	0.01.	0.02.	0.00.				
	Test value	Crit. (0.05)	Со	nclusion w	ith Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.973			ear Lognor		,		
Shapiro-Wilk (NDs = DL)	0.855		Data Not					
Shapiro-Wilk (NDs = DL/2)	0.873		Data Not	-				
Shapiro-Wilk (Lognormal ROS Estimates)	0.958			ear Lognor	mal			
Lilliefors (Detects Only)	0.157	0.22		ear Lognor				
Lilliefors (NDs = DL)	0.183			ear Lognor				
Lilliefors (NDs = DL/2)	0.159			ear Lognor				
Lilliefors (Lognormal ROS Estimates)	0.166			ear Lognor				
				<del>-</del>				
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
Thallium (my 60)								
Thallium (mw-69)								
	Num Oba	Num Miss	Num Valia	Detects	NDc	% NDs		
Raw Statistics	18	0	18	9	NDs 9	% NDS 50.00%		
naw Statistics	10	U	10	3	3	30.00%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	9	4.0000E-4				5.4109E-4		
Statistics (Non-Detects Only) Statistics (Non-Detects Only)	9					1.0060E-4		
Statistics (Non-Detects Only)  Statistics (All: NDs treated as DL value)	18	1.4000E-4				1.0060E-4 14.3192E-4		
Statistics (All: NDs treated as DL/2 value)	18	1.4000E-4				2.0224E-4		
Statistics (All. NDs treated as DL72 value)  Statistics (Normal ROS Imputed Data)	18					8.0142E-5		
Statistics (Gamma ROS Imputed Data)	18	1.4000E-4		0.00512				
Statistics (Gamma ROS Imputed Data)  Statistics (Lognormal ROS Imputed Data)	18					7.7412E-5		
Statistics (Logitornial ROS Imputed Data)	10	1.4000E-4	4.7000E-2	∠.3408E-4	2.230 IE-4	7.741ZE-3		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non Datasta Calid	7.978		3.1058E-5		0.37	-0.0442		
Statistics (Non-Detects Only)	7.978	5.393	ა. 1008E-ზ	-0.30/	0.37	-0.0442		

510	3 FIOOCL	GOODINE	33 OF FIT 3	IATIOTIC	.0			
Statistics (NDs = DL)	2.234	1.899	2.0219E-4	-7.943	0.64	-0.0806		
Statistics (NDs = DL/2)	3.834	3.232	7.5056E-5	-8.289	0.475	-0.0573	İ	
Statistics (Gamma ROS Estimates)	0.521	0.471	0.00984	-6.486	1.952	-0.301	i	
Statistics (Lognormal ROS Estimates)				-8.401	0.296	-0.0353		
No	rmal GOF	Test Resu	lts					
		1	1					
	No NDs		NDs = DL/2loi					
Correlation Coefficient R	0.931	0.755	0.766	0.941				
	T4	O: (0.0E)	0		h Al-l/0	05)		
Charira Wills (Data eta Only)		Crit. (0.05)			h Alpha(0	.05)		
Shapiro-Wilk (Detects Only)			Data Appear Data Not No					
Shapiro-Wilk (NDs = DL) Shapiro-Wilk (NDs = DL/2)			Data Not No					
Shapiro-Wilk (Normal ROS Estimates)								
			Data Appear					
Lilliefors (Detects Only) Lilliefors (NDs = DL)			Data Appear Data Not No				i	-
Lilliefors (NDs = DL/2)			Data Not No					
Lilliefors (Normal ROS Estimates)			Data Not No Data Appear				i	-
Lillielois (Normal NOS Estimates)	0.103	0.202	Data Appeal	Nomai				
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/aar	mma RO				
Correlation Coefficient R	0.972	0.88	0.874	0.654				
	I	II.					 I	
	Test value	Crit. (0.05)	Conc	lusion wit	h Alpha(0	.05)	<del></del>	
Anderson-Darling (Detects Only)	0.291	0.722						
Kolmogorov-Smirnov (Detects Only)	0.155	0.28	Detected Da	ta Appea	r Gamma	Distributed		
Anderson-Darling (NDs = DL)	1.205	0.751						
Kolmogorov-Smirnov (NDs = DL)	0.258	0.206	Data Not Ga	mma Dis	tributed			
Anderson-Darling (NDs = DL/2)	1.775	0.743						
Kolmogorov-Smirnov (NDs = DL/2)			Data Not Ga	mma Dis	tributed			
nderson-Darling (Gamma ROS Estimates)		0.798						
Kolmogorov-Smirnov (Gamma ROS Est.)	0.338	0.215	Data Not Ga	mma Dis	tributed		<u> </u>	
Law		D						
Logi	normal GO	F Test Res	sults					_
	No NDs	NDs = DI	NDs = DL/2 L	og ROS				-
Correlation Coefficient R		0.942	0.894	0.972				
252.2.3 200	0.07.0	0.012	3.551					-
	Test value	Crit. (0.05)	Conc	lusion wit	h Alpha(0.	.05)		
Shapiro-Wilk (Detects Only)			Data Appear			•		+
Shapiro-Wilk (NDs = DL)			Data Appear				 I	1
Shapiro-Wilk (NDs = DL/2)	0.814	0.897	Data Not Log	gnormal			<del></del>	
Shapiro-Wilk (Lognormal ROS Estimates)	0.951	0.897	Data Appear	Lognorm	nal			
Lilliefors (Detects Only)	0.135	0.274	Data Appear	Lognorm	nal		1	
Lilliefors (NDs = DL)	0.204	0.202	Data Not Log	gnormal				
Lilliefors (NDs = DL/2)			Data Not Log					
Lilliefors (Lognormal ROS Estimates)	0.139	0.202	Data Appear	Lognorm	nal			
Note: Substitution methods such as DL or	DL/2 are r	ot recomm	ended.					
Thallium (mw-70)								1

		ı		T	T	1 -	1	
		Num Miss			NDs	% NDs		
Raw Statistics	18	0	18	9	9	50.00%		
	Number		Maximum		Median	SD		
Statistics (Non-Detects Only)	9	4.0000E-4				5.4263E-4		
Statistics (Non-Detects Only)	9	2.7000E-4	5.7000E-4	4.2333E-4	4.0000E-4	8.6603E-5		
Statistics (All: NDs treated as DL value)	18	2.7000E-4	0.002	5.7278E-4	4.0000E-4	4.0711E-4		
Statistics (All: NDs treated as DL/2 value)	18	2.0000E-4	0.001	3.9222E-4	3.9000E-4	1.9798E-4		
Statistics (Normal ROS Imputed Data)	18	2.7000E-4	5.7000E-4	3.9476E-4	3.9000E-4	7.2673E-5		
Statistics (Gamma ROS Imputed Data)	18	2.7000E-4	0.01	0.00521	0.00529	0.00493		
Statistics (Lognormal ROS Imputed Data)	18	2.7000E-4	5.7000E-4	3.9304E-4	3.8747E-4	7.1892E-5		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	25.71	17.21	1.6468E-5	_	0.214	-0.0274		
Statistics (NDs = DL)	3.812		1.5025E-4	-7.602	0.473	-0.0623		
Statistics (NDs = DL/2)	4.934		7.9502E-5		0.464	-0.0584		
Statistics (Gamma ROS Estimates)	0.65	0.579	0.00802		1.644	-0.265		
Statistics (Lognormal ROS Estimates)				-7.857	0.179	-0.0227		
Cidiotics (Edgnormal NCC Estimates)				7.007	0.175	0.0227		
No	rmal COE	Test Resu	lte					
l NC	aniai GOF	. 63t i 163U						
	No NDc	NDe - Di	NDe - DI "	lormal RO	1			
O								
Correlation Coefficient R	0.965	0.743	0.899	0.965				
	ı <del>.</del>	0 : (0 05)				05)		
		Crit. (0.05)		nclusion wi		.05)		
Shapiro-Wilk (Detects Only)	0.945		• • •	ear Normal				
Shapiro-Wilk (NDs = DL)	0.577		Data Not I					
Shapiro-Wilk (NDs = DL/2)	0.819		Data Not I					
Shapiro-Wilk (Normal ROS Estimates)	0.94			ear Normal				
Lilliefors (Detects Only)	0.197	0.274	Data Appe	ear Normal				
Lilliefors (NDs = DL)	0.349	0.202	Data Not I	Normal				
Lilliefors (NDs = DL/2)	0.182	0.202	Data Appe	ear Normal				
Lilliefors (Normal ROS Estimates)	0.185	0.202	Data Appe	ear Normal				
Ga	mma GOF	Test Resu	ılts					
	No NDs	NDs = DL	NDs = DL/2	amma RO				
Correlation Coefficient R	0.966	0.855	0.946	0.681				
	Test value	Crit. (0.05)	Co	nclusion wi	ith Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.386	0.721	30		,,,,,,(0	- /		
Kolmogorov-Smirnov (Detects Only)	0.208	0.721	Detected I	Data Anne	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)		0.273	Dolooled I	Data Appe	a. Gaiiiila			
Kolmogorov-Smirnov (NDs = DL)	0.312	0.743	Data Not (	Gamma Dis	etributed			
Anderson-Darling (NDs = DL/2)	0.312	0.205	שמים ואטני (	Janina Di	รถามนเ <del>ป</del> น			
			Data Ass	oor Comm	Diotribut-	nd.		
Kolmogorov-Smirnov (NDs = DL/2)	0.16	0.204	рага Арре	ear Gamma	DISTRIBUTE	:u		
nderson-Darling (Gamma ROS Estimates)	2.857	0.787	D 1 11 11	<u> </u>				
Kolmogorov-Smirnov (Gamma ROS Est.)	0.338	0.213	Data Not (	Gamma Dis	stributed			
Logi	normal GO	F Test Res	ults					
	T			I	T			
				Log ROS				
Correlation Coefficient R	0.953	0.856	0.951	0.976				
1								

<u> </u>							
		Crit. (0.05)		nclusion wi		.05)	
Shapiro-Wilk (Detects Only)			Data Appe	_	nal		
Shapiro-Wilk (NDs = DL)		0.897					
Shapiro-Wilk (NDs = DL/2)				_			
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appe	-			
Lilliefors (Detects Only)	0.228	0.274	Data Appe	ar Lognorr	nal		
Lilliefors (NDs = DL)	0.277	0.202	Data Not L	.ognormal			
Lilliefors (NDs = DL/2)	0.174	0.202	Data Appe	ar Lognorr	nal		
Lilliefors (Lognormal ROS Estimates)	0.149	0.202	Data Appe	ar Lognorr	nal		
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Fluoride (background)							
		ı					
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	46	0	46	3	43	93.48%	
	Number	Minimum	Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	43	0.4	4	1.47	2	0.979	
Statistics (Non-Detects Only)	3	0.2	0.44	0.32	0.32	0.12	
Statistics (All: NDs treated as DL value)	46	0.2	4	1.395	0.8	0.988	
Statistics (All: NDs treated as DL/2 value)	46	0.2	2	0.708	0.42	0.485	
Statistics (Normal ROS Imputed Data)		0.0965	0.44	0.268	0.268	0.0863	
Statistics (Gamma ROS Imputed Data)		0.141	0.44	0.271	0.264	0.0758	
Statistics (Lognormal ROS Imputed Data)		0.148	0.447	0.268	0.257	0.0753	
	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)	1.995	1.879	0.699	0.0616	0.781	12.67	
Statistics (NDs = DL/2)	2.229	2.098	0.318	-0.586	0.724	-1.235	
Statistics (Gamma ROS Estimates)	13.05	12.21	0.0208	-1.345	0.284	-0.211	
Statistics (Lognormal ROS Estimates)				-1.356	0.279	-0.206	
,							
No	rmal GOF	Test Resu	lts				
	No NDs	NDc - Di	NDc - DI 4	lormal DO			1
Correlation Coefficient D			NDs = DL/2				1
Correlation Coefficient R	ı	0.899	0.893	0.996			1
	Test value	Crit. (0.05)	Car	nclusion wi	th Alpha/A	05)	1
Shapiro-Wilk (Detects Only)	1	0.767			uı ∕ıhııg(0	.00)	1
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)			Data Not N				
		0.945					-
Shapiro-Wilk (NDs = DL/2)							1
Shapiro-Wilk (Normal ROS Estimates)							1
Lilliefors (Detects Only)	0.175						1
LUC C. AID DIX	0.040	0.129	Data Not N	vormal			1
Lilliefors (NDs = DL)			<b>A</b>				
Lilliefors (NDs = DL/2)	0.237	0.129	Data Not N				
,	0.237	0.129					
Lilliefors (NDs = DL/2) Lilliefors (Normal ROS Estimates)	0.237 0.0563	0.129 0.129	Data Appe				
Lilliefors (NDs = DL/2) Lilliefors (Normal ROS Estimates)	0.237	0.129 0.129	Data Appe				
Lilliefors (NDs = DL/2) Lilliefors (Normal ROS Estimates)	0.237 0.0563	0.129 0.129 Test Resu	Data Appe	ear Normal			
Lilliefors (NDs = DL/2) Lilliefors (Normal ROS Estimates)	0.237 0.0563 mma GOF	0.129 0.129 Test Resu	Data Appe	ear Normal			

	Toot value	O-: 10 0E	<u> </u>	nalusian w	ارمطمالا طفا	) OE)	T
Anderson Darling (Detects Only)	N/A	Crit. (0.05) N/A	Co	nclusion w	itn Aipna(u	1.05)	
Anderson-Darling (Detects Only)	N/A N/A	N/A N/A					
Kolmogorov-Smirnov (Detects Only)							
Anderson-Darling (NDs = DL)	2.819	0.761	Data Nati	O D:	-4		
Kolmogorov-Smirnov (NDs = DL)		0.132	Data Not	Gamma Di	stributea		
Anderson-Darling (NDs = DL/2)		0.76					
Kolmogorov-Smirnov (NDs = DL/2)	0.256	0.132	Data Not	Gamma Di	stributed		
nderson-Darling (Gamma ROS Estimates)		0.749					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.0559	0.13	Data App	ear Gamma	a Distribute	ed	
Logi	normal GO	E Toet Doe	vulte				
Logi	ioilliai GO	i restrict	suits				
	No NDs	NDs = DL	NDs = DL/	Log ROS			
Correlation Coefficient R	0.994	0.94	0.93	0.996			
	Test value			nclusion w		.05)	
Shapiro-Wilk (Detects Only)	0.988			ear Lognor	mal		
Shapiro-Wilk (NDs = DL)				Lognormal			
Shapiro-Wilk (NDs = DL/2)				Lognormal			
Shapiro-Wilk (Lognormal ROS Estimates)				ear Lognor			
Lilliefors (Detects Only)				ear Lognor	mal		
Lilliefors (NDs = DL)				Lognormal			
Lilliefors (NDs = DL/2)	0.269	0.129	Data Not	Lognormal			
Lilliefors (Lognormal ROS Estimates)	0.0559	0.129	Data App	ear Lognor	mal		
		•					
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
Fluoride (mw-66)							
Raw Statistics							
Number of Valid Ob		18					
Number of Distinct Ob		9					
	Minimum	17					
	Maximum	41					
	Raw Data	23.33					
Standard Deviation of	Raw Data	5.477					
	Khat	22.67					
	Theta hat						
	Kstar	18.93					
	Theta star	1.233					
Mean of Log Transfo	rmed Data	3.128					
Standard Deviation of Log Transfo	rmed Data	0.21					
No	la						
Normal GOF Test Resu	ITS						
Correlation Co	efficient R	0.873					
Shapiro Wilk Te							
Shapiro Wilk Critical (0							
Approximate Shapiro W	,		<u> </u> 	1			
Lilliefors Te							
Lilliefors Critical (0	-	0.202					
Data not Normal at (0.05) Significance Lev	/ <del>U</del> I						
Gamma GOF Test Resu	ulto						
Gamina GOF Test Resu	ii lõ						

Correlation Coefficient R	0.898					
A-D Test Statistic	0.935					
A-D Critical (0.05) Value	0.739					
K-S Test Statistic	0.221					
K-S Critical(0.05) Value	0.203					
Data not Gamma Distributed at (0.05) Significance Le						
Data not danima Distributed at (0.00) digrimoance Et						
Lognormal GOF Test Results						
Lognormal GOF Test Results						
O	0.004					
Correlation Coefficient R	0.924					
Shapiro Wilk Test Statistic	0.867					
Shapiro Wilk Critical (0.05) Value	0.897					
Approximate Shapiro Wilk P Value	0.0136					
Lilliefors Test Statistic	0.212					
Lilliefors Critical (0.05) Value	0.202					
Data not Lognormal at (0.05) Significance Level						
Non-parametric GOF Test Results						
Data do not follow a discernible distribution at (0.05) I	_evel of Si					
, , , , , , , , , , , , , , , , , , ,	'					
Fluoride (mw-67)						
ridorido (interes)						
Raw Statistics						
Number of Valid Observations	10					
	18					
Number of Distinct Observations	12					
Minimum	15					
Maximum	37					
Mean of Raw Data	22.22					
Standard Deviation of Raw Data	5.275					
Khat	21.1					
Theta hat	1.053					
Kstar	17.62					
Theta star	1.261					
Mean of Log Transformed Data	3.077					
Standard Deviation of Log Transformed Data	0.22					
Normal GOF Test Results						
Correlation Coefficient R	0.936					
Shapiro Wilk Test Statistic	0.889					
Shapiro Wilk Critical (0.05) Value	0.897					
Approximate Shapiro Wilk P Value	0.0327		1			
Lilliefors Test Statistic	0.188					
Lilliefors Critical (0.05) Value	0.202					
Data appear Approximate Normal at (0.05) Significan	ce Level					
Gamma GOF Test Results						
Correlation Coefficient R	0.959					
A-D Test Statistic	0.431					
A-D Critical (0.05) Value	0.739					
K-S Test Statistic	0.156					
				1	1	

I/ C O (iki1/0 OF)	0.202		1	1	
K-S Critical(0.05) Value	0.203				
Data appear Gamma Distributed at (0.05) Significance	e Level				
Lognormal GOF Test Results					
Correlation Coefficient R	0.973				
Shapiro Wilk Test Statistic	0.955				
Shapiro Wilk Critical (0.05) Value	0.897				
Approximate Shapiro Wilk P Value	0.476				
Lilliefors Test Statistic	0.149				
Lilliefors Critical (0.05) Value	0.202				
Data appear Lognormal at (0.05) Significance Level					
Fluoride (mw-68)					
Raw Statistics					
Number of Valid Observations	18				
Number of Distinct Observations	14				
Minimum	5.5				
Maximum	14				
Mean of Raw Data	9.211				
Standard Deviation of Raw Data	2.234				
Khat	17.27				
Theta hat	0.533				
Kstar	14.43				
Theta star	0.638				
Mean of Log Transformed Data	2.191				
Standard Deviation of Log Transformed Data	0.253				
Normal GOF Test Results					
0 1 0	0.007				
Correlation Coefficient R	0.987				
Shapiro Wilk Test Statistic	0.973				
Shapiro Wilk Critical (0.05) Value	0.897				
Approximate Shapiro Wilk P Value	0.852				
Lilliefors Test Statistic	0.125				
Lilliefors Critical (0.05) Value	0.202				
Data appear Normal at (0.05) Significance Level					
0					
Gamma GOF Test Results					
01:: 0 #:: :5	0.000				
Correlation Coefficient R	0.986				
A-D Test Statistic	0.287				
A-D Critical (0.05) Value	0.739				
K-S Test Statistic	0.155				
K-S Critical(0.05) Value	0.203				
Data appear Gamma Distributed at (0.05) Significance	e Level				
100== := ::					
Lognormal GOF Test Results					
Correlation Coefficient R	0.982				
Shapiro Wilk Test Statistic	0.962				
Shapiro Wilk Critical (0.05) Value	0.897				
Approximate Shapiro Wilk P Value	0.643				

	<u> </u>	0.40=				1	1	1
Lilliefors Test		0.165						
Lilliefors Critical (0.09		0.202						
Data appear Lognormal at (0.05) Significance	e Level							
Fluoride (mw-69)								
Raw Statistics								
Number of Valid Obse		18						
Number of Distinct Obse	rvations	12						
N	linimum	9.6						
	aximum	29						
Mean of Ra	aw Data	16.02						
Standard Deviation of Ra	aw Data	4.78						
	Khat	12.76						
T	heta hat	1.256						
	Kstar	10.67						
Th	eta star	1.501						
Mean of Log Transform		2.734						
Standard Deviation of Log Transform		0.288						
Normal GOF Test Results								
Correlation Coef	ficient R	0.957						
Shapiro Wilk Test		0.923						
Shapiro Wilk Critical (0.09		0.897						
Approximate Shapiro Wilk		0.143						
Lilliefors Test		0.125						
Lilliefors Critical (0.0		0.202						
Data appear Normal at (0.05) Significance Lo		0.202						
Data appear Normal at (0.00) dignificance Ed	3401							
Gamma GOF Test Results								
danina doi restriesula								
Correlation Coef	ficiont D	0.976						
A-D Test		0.976						
		0.292						
A-D Critical (0.0)	-	0.739						
K-S Test								
K-S Critical(0.05		0.203						
Data appear Gamma Distributed at (0.05) Signature (0.05)	ynmcanc	e Levei						
I amazan de Contrato								
Lognormal GOF Test Result	S							
	c 1	0.000						
Correlation Coef		0.983						
Shapiro Wilk Test		0.967						
Shapiro Wilk Critical (0.0	-	0.897						
Approximate Shapiro Wilk		0.729						
Lilliefors Test		0.134						
Lilliefors Critical (0.09		0.202						
Data appear Lognormal at (0.05) Significance	e Level							
Fluoride (mw-70)								
			Num Valid	Detects	NDs	% NDs		
Raw Statistics	18	0	18	14	4	22.22%		
	<u> </u>		. <u></u>	·	·	-		

	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	4	0.4	0.8	0.5	0.4	0.2	1	
Statistics (Non-Detects Only)	14	0.85	3.2	2.204	2.25	0.693		
Statistics (All: NDs treated as DL value)	18	0.4	3.2	1.825	2.1	0.952	i	
Statistics (All: NDs treated as DL/2 value)	18	0.2	3.2	1.769	2.1	1.033	i	
Statistics (Normal ROS Imputed Data)	18	0.28	3.2	1.851	2.1	0.915		
Statistics (Gamma ROS Imputed Data)	18	0.708	3.2	1.918	2.1	0.821		
Statistics (Lognormal ROS Imputed Data)	18	0.767	3.2	1.918	2.1	0.819	<del></del>	
							<del></del>	
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	8.436	6.676	0.261	0.73	0.39	0.534		
Statistics (NDs = DL)	2.665	2.258	0.685	0.402	0.731	1.817		
Statistics (NDs = DL/2)	1.699	1.453	1.042	0.248	0.998	4.018		
Statistics (Gamma ROS Estimates)	4.898	4.119	0.392	0.546	0.498	0.912		
Statistics (Lognormal ROS Estimates)				0.547	0.492	0.899		
Cianonios (Loginorma, 1700 Lonmatos)	L			0.017	002	0.000		
No	rmal COF	Test Resu	lts				I	
	iai GOF	163t 1163ti						-
	No NDs	NDe - DI	NDe = DI /	lormal RO				
Correlation Coefficient R	0.976	0.965	0.959	0.972				
Correlation Coefficient R	0.870	0.905	0.808	0.972				
	Tookwalua	O-: (0.0E)	0-		4l- Al-l/0	05)		
01 : W(11 (D : : 0 1 )		Crit. (0.05)		nclusion wi	tn Aipna(u	.05)		
Shapiro-Wilk (Detects Only)	0.946			ear Normal				
Shapiro-Wilk (NDs = DL)	0.911			ear Normal				
Shapiro-Wilk (NDs = DL/2)	0.899			ear Normal				
Shapiro-Wilk (Normal ROS Estimates)	0.93			ear Normal				
Lilliefors (Detects Only)	0.155			ear Normal				
Lilliefors (NDs = DL)	0.169			ear Normal				
Lilliefors (NDs = DL/2)	0.181			ear Normal			<u> </u>	
Lilliefors (Normal ROS Estimates)	0.163	0.202	Data Appe	ear Normal			<u> </u>	
							<u> </u>	
Ga	mma GOF	Test Resu	ilts				<u> </u>	
							İ	
	No NDs	NDs = DL	NDs = DL/2	amma RO			i	
Correlation Coefficient R	0.943	0.908	0.868	0.946				
							i	
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)		
Anderson-Darling (Detects Only)	0.617	0.736						
Kolmogorov-Smirnov (Detects Only)	0.205	0.229	Detected	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	1.042	0.748						<u> </u>
Kolmogorov-Smirnov (NDs = DL)	0.225	0.205	Data Not (	Gamma Dis	tributed			†
Anderson-Darling (NDs = DL/2)	1.375	0.755			-			<del>                                     </del>
Kolmogorov-Smirnov (NDs = DL/2)	0.249	0.207	Data Not (	Gamma Dis	stributed			<del> </del>
nderson-Darling (Gamma ROS Estimates)	0.79	0.743						-
Kolmogorov-Smirnov (Gamma ROS Est.)	0.194		Detected	Data appea	ır Approxin	nate Gamm		+
Califfic (Califf	J. 10-f	J.20-T				Gainin	1	
Logi	normal GO	F Test Res	ults				1	-
Logi							<u> </u>	
	No NDs	NDe = Di	NDs = DI /	Log ROS				-
Correlation Coefficient D				0.945			i	-
Correlation Coefficient R	0.923	0.918	0.888	0.945			i	
	Tank	O-it /0.05			4h Λlσ/Λ	OE)		
Chanina Wills /Data at Call		Crit. (0.05)		nclusion wi	uı Aıpna(U	.00)		
Shapiro-Wilk (Detects Only)	0.853		Data Not I					
Shapiro-Wilk (NDs = DL)	0.826	0.897	Data Not I	Lognormal			<u> </u>	

Shapiro-Wilk (NDs = DL/2)	0.774			•				
Shapiro-Wilk (Lognormal ROS Estimates)	0.875			-				
Lilliefors (Detects Only)	0.227		Data Not L	_				
Lilliefors (NDs = DL)	0.236		Data Not L	-				
Lilliefors (NDs = DL/2)	0.278		Data Not L	-				
Lilliefors (Lognormal ROS Estimates)	0.209	0.202	Data Not I	ognormal				
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
CombinedRadium (background)								
			l					
			Num Valid		NDs	% NDs		
Raw Statistics	46	0	46	40	6	13.04%		
	Number	Minimum	Maximum	Mean	Median	SD		
Statistics (Non-Detects Only)	6	0.5	8.0	0.65	0.65	0.105		
Statistics (Non-Detects Only)	40	0.4	4.8	2.315	2.2	0.994		
Statistics (All: NDs treated as DL value)	46	0.4	4.8	2.098	2.05	1.086	<del></del>	
Statistics (All: NDs treated as DL/2 value)	46	0.25	4.8	2.055	2.05	1.147		
Statistics (Normal ROS Imputed Data)	46	-0.00877	4.8	2.045	2.05	1.165		
Statistics (Gamma ROS Imputed Data)	46	0.4	4.8	2.106	2.05	1.075		
Statistics (Lognormal ROS Imputed Data)	46	0.4	4.8	2.11	2.05	1.068		
	K hat	K Star	Theta hat	Log Mean	Log Stdv	Log CV		
Statistics (Non-Detects Only)	4.662	4.329	0.497	0.728	0.519	0.712		
Statistics (NDs = DL)	3.184	2.99	0.659	0.576	0.628	1.092		
Statistics (NDs = DL/2)	2.279	2.145	0.902	0.485	0.799	1.647		
Statistics (Gamma ROS Estimates)	3.34	3.137	0.63	0.588	0.609	1.036		
Statistics (Lognormal ROS Estimates)	-			0.595	0.597	1.004		
,								
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DI	NDs = DL/2	Jormal RO				
Correlation Coefficient R	0.995	0.987	0.988	0.993				
Consider Commission	0.000	0.007	0.000	0.000				
	Test value	Crit. (0.05)	Col	nclusion wi	th Alnha(0	05)		
Shapiro-Wilk (Detects Only)	0.985	0.94	Data Appe		ui Aipiia(o.	00)		
Shapiro-Wilk (NDs = DL)	0.961							
Shapiro-Wilk (NDs = DL/2)	0.961		Data Appe					
Shapiro-Wilk (NDS = DL/2) Shapiro-Wilk (Normal ROS Estimates)	0.962		Data Appe					
,								
Lilliefors (Detects Only)	0.081		Data Appe					
Lilliefors (NDs = DL)	0.0825							
Lilliefors (NDs = DL/2)	0.0777			ear Normal				
Lilliefors (Normal ROS Estimates)	0.0676	0.129	Data Appe	ear inormal				
		Tack Dec	-14-0					
Ga	mma GOF	Test Resu	IIIS					
	N. N.	ND 5:	ID 51."					
	No NDs		NDs = DL/2					
Correlation Coefficient R	0.989	0.981	0.963	0.983				
		T =	T					
		Crit. (0.05)	Co	nclusion wi	th Alpha(0.	05)		
Anderson-Darling (Detects Only)	0.338	0.752						
Kolmogorov-Smirnov (Detects Only)	0.0992		Detected I	Data Appea	ar Gamma	Distributed		
Anderson-Darling (NDs = DL)	0.692	0.755						

Kolmogorov-Smirnov (NDs = DL)	0.115		Data Appe	ear Gamma	Distribute	d	
Anderson-Darling (NDs = DL/2)	1.335	0.76					
Kolmogorov-Smirnov (NDs = DL/2)	0.151	0.132	Data Not (	Gamma Dis	stributed		
nderson-Darling (Gamma ROS Estimates)	0.626	0.755					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.109	0.131	Data Appe	ear Gamma	Distribute	d	
Logr	normal GO	F Test Res	sults				
		T	T	ı			
	No NDs		NDs = DL/2	_			
Correlation Coefficient R	0.964	0.969	0.934	0.972			
		1 -	1				
		Crit. (0.05)		nclusion wi	th Alpha(0	.05)	
Shapiro-Wilk (Detects Only)	0.935	0.94	Data Not I				
Shapiro-Wilk (NDs = DL)	0.925		Data Not I				
Shapiro-Wilk (NDs = DL/2)	0.859		Data Not I				
Shapiro-Wilk (Lognormal ROS Estimates)	0.936		Data Not I				
Lilliefors (Detects Only)	0.134			ear Lognorr	mal		
Lilliefors (NDs = DL)	0.151		Data Not I				
Lilliefors (NDs = DL/2)	0.186		Data Not I				
Lilliefors (Lognormal ROS Estimates)	0.14	0.129	Data Not I	_ognormal			
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
CombinedRadium (mw-66)							
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
	Number		Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	1.5	1.5	1.5	1.5	N/A	
Statistics (Non-Detects Only)	17	0.4	5.1	2.599	2.8	1.229	
Statistics (All: NDs treated as DL value)	18	0.4	5.1	2.538	2.65	1.22	
Statistics (All: NDs treated as DL/2 value)	18	0.4	5.1	2.496	2.65	1.269	
Statistics (Normal ROS Imputed Data)	18	0.4	5.1	2.5	2.65	1.264	
Statistics (Gamma ROS Imputed Data)	18	0.4	5.1	2.514	2.65	1.245	
Statistics (Lognormal ROS Imputed Data)	18	0.4	5.1	2.504	2.65	1.258	
	17.1 .	I/ O:	There	1 14	1 0:1	1 - 01/	
Otalialia (N. D. C. C. C.	K hat	K Star		Log Mean		Log CV	
Statistics (Non-Detects Only)	3.283	2.743	0.792	0.795	0.67	0.843	
Statistics (NDs = DL)	3.325	2.808	0.763	0.773	0.657	0.849	
Statistics (NDs = DL/2)	2.937	2.485	0.85	0.735	0.699	0.95	
Statistics (Gamma ROS Estimates)	3.151	2.663	0.798	0.755	0.672	0.89	
Statistics (Lognormal ROS Estimates)				0.744	0.685	0.921	-
No	rmal GOF	Test Resu	lts				
	No NDs			Iormal RO			
Correlation Coefficient R	0.99	0.992	0.989	0.99			
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha/A	05)	
Shapiro-Wilk (Detects Only)	0.98	` '		ear Normal	ııı ∨ıhııa(∩	.00)	
Shapiro-Wilk (Detects Only) Shapiro-Wilk (NDs = DL)	0.98	0.892		ear Normal			
Shapiro-Wilk (NDs = DL/2)	0.984	0.897		ear Normal			
Shapiro-Wilk (Normal ROS Estimates)	0.974			ear Normal			
Shapiro-wilk (Normal ROS Estimates)	0.975	0.897	рата Арре	ai inoiiiial			

Lilliefors (Detects Only)			FF	ear Normal			
Lilliefors (NDs = DL)				ear Normal			
Lilliefors (NDs = DL/2)	0.112		Data Appe				
Lilliefors (Normal ROS Estimates)	0.111	0.202	Data Appe	ear Normal			
Ga	mma GOF	Test Resu	ılts				
	No NDs	NDs = DL	NDs = DL/2	amma RO			
Correlation Coefficient R	0.962	0.97	0.962	0.967			
		Crit. (0.05)	Co	nclusion wi	th Alpha(0	.05)	
Anderson-Darling (Detects Only)	0.61	0.745					
Kolmogorov-Smirnov (Detects Only)	0.193	0.21	Detected I	Data Appea	ar Gamma	Distributed	
Anderson-Darling (NDs = DL)	0.481	0.745					
Kolmogorov-Smirnov (NDs = DL)	0.173	0.205	Data Appe	ear Gamma	a Distribute	d	
Anderson-Darling (NDs = DL/2)	0.589	0.746					
Kolmogorov-Smirnov (NDs = DL/2)	0.19	0.205	Data Appe	ear Gamma	a Distribute	d	
nderson-Darling (Gamma ROS Estimates)		0.745					
Kolmogorov-Smirnov (Gamma ROS Est.)	0.182	0.205	Data Appe	ear Gamma	a Distribute	d	
Logi	normal GO	F Test Res	zulte				
Logi	iomai do	i restrice	ouito				
	No NDs	NDs = DI	NDs = DL/2	Log ROS			
Correlation Coefficient R		0.934	0.938	0.941			
Conclusion Coefficient 1	0.521	0.504	0.500	0.041			
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0	05)	
Shapiro-Wilk (Detects Only)	0.854		Data Not I		ur / upria(o	.00)	
Shapiro-Wilk (NDs = DL)			Data Not I	-			
Shapiro-Wilk (NDs = DL/2)	0.88		Data Not I	-			
Shapiro-Wilk (Lognormal ROS Estimates)			Data Not I				
Lilliefors (Detects Only)			Data Not I	-			
Lilliefors (NDs = DL)			Data Appe	-	mal		
Lilliefors (NDs = DL/2)			Data Not I	-			
Lilliefors (Lognormal ROS Estimates)			Data Not I	•			
,							
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.				
CombinedRadium (mw-67)							
	L:	L				0/ ::=	
			Num Valid		NDs	% NDs	
Raw Statistics	18	0	18	17	1	5.56%	
	Ni 1	N4::	NA	14-	NA - 12	0.0	
0	Number		Maximum	Mean	Median	SD	
Statistics (Non-Detects Only)	1	2	2	2	2	N/A	
Statistics (Non-Detects Only)	17	0.9	4.2	2.592	2.67	0.895	
Statistics (All: NDs treated as DL value)		0.9	4.2	2.559	2.635	0.879	
Statistics (All: NDs treated as DL/2 value)		0.9	4.2	2.504	2.635	0.946	
Statistics (Normal ROS Imputed Data)		0.9	4.2	2.52	2.635	0.92	
Statistics (Gamma ROS Imputed Data)		0.9	4.2	2.527	2.635	0.912	
Statistics (Lognormal ROS Imputed Data)	18	0.9	4.2	2.525	2.635	0.914	
	17.	14.0:	T				
0	K hat	K Star		Log Mean	_	Log CV	
Statistics (Non-Detects Only)		6.374	0.337	0.886	0.398	0.449	
Statistics (NDs = DL)	7.932	6.647	0.323	0.875	0.388	0.444	

OI V	IS FIOOCL	GOODINE	33 OF FIT 3	JIAHOH				
Statistics (NDs = DL/2)	6.341	5.321	0.395	0.837	0.439	0.524		
Statistics (Gamma ROS Estimates)	7.212	6.047	0.35	0.856	0.406	0.475		
Statistics (Lognormal ROS Estimates)				0.855	0.408	0.477		
No	ormal GOF	Test Resu	lts					
	No NDo	NDo - DI	NDs = DL /I	ormal DO				
Correlation Coefficient B	No NDs	0.988	NDs = DL/2 0.988	0.989				-
Correlation Coefficient R	0.989	0.988	0.988	0.989				
	Test value	Crit. (0.05)	Con	clusion wit	th Alpha(0	05)		
Shapiro-Wilk (Detects Only)			Data Appea		iii / lipiia(o	.00)		
Shapiro-Wilk (NDs = DL)			Data Appea					
Shapiro-Wilk (NDs = DL/2)			Data Appea					
Shapiro-Wilk (Normal ROS Estimates)			Data Appea					
Lilliefors (Detects Only)			Data Appea					
Lilliefors (NDs = DL)			Data Appea					+
Lilliefors (NDs = DL/2)			Data Appea					1
Lilliefors (Normal ROS Estimates)	0.0901	0.202	Data Appea	ar Normal				
			II.					
Ga	mma GOF	Test Resu	ılts					
		T						
			NDs = DL/2					
Correlation Coefficient R	0.976	0.98	0.973	0.978				
	Tootyolyo	C=+ (0.0E)	Com	انبد معنصياء	۸۱مهم۸۱	OE)		
Anderson Darling (Detects Only)		Crit. (0.05) 0.74	Con	clusion wit	ın Aipna(u	.05)		
Anderson-Darling (Detects Only)  Kolmogorov-Smirnov (Detects Only)		0.74	Detected D	lata Annos	r Camma	Dietributoe		
Anderson-Darling (NDs = DL)		0.203	Detected D	ата Арреа	ii Gaiiiiia	Distributed		
Kolmogorov-Smirnov (NDs = DL)		0.204	Data Appea	ar Gamma	Distribute	hd		
Anderson-Darling (NDs = DL/2)		0.742	Zata / tppot		2.012410			
Kolmogorov-Smirnov (NDs = DL/2)			Data Appea	ar Gamma	Distribute	ed		
iderson-Darling (Gamma ROS Estimates)		0.741						
Kolmogorov-Smirnov (Gamma ROS Est.)			Data Appea	ar Gamma	Distribute	d		
Logi	normal GO	F Test Res	sults					
	L. N.	ND D	ID 51 4	. 500				
0 1 0 1			NDs = DL/2				<u> </u>	
Correlation Coefficient R	0.962	0.966	0.963	0.971				
	Test value	Crit. (0.05)	Con	clusion wit	th Alpha/N	05)		
Shapiro-Wilk (Detects Only)		` '	Data Appea			.00)		
Shapiro-Wilk (NDs = DL)			Data Appea					
Shapiro-Wilk (NDs = DL/2)			Data Appea					
Shapiro-Wilk (Lognormal ROS Estimates)			Data Appea					
Lilliefors (Detects Only)			Data Appea	-				
Lilliefors (NDs = DL)			Data Appea					
Lilliefors (NDs = DL/2)			Data Appea					
Lilliefors (Lognormal ROS Estimates)	0.153	0.202	Data Appea	ar Lognorn	nal			+
		.1	<u>u</u>					1
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.					
CombinedRadium (mw-68)								
	I	T						
	Num Obs	Num Miss	Num Valid	Detects	NDs	% NDs		

311	3 PIOUCL	GOODILE		0				
Raw Statistics	18	0	18	17	1	5.56%		
	Number		Maximum	Mean	Median	SD	<u> </u>	
Statistics (Non-Detects Only)	1	0.6	0.6	0.6	0.6	N/A	<u> </u>	
Statistics (Non-Detects Only)	17	0.6	3.8	2.021	2.1	0.913		
Statistics (All: NDs treated as DL value)		0.6	3.8	1.942	2	0.947	<u> </u>	
Statistics (All: NDs treated as DL/2 value)	18	0.3	3.8	1.925	2	0.974	<u> </u>	
Statistics (Normal ROS Imputed Data)	18	-0.237	3.8	1.895	2	1.033	<u> </u>	
Statistics (Gamma ROS Imputed Data)	18	0.37	3.8	1.929	2	0.967	<u> </u>	
Statistics (Lognormal ROS Imputed Data)	18	0.527	3.8	1.938	2	0.953		
							<u> </u>	
	K hat	K Star		Log Mean		Log CV	<u> </u>	
Statistics (Non-Detects Only)	4.688	3.9	0.431	0.593	0.508	0.857		
Statistics (NDs = DL)	3.95	3.328	0.492	0.532	0.557	1.048		
Statistics (NDs = DL/2)	3.248	2.743	0.593	0.493	0.65	1.318		
Statistics (Gamma ROS Estimates)	3.444	2.907	0.56	0.505	0.619	1.226		
Statistics (Lognormal ROS Estimates)				0.524	0.572	1.091		
			,					
No	rmal GOF	Test Resu	lts					
	No NDs	NDs = DL	NDs = DL/2	Iormal RO				
Correlation Coefficient R	0.985	0.983	0.99	0.991			 	
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)		
Shapiro-Wilk (Detects Only)	0.962	0.892	Data Appe	ar Normal				
Shapiro-Wilk (NDs = DL)	0.954	0.897	Data Appe	ar Normal				
Shapiro-Wilk (NDs = DL/2)	0.972	0.897	Data Appe					
Shapiro-Wilk (Normal ROS Estimates)	0.983	0.897						
Lilliefors (Detects Only)	0.128	0.207	Data Appe					
Lilliefors (NDs = DL)			Data Appe				 	
Lilliefors (NDs = DL/2)			Data Appe					+
Lilliefors (Normal ROS Estimates)			Data Appe					
,								
Ga	mma GOF	Test Resu	ılts					
								+
	No NDs	NDs = DL	NDs = DL/2	amma RO				+
Correlation Coefficient R		0.978	0.972	0.975				
								+
	Test value	Crit. (0.05)	Cor	nclusion wi	th Alpha(0	.05)		+
Anderson-Darling (Detects Only)	0.267	0.742				,		+
Kolmogorov-Smirnov (Detects Only)		0.21	Detected [	Data Appea	ar Gamma	Distributed		+
Anderson-Darling (NDs = DL)		0.743		1-1-30				+
Kolmogorov-Smirnov (NDs = DL)		0.205	Data Appe	ar Gamma	Distribute	d		-
Anderson-Darling (NDs = DL/2)	0.298	0.745						+
Kolmogorov-Smirnov (NDs = DL/2)	0.135	0.205	Data Appe	ar Gamma	Distribute	d		+
nderson-Darling (Gamma ROS Estimates)		0.744			55010	-		1
Kolmogorov-Smirnov (Gamma ROS Est.)	0.133		Data Appe	ar Gamma	Distribute	d		+
Control Control (Gamma 1100 Lot.)	3.100	5.200	, .ppo		2.0	-		+
Logi	normal GO	F Test Res	ults					+
Logi								-
	No NDs	NDs = DI	NDs = DL/2	Log ROS				
Correlation Coefficient R	0.98	0.976	0.956	0.975				1
Correlation Coefficient N	0.30	0.370	0.330	0.373				+
	Test value	Crit (0.05)	Cor	nclusion wi	th Alpha/A	05)		
	i est value	Crit. (0.05)	COL	nclusion wi	ui Aibiia(0	.00)	<u> </u>	

## TABLE B-3 URS ProUCL GOODNESS OF FIT STATISTICS\*

	.0002	3000112		01711101			
	0.956		Data App				
, , , , , , , , , , , , , , , , , , , ,	0.94		Data App	_			
,	0.917		Data App	_			
, , ,	0.943		Data App	_			
` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` `	0.145		Data App	_			
	0.147		Data App				
· · · · · · · · · · · · · · · · · · ·	0.149	0.202	Data App	ear Logno	rmal		
Lilliefors (Lognormal ROS Estimates)	0.148	0.202	Data App	ear Logno	rmal		
Note: Substitution methods such as DL or DL/	2 are no	ot recomm	ended.				
CombinedRadium (mw-69)							
Raw Statistics							
Number of Valid Observ	/ations	18					
Number of Distinct Observ	ations	15					
Mii	nimum	3.1					
Max	ximum	6.7					
Mean of Ray	w Data	4.565					
Standard Deviation of Ray	w Data	1.073					
	Khat	18.8					
The	eta hat	0.243					
	Kstar	15.7					
The	ta star	0.291					
Mean of Log Transforme	d Data	1.492					
Standard Deviation of Log Transforme		0.24					
Normal GOF Test Results							
Correlation Coeffice	cient R	0.973					
Shapiro Wilk Test S	tatistic	0.936					
Shapiro Wilk Critical (0.05)	Value	0.897					
Approximate Shapiro Wilk P	Value	0.287					
Lilliefors Test S	tatistic	0.149					
Lilliefors Critical (0.05)	Value	0.202					
Data appear Normal at (0.05) Significance Lev	/el						
Gamma GOF Test Results							
Correlation Coeffic	cient R	0.974	-				
A-D Test S		0.546					
A-D Critical (0.05)		0.739					
K-S Test S		0.152					
K-S Critical(0.05)		0.203					
Data appear Gamma Distributed at (0.05) Sign	nificance	e Level					
Lognormal GOF Test Results							
Correlation Coeffic		0.971					
Shapiro Wilk Test S	tatistic	0.928					
Shapiro Wilk Critical (0.05)		0.897					
						 _	
Approximate Shapiro Wilk P	Value	0.216					
Approximate Shapiro Wilk P Lilliefors Test S		0.216 0.158					

## TABLE B-3 URS ProUCL GOODNESS OF FIT STATISTICS\*

Statistics (Non-Detects Only)   11.36   9.268     Statistics (NDs = DL)   5.819   4.886     Statistics (NDs = DL/2)   3.582   3.022     Statistics (Gamma ROS Estimates)   7.094   5.949     Statistics (Lognormal ROS Estimates)         Normal GOF Test Results     No NDs   NDs = DL ND     Correlation Coefficient R   0.988   0.992     Test value Crit. (0.05)     Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	18  Maximum 0.7 3.3 3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	Mean 0.65 2.039 1.885 1.849 1.878 1.904 1.917  Log Mean 0.668 0.546 0.469 0.572 0.587	NDs 2  Median 0.65 1.95 1.85 1.85 1.85 1.85 1.85 0.314 0.463 0.652 0.407 0.377	% NDs 11.11% SD 0.0707 0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711 0.643		
Num Obs   Num Miss   Num Statistics   18	18  Maximum 0.7 3.3 3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	Mean 0.65 2.039 1.885 1.849 1.878 1.904 1.917  Log Mean 0.668 0.546 0.469 0.572 0.587	Median 0.65 1.95 1.85 1.85 1.85 1.85 1.85 0.85 Log Stdv 0.314 0.463 0.652 0.407	SD 0.0707 0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Num Obs   Num Miss   Num Statistics   18	18  Maximum 0.7 3.3 3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	Mean 0.65 2.039 1.885 1.849 1.878 1.904 1.917  Log Mean 0.668 0.546 0.469 0.572 0.587	Median 0.65 1.95 1.85 1.85 1.85 1.85 1.85 0.85 Log Stdv 0.314 0.463 0.652 0.407	SD 0.0707 0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Number   Minimum   M	18  Maximum 0.7 3.3 3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	Mean 0.65 2.039 1.885 1.849 1.878 1.904 1.917  Log Mean 0.668 0.546 0.469 0.572 0.587	Median 0.65 1.95 1.85 1.85 1.85 1.85 1.85 0.85 Log Stdv 0.314 0.463 0.652 0.407	SD 0.0707 0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Number   Minimum   M	18  Maximum 0.7 3.3 3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	Mean 0.65 2.039 1.885 1.849 1.878 1.904 1.917  Log Mean 0.668 0.546 0.469 0.572 0.587	Median 0.65 1.95 1.85 1.85 1.85 1.85 1.85 0.85 Log Stdv 0.314 0.463 0.652 0.407	SD 0.0707 0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (Non-Detects Only)   2   0.6     Statistics (Non-Detects Only)   16   1     Statistics (All: NDs treated as DL value)   18   0.6     Statistics (All: NDs treated as DL/2 value)   18   0.3     Statistics (Normal ROS Imputed Data)   18   0.591     Statistics (Gamma ROS Imputed Data)   18   0.821     Statistics (Lognormal ROS Imputed Data)   18   0.942      Statistics (Lognormal ROS Imputed Data)   18   0.942      K hat	0.7 3.3 3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	0.65 2.039 1.885 1.849 1.878 1.904 1.917  Log Mean 0.668 0.546 0.469 0.572 0.587	0.65 1.95 1.85 1.85 1.85 1.85 1.85 0.314 0.463 0.652 0.407	0.0707 0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (Non-Detects Only)   2   0.6     Statistics (Non-Detects Only)   16   1     Statistics (All: NDs treated as DL value)   18   0.6     Statistics (All: NDs treated as DL/2 value)   18   0.3     Statistics (Normal ROS Imputed Data)   18   0.591     Statistics (Gamma ROS Imputed Data)   18   0.821     Statistics (Lognormal ROS Imputed Data)   18   0.942      Statistics (Lognormal ROS Imputed Data)   18   0.942      K hat	0.7 3.3 3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	0.65 2.039 1.885 1.849 1.878 1.904 1.917  Log Mean 0.668 0.546 0.469 0.572 0.587	0.65 1.95 1.85 1.85 1.85 1.85 1.85 0.314 0.463 0.652 0.407	0.0707 0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (Non-Detects Only)   16	3.3 3.3 3.3 3.3 3.3 3.3 7heta hat 0.18 0.324 0.516 0.268	2.039 1.885 1.849 1.878 1.904 1.917 Log Mean 0.668 0.546 0.469 0.572 0.587	1.95 1.85 1.85 1.85 1.85 1.85 1.85 0.314 0.463 0.652 0.407	0.616 0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (All: NDs treated as DL value)	3.3 3.3 3.3 3.3 3.3  Theta hat 0.18 0.324 0.516 0.268	1.885 1.849 1.878 1.904 1.917 Log Mean 0.668 0.546 0.469 0.572 0.587	1.85 1.85 1.85 1.85 1.85 1.85 Log Stdv 0.314 0.463 0.652 0.407	0.733 0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (All: NDs treated as DL/2 value)   18	3.3 3.3 3.3 3.3 7heta hat 0.18 0.324 0.516 0.268	1.849 1.878 1.904 1.917 Log Mean 0.668 0.546 0.469 0.572 0.587	1.85 1.85 1.85 1.85 Log Stdv 0.314 0.463 0.652 0.407	0.801 0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (Normal ROS Imputed Data)   18   0.591     Statistics (Gamma ROS Imputed Data)   18   0.821     Statistics (Lognormal ROS Imputed Data)   18   0.942	3.3 3.3 3.3 Theta hat 0.18 0.324 0.516 0.268	1.878 1.904 1.917 Log Mean 0.668 0.546 0.469 0.572 0.587	1.85 1.85 1.85 Log Stdv 0.314 0.463 0.652 0.407	0.744 0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (Gamma ROS Imputed Data)   18	3.3 3.3 Theta hat 0.18 0.324 0.516 0.268	1.904 1.917 Log Mean 0.668 0.546 0.469 0.572 0.587	1.85 1.85 Log Stdv 0.314 0.463 0.652 0.407	0.7 0.679 Log CV 0.47 0.849 1.391 0.711		
Statistics (Lognormal ROS Imputed Data)   18   0.942	3.3  Theta hat  0.18  0.324  0.516  0.268	1.917 Log Mean 0.668 0.546 0.469 0.572 0.587	1.85 Log Stdv 0.314 0.463 0.652 0.407	0.679 Log CV 0.47 0.849 1.391 0.711		
K hat	0.18 0.324 0.516 0.268	Log Mean 0.668 0.546 0.469 0.572 0.587	Log Stdv 0.314 0.463 0.652 0.407	Log CV 0.47 0.849 1.391 0.711		
Statistics (Non-Detects Only)   11.36   9.268     Statistics (NDs = DL)   5.819   4.886     Statistics (NDs = DL/2)   3.582   3.022     Statistics (Gamma ROS Estimates)   7.094   5.949     Statistics (Lognormal ROS Estimates)         Normal GOF Test Results     No NDs   NDs = DL ND     Correlation Coefficient R   0.988   0.992     Test value Crit. (0.05)     Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	0.18 0.324 0.516 0.268	0.668 0.546 0.469 0.572 0.587	0.314 0.463 0.652 0.407	0.47 0.849 1.391 0.711		
Statistics (Non-Detects Only)   11.36   9.268     Statistics (NDs = DL)   5.819   4.886     Statistics (NDs = DL/2)   3.582   3.022     Statistics (Gamma ROS Estimates)   7.094   5.949     Statistics (Lognormal ROS Estimates)         Normal GOF Test Results     No NDs   NDs = DL ND     Correlation Coefficient R   0.988   0.992     Test value Crit. (0.05)     Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	0.18 0.324 0.516 0.268	0.668 0.546 0.469 0.572 0.587	0.314 0.463 0.652 0.407	0.47 0.849 1.391 0.711		
Statistics (NDs = DL)   5.819   4.886     Statistics (NDs = DL/2)   3.582   3.022     Statistics (Gamma ROS Estimates)   7.094   5.949     Statistics (Lognormal ROS Estimates)         Normal GOF Test Results     No NDs   NDs = DL ND     Correlation Coefficient R   0.988   0.992     Test value   Crit. (0.05)     Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	0.324 0.516 0.268	0.546 0.469 0.572 0.587	0.463 0.652 0.407	0.849 1.391 0.711		
Statistics (NDs = DL/2)   3.582   3.022     Statistics (Gamma ROS Estimates)   7.094   5.949     Statistics (Lognormal ROS Estimates)         Normal GOF Test Results     No NDs   NDs = DL ND     Correlation Coefficient R   0.988   0.992     Test value   Crit. (0.05)     Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	0.516 0.268 	0.469 0.572 0.587	0.652 0.407	1.391 0.711		
Statistics (Gamma ROS Estimates)   7.094   5.949     Statistics (Lognormal ROS Estimates)         Normal GOF Test Results     No NDs   NDs = DL NE     Correlation Coefficient R   0.988   0.992     Test value Crit. (0.05)     Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	0.268	0.572 0.587	0.407	0.711		1
Normal GOF Test Results		0.587			1	
No NDs   NDs = DL ND	<b>3</b>		0.377	0.643	<b></b>	
No NDs   NDs = DL NE		larmal DO				
No NDs   NDs = DL ND		larmal DO				
Test value Crit. (0.05)   Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	Ds = DL/2	larmal DO				
Test value Crit. (0.05)   Shapiro-Wilk (Detects Only)   0.974   0.887   D.     Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	US = DL/4					
Test value Crit. (0.05)   Shapiro-Wilk (Detects Only)   0.974   0.887   D.   Shapiro-Wilk (NDs = DL)   0.98   0.897   D.	0.985					
Shapiro-Wilk (Detects Only)         0.974         0.887         D.           Shapiro-Wilk (NDs = DL)         0.98         0.897         D.	0.965	0.99				
Shapiro-Wilk (Detects Only)         0.974         0.887         D.           Shapiro-Wilk (NDs = DL)         0.98         0.897         D.	Con	nclusion wi	th Alpha/A	05)		
Shapiro-Wilk (NDs = DL) 0.98 0.897 D.			iii Aipiia(u.	00)		
Shapiro-Wilk (NDs = DL/2) 0.968 0.897 D		ar Normal				
, ,		ar Normal				
, ,		ar Normal				
,		ar Normal				
		ar Normal				
Lilliefors (Normal ROS Estimates) 0.0916 0.202 D	ata Appe	ar Normal				
· · · · · · · · · · · · · · · · · · ·						
Gamma GOF Test Results	s					
No NDs   NDs = DL NE	Ds = DL/2	amma RO				
Correlation Coefficient R 0.99 0.976	0.944	0.984				
Test value Crit. (0.05)	Cor	nclusion wi	th Alpha(0.	05)		
Anderson-Darling (Detects Only) 0.201 0.739						
	Detected D	Data Appea	r Gamma	Distributed	1	
Anderson-Darling (NDs = DL) 0.352 0.742						
, ,	ata Appe	ar Gamma	Distribute	d		
Anderson-Darling (NDs = DL/2) 0.874 0.744						
, , ,	Detected D	Data appea	r Approxim	nate Gamm	1	
nderson-Darling (Gamma ROS Estimates) 0.282 0.741			B			
Kolmogorov-Smirnov (Gamma ROS Est.) 0.111 0.204 D		ar Gamma	Distribute	đ		
Lognormal GOF Test Result	рата Арре				1	

## TABLE B-3 URS ProUCL GOODNESS OF FIT STATISTICS\*

	NI NID	ND DI	ID DI	I BOO		
	No NDs	NDs = DL	NDs = DL/2	Log ROS		
Correlation Coefficient R	0.988	0.959	0.889	0.98		
	Test value	Crit. (0.05)	Co	nclusion wi	th Alpha(0.05)	
Shapiro-Wilk (Detects Only)	0.976	0.887	Data Appe	ear Lognori	mal	
Shapiro-Wilk (NDs = DL)	0.919	0.897	Data Appe	ear Lognori	mal	
Shapiro-Wilk (NDs = DL/2)	0.795	0.897	Data Not I	ognormal		
Shapiro-Wilk (Lognormal ROS Estimates)	0.947	0.897	Data Appe	ear Lognori	mal	
Lilliefors (Detects Only)	0.121	0.213	Data Appe	ear Lognori	mal	
Lilliefors (NDs = DL)	0.159	0.202	Data Appe	ear Lognori	mal	
Lilliefors (NDs = DL/2)	0.239	0.202	Data Not I	ognormal		
Lilliefors (Lognormal ROS Estimates)	0.111	0.202	Data Appe	ear Lognori	mal	
Note: Substitution methods such as DL or	DL/2 are n	ot recomm	ended.			

	Outlier Tes	ts for Sele	cted Varia	bles exclu	ding nonde	tects		
User Selected Options								
Date/Time of Computation ProUCL 5.	110/9/2018	3 1:51:29 F	PM					
From File	Table1_Ap	pendixA_l	JRS_Appe	endixIV_Pro	UCLUploa	ad_Sept20	18.xls	
Full Precision	OFF							
Dixon's Outlier Test for Antimony (backg	round)							
Total N = 43								
Number NDs = 39								
Number Detects = 4								
10% critical value: 0.679								
5% critical value: 0.765								
1% critical value: 0.889								
Note: NDs excluded from Outlier Test								
1 Data Value 0.00027 is a Datastial Outli	/l l 1							
Data Value 0.00027 is a Potential Outline	er (Upper I							
Test Statistic: 0.200								
Test Statistic: 0.200								
For 10% significance level, 0.00027 is not	an outlier							
For 5% significance level, 0.00027 is not a								
For 1% significance level, 0.00027 is not a								
1 or 176 significance level, 0.00027 is not a	ii outilei.							
2. Data Value 0.00012 is a Potential Outlie	r (I ower T							
2. Data Value 0.00012 is a 1 oteritar outlie	i (LOWEI I							
Test Statistic: 0.667								
Tool Stations. 5.557								
For 10% significance level, 0.00012 is not	an outlier.							
For 5% significance level, 0.00012 is not a								
For 1% significance level, 0.00012 is not a								
No Outlier Test for Antimony (mw-6	6)							
Dixon's Outlier Test for Antimony (mw	<i>r</i> -67)							
Total N = 17								
Number NDs = 14								
Number Detects = 3								
10% critical value: 0.886								
5% critical value: 0.941								
1% critical value: 0.988								
Note: NDs excluded from Outlier Test								
Data Value 0.00029 is a Potential Outlie	er (Upper 1							
Test Statistic: 0.667								
For 10% significance level, 0.00029 is not								
For 5% significance level, 0.00029 is not a								
For 1% significance level, 0.00029 is not a	n outlier.							

2. Data Value 0.00014 is a Potential Outlier (Lower T				
Test Statistic: 0.333				
For 10% significance level, 0.00014 is not an outlier.				
For 5% significance level, 0.00014 is not an outlier.				
For 1% significance level, 0.00014 is not an outlier.				
Dixon's Outlier Test for Antimony (mw-68)				
Total N = 17				
Number NDs = 14				
Number Detects = 3				
10% critical value: 0.886				
5% critical value: 0.941				
1% critical value: 0.988				
Note: NDs excluded from Outlier Test				
1. Data Value 0.00045 is a Potential Outlier (Upper 1				
(3,5,5)				
Test Statistic: 0.971				
For 10% significance level, 0.00045 is an outlier.				
For 5% significance level, 0.00045 is an outlier.				
For 1% significance level, 0.00045 is not an outlier.				
or the digition for the form of the first and cannot be				
2. Data Value 0.00011 is a Potential Outlier (Lower T				
21. 24.4 (41.4 (51.6 (51.7 (51.				
Test Statistic: 0.029				
For 10% significance level, 0.00011 is not an outlier.				
For 5% significance level, 0.00011 is not an outlier.				
For 1% significance level, 0.00011 is not an outlier.				
1 of 170 digrimounds fovol, 0.00011 is not all dation.				
Dixon's Outlier Test for Antimony (mw-69)				
Dixorra Oddier Teat for Andmony (mw-03)				
Total N = 17				
Number NDs = 14				
Number Nos = 14 Number Detects = 3				
10% critical value: 0.886				
5% critical value: 0.886				
1% critical value: 0.988				
Note: NDs excluded from Outlier Test				
INDS EXCIDED HOITI OUTILET TEST				
Data Value 0.00054 is a Potential Outlier (Upper 7)				
1. Data value 0.00034 is a Potential Outlier (Upper I				
Took Statistics 0.242				
Test Statistic: 0.242				
F 400/ : 'F   1   0 00054:				
For 10% significance level, 0.00054 is not an outlier.				
For 5% significance level, 0.00054 is not an outlier.				
For 1% significance level, 0.00054 is not an outlier.				

2. Data Value 0.00021 is a Pote	ential Outlie	(Lower T					
Test Statistic: 0.758							
For 10% significance level, 0.00							
For 5% significance level, 0.000	)21 is not ar	outlier.					
For 1% significance level, 0.000	)21 is not ar	outlier.					
Dixon's Outlier Test for Ant	timony (mw-	·70)					
Total N = 17							
Number NDs = 14							
Number Detects = 3							
10% critical value: 0.886							
5% critical value: 0.941							
1% critical value: 0.988							
Note: NDs excluded from Outlie	er Test						
1. Data Value 0.00026 is a Pot	ential Outlie	r (Upper 1					
Test Statistic: 0.600							
For 10% significance level, 0.00	026 is not a	n outlier.					
For 5% significance level, 0.000							
For 1% significance level, 0.000							
2. Data Value 0.00011 is a Pote	ential Outlier	· (Lower T					
		•					
Test Statistic: 0.400							
For 10% significance level, 0.00	011 is not a	n outlier.					
For 5% significance level, 0.000							
For 1% significance level, 0.000							
,							
Rosner's Outlier Tes	st for 1 Outli	ers in Ars	enic (back	around)			
				,			
Total N	46						
Number NDs	14						
Number Detects	32						
Mean of Detects	0.00505						
SD of Detects	0.00279						
Number of data	32						
Number of suspected outliers	1						
s not included in the following:	-						
	<u> </u>						
	Potential	Obs.	Test	Critical	Critical		
# Mean sd	outlier	Number			ralue (1%)		-
1 0.00505 0.00274		32	2.53	2.94	3.27		
1 0.00000 0.00274	0.012	52	2.00	2.34	5.27		
For 5% Significance Level, then	a is no Doto	ntial Outli	ar				
i or 5 % Significance Level, then	c is no Pole	mai Outli	<del>5</del> 1				

For 1% Significance Level, there is no Potential Outlie				
Dixon's Outlier Test for Arsenic (mw-66)				
DIXOTTS Oddier Test for Alseriic (ITW-00)				
Total N = 18				
Number NDs = 7				
Number Detects = 11				
10% critical value: 0.517				
5% critical value: 0.576				
1% critical value: 0.576				
Note: NDs excluded from Outlier Test				
vote. NDS excluded from Outlier Test				
Data Value 0.005 is a Potential Outlier (Upper Tai				
1. Data value 0.005 is a Potential Outlier (Opper Tail				
F4 O4-4:-4: 0 FF0				
Test Statistic: 0.550				
For 109/ pignificance level 0.005 is an autilian				
For 10% significance level, 0.005 is an outlier.				
For 5% significance level, 0.005 is not an outlier.				
For 1% significance level, 0.005 is not an outlier.				
2. Data Value 0.00067 is a Potential Outlier (Lower T				
Fest Statistic: 0.231				
For 10% significance level, 0.00067 is not an outlier.				
For 5% significance level, 0.00067 is not an outlier.				
For 1% significance level, 0.00067 is not an outlier.				
Dixon's Outlier Test for Arsenic (mw-67)				
Γotal N = 18				
Number NDs = 3				
Number Detects = 15				
10% critical value: 0.472				
5% critical value: 0.525				
1% critical value: 0.616				
Note: NDs excluded from Outlier Test				
I. Data Value 0.0046 is a Potential Outlier (Upper Ta				
Test Statistic: 0.500				
For 10% significance level, 0.0046 is an outlier.				
For 5% significance level, 0.0046 is not an outlier.				
For 1% significance level, 0.0046 is not an outlier.				
2. Data Value 0.00099 is a Potential Outlier (Lower T				
Fest Statistic: 0.437				
For 10% significance level, 0.00099 is not an outlier.				
or 10% organicanos level, 0.00033 is flut all butilet.				

For 1% significance level, 0.00099 is not an outlier.				
Dixon's Outlier Test for Arsenic (mw-68)				
T-t-  N = 10				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.577				
Note: NDs excluded from Outlier Test				
1. Data Value 0.0097 is a Potential Outlier (Upper Ta				
Test Statistic: 0.171				
For 10% eignificance level 0 0007 is not an autilian				
For 10% significance level, 0.0097 is not an outlier. For 5% significance level, 0.0097 is not an outlier.				
For 1% significance level, 0.0097 is not an outlier.				
2. Data Valua 0.0006 is a Datastial Quilian (Laures Ta				
2. Data Value 0.0006 is a Potential Outlier (Lower Ta				
T + 0+ 1' 1' 0 000				
Test Statistic: 0.266				
- 100/ · · · · · · · · · · · · · · · · · ·				
For 10% significance level, 0.0006 is not an outlier.				
For 5% significance level, 0.0006 is not an outlier.				
For 1% significance level, 0.0006 is not an outlier.				
Dixon's Outlier Test for Arsenic (mw-69)				
Dixon's Oddier Test for Alsenic (HW-03)				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.577				
Note: NDs excluded from Outlier Test				
1. Data Value 0.011 is a Potential Outlier (Upper Tai				
Test Statistic: 0.288				
. 551 510110110. 0.200				
For 10% significance level, 0.011 is not an outlier.				
For 5% significance level, 0.011 is not an outlier.				
For 1% significance level, 0.011 is not an outlier.				
2. Data Value 0.0026 is a Potential Outlier (Lower Ta				
Test Statistic: 0.175				
For 10% significance level, 0.0026 is not an outlier.				
For 5% significance level, 0.0026 is not an outlier.				

						T		T	T	
For 1% significance level,	0.002	26 is not an	outlier.							
Dixon's Outlier Test	for Ar	senic (mw-	70)							
Total N = 18										
Number NDs = 2										
Number Detects = 16										
10% critical value: 0.454										
5% critical value: 0.507										
1% critical value: 0.595										
Note: NDs excluded from	Outlie	r Test								
1. Data Value 0.0094 is a	Pote	ntial Outlier	(Upper Ta							
Test Statistic: 0.404										
For 10% significance leve	1, 0.00	94 is not a	n outlier.							
For 5% significance level,										+
For 1% significance level,										-
3										+
2. Data Value 0.00049 is a	a Pote	ential Outlie	r (Lower T							-
2. Data Value 01000 10 10 10	<b>.</b>	Tidal Gallo	. (20.10							
Test Statistic: 0.545										
Test statistic. 0.040										
For 10% significance leve	utlior									
For 5% significance level,										
For 1% significance level,										
roi 1/0 signincance level,	0.000	143 IS HUL a	ii outilei.							
D	<b>.</b> .	-4 6 1 04	!! ! D	/b = ala						
Rosner's Outl	ier i e	st for 1 Out	ilers in bai	ium (backę	grouna)					
T-	-4-1 81	40								
	otal N	46								
Number		2								
Number De		44								
Mean of De		0.0164								
SD of De		0.0101								
Number of		44								
Number of suspected out		1								
s not included in the follow	ving:									
		Potential	Obs.	Test	Critical					
# Mean	sd	outlier	Number	value	, ,	/alue (1%)				
1 0.0164 0.0	00998	0.051	4	3.467	3.08	3.43				
For 5% Significance Level, there is 1 Potential Outlier										
Therefore, Observation 0.	.051 is	a Potentia	l Statistica	l Outlier						
For 1% Significance Leve	l, there	e is 1 Poter	ntial Outlie	r		I .		1	1	1
-										T
										+
Dixon's Outlier Test	for R	arium (mw-	66)							-
23.0113 Guiloi 100t			,							-

			1	
Total N = 18				
Number NDs = 0				
Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.561				
Note: NDs excluded from Outlier Test				
Note: NES excided from Caller Test				
Data Value 0.022 is a Potential Outlier (Upper Tai				
1. Data value 0.022 is a Potential Outlier (Opper Tai				
Test Statistic: 0.000				
For 10% significance level, 0.022 is not an outlier.				
For 5% significance level, 0.022 is not an outlier.				
For 1% significance level, 0.022 is not an outlier.				
2. Data Value 0.0013 is a Potential Outlier (Lower Ta				
,				
Test Statistic: 0.710				
For 10% significance level, 0.0013 is an outlier.				
For 5% significance level, 0.0013 is an outlier.				
For 1% significance level, 0.0013 is an outlier.				
For 1% significance level, 0.0013 is an outlier.				
Dixon's Outlier Test for Barium (mw-67)				
Total N = 18				
Number NDs = 0				
Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.561				
Note: NDs excluded from Outlier Test				
Note: NES excided from Caller Test				
Data Value 0.022 is a Potential Outlier (Upper Tai				
1. Data value 0.022 is a Potential Outlier (Opper Tai				
Test Statistic: 0.000				
For 10% significance level, 0.022 is not an outlier.				
For 5% significance level, 0.022 is not an outlier.				
For 1% significance level, 0.022 is not an outlier.				
2. Data Value 0.017 is a Potential Outlier (Lower Tail				
Test Statistic: 0.200				
For 10% significance level, 0.017 is not an outlier.				
For 5% significance level, 0.017 is not an outlier.				
For 1% significance level, 0.017 is not an outlier.				
or 170 Significance level, 0.017 is not an outlier.				
Dixon's Outlier Test for Barium (mw-68)				

F	 	T	T	T	T
Total N = 18					
Number NDs = 1					
Number Detects = 17					
10% critical value: 0.438					
5% critical value: 0.49					
1% critical value: 0.577					
Note: NDs excluded from Outlier Test					
Data Value 0.013 is a Potential Outlier (Upper Tai					
· · · · · · · · · · · · · · · · · · ·					
Test Statistic: 0.627					
1 001 0141101101 01027					
For 10% significance level, 0.013 is an outlier.					
For 5% significance level, 0.013 is an outlier.					
For 1% significance level, 0.013 is an outlier.					
1 of 170 significance level, 0.013 is an outlier.					
2. Data Value 0.0066 is a Batantial Outlier / Javar Ta					
2. Data Value 0.0066 is a Potential Outlier (Lower Ta					
Total Chalifornia 0 105					
Test Statistic: 0.185					
For 10% significance level, 0.0066 is not an outlier.					
For 5% significance level, 0.0066 is not an outlier.					
For 1% significance level, 0.0066 is not an outlier.					
Dixon's Outlier Test for Barium (mw-69)					
Total N = 18					
Number NDs = 0					
Number Detects = 18					
10% critical value: 0.424					
5% critical value: 0.475					
1% critical value: 0.561					
Note: NDs excluded from Outlier Test					
1. Data Value 0.019 is a Potential Outlier (Upper Tai					
· · · · ·					
Test Statistic: 0.200					
For 10% significance level, 0.019 is not an outlier.					
For 5% significance level, 0.019 is not an outlier.					
For 1% significance level, 0.019 is not an outlier.					
Data Value 0.013 is a Potential Outlier (Lower Tail)					
2. Data value 0.010 18 a 1 oteriuai Outriei (Lowel Tali					
Test Statistic: 0.200					
า ธอะ อเสมอนอ. บ.200					
For 100/ cignificance level 0.042 is got and a					
For 10% significance level, 0.013 is not an outlier.					
For 5% significance level, 0.013 is not an outlier.					
For 1% significance level, 0.013 is not an outlier.					
		1	1	1	I
Dixon's Outlier Test for Barium (mw-70)	 				

,					
Total N = 17					
Number NDs = 0					
Number Detects = 17					
10% critical value: 0.438					
5% critical value: 0.49					
1% critical value: 0.577					
Note: NDs excluded from Outlier Test					
1. Data Value 0.016 is a Potential Outlier (Upper Tai					
· · · · · · · · · · · · · · · · · · ·					
Test Statistic: 0.286					
For 10% significance level, 0.016 is not an outlier.					
For 5% significance level, 0.016 is not an outlier.					
For 1% significance level, 0.016 is not an outlier.					
1 of 170 significance level, 0.0 to is not an outlier.					
Data Value 0.0073 is a Potential Outlier (Lower Ta					
2. Data value 0.0073 is a Potential Outlier (Lower Ta					
Test Statistic: 0.254					
Test Statistic: 0.254					
5 400/ : :5					
For 10% significance level, 0.0073 is not an outlier.					
For 5% significance level, 0.0073 is not an outlier.					
For 1% significance level, 0.0073 is not an outlier.					
No Outlier Test for Beryllium (background)					
No Outlier Test for Beryllium (mw-66)					
No Outlier Test for Beryllium (mw-67)					
No Outlier Test for Beryllium (mw-68)					
No Outlier Test for Beryllium (mw-69)					
No Outlier Test for Beryllium (mw-70)					
Dixon's Outlier Test for Cadmium (background)					
Total N = 42					
Number NDs = 36					
Number Detects = 6					
10% critical value: 0.482					
5% critical value: 0.56					
1% critical value: 0.698					
Note: NDs excluded from Outlier Test					
1. Data Value 0.0003 is a Potential Outlier (Upper Ta	 				
Test Statistic: 0.474					
For 10% significance level, 0.0003 is not an outlier.					
For 5% significance level, 0.0003 is not an outlier.					
For 1% significance level, 0.0003 is not an outlier.					
	 _	 	_	_	

			1	1	
Data Value 0.00011 is a Potential Outlier (Lower T					
2. Data Value 0.00011 is a Potential Outlier (Lower 1					
Test Statistic: 0.211					
For 10% significance level, 0.00011 is not an outlier.					
For 5% significance level, 0.00011 is not an outlier.					
For 1% significance level, 0.00011 is not an outlier.					
For 1% significance level, 0.00011 is not an outlier.					
No Outlier Test for Cadmium (mw-66)					
140 Oddier Test for Cadmidin (mw-00)					
Dixon's Outlier Test for Cadmium (mw-67)					
Total N = 17					
Number NDs = 13					
Number Detects = 4					
10% critical value: 0.679					
5% critical value: 0.765					
1% critical value: 0.889					
Note: NDs excluded from Outlier Test					
1. Data Value 0.00018 is a Potential Outlier (Upper 1					
(					
Test Statistic: 0.667					
For 10% significance level, 0.00018 is not an outlier.					
For 5% significance level, 0.00018 is not an outlier.					
For 1% significance level, 0.00018 is not an outlier.					
2. Data Value 0.00015 is a Potential Outlier (Lower T					
•					
Test Statistic: 0.000					
For 10% significance level, 0.00015 is not an outlier.					
For 5% significance level, 0.00015 is not an outlier.					
For 1% significance level, 0.00015 is not an outlier.					
Dixon's Outlier Test for Cadmium (mw-68)					
Total N = 17					
Number NDs = 12					
Number Detects = 5					
10% critical value: 0.557					
5% critical value: 0.642					
1% critical value: 0.78					
Note: NDs excluded from Outlier Test					
Data Value 0.00046 is a Potential Outlier (Upper 1)					
Toot Statistic: 0.600					
Test Statistic: 0.600					
For 10% significance level, 0.00046 is an outlier.					

For 5% significance level, 0.00046 is not an outlier.				
For 1% significance level, 0.00046 is not an outlier.				
2. Data Value 0.00011 is a Potential Outlier (Lower T				
Test Statistic: 0.029				
For 10% significance level, 0.00011 is not an outlier.				
For 5% significance level, 0.00011 is not an outlier.				
For 1% significance level, 0.00011 is not an outlier.				
No Outlier Test for Cadmium (mw-69)				
Dixon's Outlier Test for Cadmium (mw-70)				
Total N = 17				
Number NDs = 14				
Number Detects = 3				
10% critical value: 0.886				
5% critical value: 0.941				
1% critical value: 0.988				
Note: NDs excluded from Outlier Test				
Note: NDS excluded from Outlier Test				
4 5				
1. Data Value 0.00024 is a Potential Outlier (Upper 1				
Test Statistic: 0.769				
For 10% significance level, 0.00024 is not an outlier.				
For 5% significance level, 0.00024 is not an outlier.				
For 1% significance level, 0.00024 is not an outlier.				
2. Data Value 0.00011 is a Potential Outlier (Lower T				
· · · · · · · · · · · · · · · · · · ·				
Test Statistic: 0.231				
Test diations. 0.201				
For 10% significance level 0.00011 is not an autiliar				
For 10% significance level, 0.00011 is not an outlier.				
For 5% significance level, 0.00011 is not an outlier.				
For 1% significance level, 0.00011 is not an outlier.				
Dixon's Outlier Test for Chromium (background)				
	-	 	 	 <u></u>
Total N = 42				
Number NDs = 38				
Number Detects = 4				
10% critical value: 0.679				
5% critical value: 0.765				
1% critical value: 0.889				
Note: NDs excluded from Outlier Test				
INDS EXCIDED HOITI OUTILET TEST				
Data Value 0.0041 is a Potential Outlier (Upper Ta				
Test Statistic: 0.371				

For 10% significance level, 0.0041 is not an outlier.				
For 5% significance level, 0.0041 is not an outlier.				
For 1% significance level, 0.0041 is not an outlier.				
2. Data Value 0.0006 is a Potential Outlier (Lower Ta				
·				
Test Statistic: 0.114				
For 10% significance level, 0.0006 is not an outlier.				
For 5% significance level, 0.0006 is not an outlier.				
For 1% significance level, 0.0006 is not an outlier.				
Dixon's Outlier Test for Chromium (mw-66)				
Total N = 16				
Number NDs = 10				
Number Nets = 10				
10% critical value: 0.482				
5% critical value: 0.462				
1% critical value: 0.598				
Note: NDs excluded from Outlier Test				
Note. NDs excluded from Outlier Test				
1. Data Value 0.0031 is a Potential Outlier (Upper Ta				
1. Data value 0.003 i is a Potential Oduler (Opper 18				
Test Statistic: 0.000				
Test Statistic. 0.000				
For 10% significance level, 0.0031 is not an outlier.				
For 5% significance level, 0.0031 is not an outlier.				
For 1% significance level, 0.0031 is not an outlier.				
1 of 170 significance level, 0.0031 is not an outlier.				
2. Data Value 0.00074 is a Potential Outlier (Lower T				
2. Data value 0.00074 is a 1 otential oduller (Lower 1				
Test Statistic: 0.059				
Test Statistic. 0.009				
For 10% significance level, 0.00074 is not an outlier.				
For 5% significance level, 0.00074 is not an outlier.				
For 1% significance level, 0.00074 is not an outlier.				
1 of 170 significance level, 0.00074 is not an outlier.				
Dixon's Outlier Test for Chromium (mw-67)				
Dixon's Oddier Test for Chromidin (mw-67)				
Total N = 17				
Number NDs = 13				
Number NDS = 13 Number Detects = 4				
10% critical value: 0.679				
5% critical value: 0.765				
5% critical value: 0.765 1% critical value: 0.889				
Note: NDs excluded from Outlier Test				
INOIE. INDS excluded ITOM OUTIIET LEST				
1. Data Value 0.0040 is a Datamatic Continue // Inc.				
Data Value 0.0016 is a Potential Outlier (Upper Tage 1)				
T + 0 + 1 + 1 + 0 + 0 0 0 4				
Test Statistic: 0.804				

For 10% significance level, 0.0016 is an outlier. For 5% significance level, 0.0016 is not an outlier. For 1% significance level, 0.0016 is not an outlier.  2. Data Value 0.00058 is a Potential Outlier (Lower T  Test Statistic: 0.108  For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.57  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Total County of the County o					
For 5% significance level, 0.0016 is not an outlier.  For 1% significance level, 0.0016 is not an outlier.  2. Data Value 0.00058 is a Potential Outlier (Lower T  Test Statistic: 0.108  For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.542 1% critical value: 0.547 1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Ti Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.					
For 1% significance level, 0.0016 is not an outlier.  2. Data Value 0.00058 is a Potential Outlier (Lower T  Test Statistic: 0.108  For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-88)  Dixon's Outlier Test for Chromium (mw-88)  Total N = 17  Number NDs = 12  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.557  5% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper T)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 5% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-89)  Total N = 17  Number NDs = 14	For 10% significance level, 0.0016 is an outlier.				
2. Data Value 0.00058 is a Potential Outlier (Lower T  Test Statistic: 0.108  For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number NDs = 12  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Total Significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier.	For 5% significance level, 0.0016 is an outlier.				
2. Data Value 0.00058 is a Potential Outlier (Lower T  Test Statistic: 0.108  For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number NDs = 12  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Total Significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier.	For 1% significance level, 0.0016 is not an outlier.				
Test Statistic: 0.108  For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Till 1)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 5% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.					
Test Statistic: 0.108  For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Till 1)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 5% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.	P. Data Value 0.00059 is a Potential Outlier /Lower T				
For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tile of 10% significance level, 0.0012 is not an outlier. For 10% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	2. Data Value 0.00056 is a Foteritial Outlier (Lower 1				
For 10% significance level, 0.00058 is not an outlier. For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number Detects = 5  10% critical value: 0.557 5% critical value: 0.557 5% critical value: 0.642 1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Test)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number Detects = 5 10% critical value: 0.557 5% critical value: 0.642 1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tale 1)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	l est Statistic: U. 108				
For 5% significance level, 0.00058 is not an outlier. For 1% significance level, 0.00058 is not an outlier.  Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number Detects = 5 10% critical value: 0.557 5% critical value: 0.642 1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tale 1)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
For 1% significance level, 0.00058 is not an outlier.    Dixon's Outlier Test for Chromium (mw-68)					
Dixon's Outlier Test for Chromium (mw-68)  Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.557  5% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Test)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  Test Statistic: 0.021  Test Statistic: 0.001  Total N = 17  Number NDs = 14	For 5% significance level, 0.00058 is not an outlier.				
Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tatast Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	For 1% significance level, 0.00058 is not an outlier.				
Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tatast Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tatast Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
Total N = 17  Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tatast Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	Dixon's Outlier Test for Chromium (mw-68)				
Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tate)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier. For 5% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
Number NDs = 12  Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tate)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier. For 19% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier. For 5% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier. For 19% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	Total N = 17				
Number Detects = 5  10% critical value: 0.557  5% critical value: 0.642  1% critical value: 0.78  Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tage of the programment of the prog					
10% critical value: 0.557 5% critical value: 0.642 1% critical value: 0.78 Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Tage 1) Test Statistic: 0.000 For 10% significance level, 0.0012 is not an outlier. For 15% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021 For 10% significance level, 0.00072 is not an outlier. For 10% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
5% critical value: 0.642 1% critical value: 0.78 Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Test)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier.  Test Statistic: 0.021  Test Statistic: 0.021  For 10% significance level, 0.0072 is not an outlier.  For 1% significance level, 0.0072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.					
1% critical value: 0.78 Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Te  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier. For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
Note: NDs excluded from Outlier Test  1. Data Value 0.0012 is a Potential Outlier (Upper Test)  Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier. For 5% significance level, 0.0012 is not an outlier. For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier. For 5% significance level, 0.00072 is not an outlier. For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
1. Data Value 0.0012 is a Potential Outlier (Upper Tate 1					
Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier.  For 5% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Total N = 17  Number NDs = 14	Note: NDs excluded from Outlier Test				
Test Statistic: 0.000  For 10% significance level, 0.0012 is not an outlier.  For 5% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Total N = 17  Number NDs = 14					
For 10% significance level, 0.0012 is not an outlier.  For 5% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	<ol> <li>Data Value 0.0012 is a Potential Outlier (Upper Ta</li> </ol>				
For 10% significance level, 0.0012 is not an outlier.  For 5% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
For 5% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Total N = 17  Number NDs = 14	Fest Statistic: 0.000				
For 5% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Total N = 17  Number NDs = 14					
For 5% significance level, 0.0012 is not an outlier.  For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Total N = 17  Number NDs = 14	For 10% significance level, 0.0012 is not an outlier.				
For 1% significance level, 0.0012 is not an outlier.  2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Total N = 17  Number NDs = 14	-				
2. Data Value 0.00072 is a Potential Outlier (Lower T  Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14					
Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	o. The dignimum to the property of the terror of the terro				
Test Statistic: 0.021  For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	Data Value 0.00072 is a Potential Outlier (Lower T				
For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	2. Data Value 0.00072 is a Foteritial Outlier (Lower 1				
For 10% significance level, 0.00072 is not an outlier.  For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	F+ O+-+:: 0 001				
For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	l est Statistic: 0.02 i				
For 5% significance level, 0.00072 is not an outlier.  For 1% significance level, 0.00072 is not an outlier.  Dixon's Outlier Test for Chromium (mw-69)  Total N = 17  Number NDs = 14	- 400/ : :5				
For 1% significance level, 0.00072 is not an outlier.    Dixon's Outlier Test for Chromium (mw-69)					
Dixon's Outlier Test for Chromium (mw-69)	•				
Total N = 17 Number NDs = 14	For 1% significance level, 0.00072 is not an outlier.				
Total N = 17 Number NDs = 14					
Total N = 17  Number NDs = 14					
Number NDs = 14	Dixon's Outlier Test for Chromium (mw-69)				
Number NDs = 14					
	Total N = 17				
Number Detects = 3	Number NDs = 14				
	Number Detects = 3				
10% critical value: 0.886					
5% critical value: 0.941					
1% critical value: 0.988					
Note: NDs excluded from Outlier Test					
Trote. 1423 excluded from Outlier 163t	VOIG. 1423 EXCIUUEU IIOIII OULIIEI 1631				
1. Data Value 0.00093 is a Datastic Outlier / Uses 2					
1. Data value 0.00083 is a Potential Outlier (Opper	Deta \/alica 0 00000 ia a Detectici Ocalica // loco con				
	I. Data Value 0.00083 is a Potential Outlier (Upper 1				
Test Statistic: 0.286	* * * *				

									T
For 10% significance level, 0.00									
For 5% significance level, 0.000									
For 1% significance level, 0.000	83 is not ar	outlier.							
2. Data Value 0.00076 is a Pote	ntial Outlie	r (Lower T							
Test Statistic: 0.714									
For 10% significance level, 0.00									
For 5% significance level, 0.000	76 is not ar	outlier.							
For 1% significance level, 0.000	76 is not ar	outlier.							
Dixon's Outlier Test for Chro	omium (mw	-70)							
	·								
Total N = 17									
Number NDs = 12									
Number Detects = 5									
10% critical value: 0.557									
5% critical value: 0.642									
1% critical value: 0.78									
Note: NDs excluded from Outlie	r Test								
1. Data Value 0.0037 is a Potential Outlier (Upper Ta									
Test Statistic: 0.677									
For 10% significance level, 0.00	37 is an ou	tlier.							
For 5% significance level, 0.003	7 is an outl	ier.							
For 1% significance level, 0.003	7 is not an	outlier.							
2. Data Value 0.0006 is a Poten	tial Outlier	(Lower Ta							
Test Statistic: 0.006									
For 10% significance level, 0.00	06 is not ar	outlier.							
For 5% significance level, 0.000	6 is not an	outlier.							
For 1% significance level, 0.000	6 is not an	outlier.							
Rosner's Outlier Te	st for 1 Out	liers in Co	balt (backg	round)					
Total N	45								
Number NDs	18								
Number Detects	27								
Mean of Detects	0.00425								
SD of Detects	0.0022								
Number of data	27								
Number of suspected outliers	1								
s not included in the following:									
			<u> </u>	<u> </u>					
	Potential	Obs.	Test	Critical	Critical				
						1	1	1	L

,,,			.1:	N		/F0/)	.1 (40/)	1		
#	Mean	sd	outlier	Number		alue (5%)				
1	0.00425	0.00216	0.0087	2	2.06	2.86	3.18			
For 5% Sig	gnificance l	_evel, there	is no Pote	ential Outlie	r			1		
E 40/ O:				1: 1 O 11:						
For 1% Sig	gnificance i	_evel, there	is no Pote	ential Outlie	r					T
					1					
Ď.		T	b - b /	10)						
DIXO	on's Outlier	Test for Co	bait (mw-t	96)						
T	10									
Total N = 1										
Number N										
	etects = 18									
	al value: 0.4									
	value: 0.47									
	value: 0.56		T							
NOTE: NDs	excluded f	rom Outlier	ıest							
4 D-/ 11	-1 0 04 1	- D-4- ''	O. 41 - 71	less T						
1. Data Va	alue 0.01 is	a Potentia	Outlier (U	pper (ail)						
<del>-</del> . 0:	0.405									
Test Statis	stic: 0.465									
E 400/										
	-	level, 0.01								
_		evel, 0.01 is								
For 1% sig	Initicance le	evel, 0.01 is	not an ou	tlier.						
0.0.1										
2. Data Va	lue 0.0029	is a Potent	ial Outlier	(Lower Ta						
Test Statis	stic: 0.549									
E 400/										
	-	level, 0.002								
,	•	evel, 0.0029								
For 1% sig	Initicance is	evel, 0.0029	s not an	outlier.						
Disco		T	h = lk / C	·7\						
DIXO	on's Outlier	Test for Co	Dait (mw-c	97)						
T-4-1 NI - 1	10									
Total N = 1										
	etects = 17									
	etects = 17 al value: 0.4								1	-
	value: 0.49									
	value: 0.48									
		rom Outlier	Toct						1	-
NOTE: NDS	excluded f	ioni Outlier	ı est						1	-
1 Doto V	alue O OO79	B is a Poten	tial Outlies	(Unnor T						
i. Dala Va	alue 0.00/6	o is a FULEN	uai Guuler	(Opper 18						
Test Statis	tio: 0 271									
rest statis	ouc. U.3/ I									
Ear 100/ a	ianificance	level, 0.007	10 ic not a	outlier.						
	-	evel, 0.0078								
_									1	
FUI 1% SIG	jiiiiicance le	evel, 0.0078	is not an	оишег.						
0 Det- \	0 000T	is a Data of	ial Ocalia	() and : T					<u> </u>	
∠. ∪ata Va	iiue 0.0025	is a Potent	iai Outlier	(Lower Ia						

					,
Test Statistic: 0.450					
For 10% significance level, 0.0025 is an outlier.					
For 5% significance level, 0.0025 is not an outlier.					
For 1% significance level, 0.0025 is not an outlier.					
Dixon's Outlier Test for Cobalt (mw-68)					
, ,					
Total N = 18					
Number NDs = 3					
Number Detects = 15					
10% critical value: 0.472					
5% critical value: 0.525					
1% critical value: 0.616					
Note: NDs excluded from Outlier Test					
140tc. 14D3 Excluded HOIH Outlier 16St					
1. Data Value 0.0053 is a Potential Outlier (Upper Ta					
1. Data value 0.0000 is a Poteriual Outlier (Opper 18					
Test Statistic: 0.559					
Test Statistic: 0.559					
5 4000 : 15 1 1 0 0050 : 11					
For 10% significance level, 0.0053 is an outlier.					
For 5% significance level, 0.0053 is an outlier.					
For 1% significance level, 0.0053 is not an outlier.					
2. Data Value 0.0017 is a Potential Outlier (Lower Ta					
Test Statistic: 0.118					
For 10% significance level, 0.0017 is not an outlier.					
For 5% significance level, 0.0017 is not an outlier.					
For 1% significance level, 0.0017 is not an outlier.					
Dixon's Outlier Test for Cobalt (mw-69)					
Total N = 18					
Number NDs = 1					
Number Detects = 17					
10% critical value: 0.438					
5% critical value: 0.49					
1% critical value: 0.577					
Note: NDs excluded from Outlier Test					<u> </u>
1. Data Value 0.0054 is a Potential Outlier (Upper Ta					
Test Statistic: 0.316					
For 10% significance level, 0.0054 is not an outlier.					
For 5% significance level, 0.0054 is not an outlier.					
For 1% significance level, 0.0054 is not an outlier.					
-					
2. Data Value 0.0027 is a Potential Outlier (Lower Ta					
,	l	l	L	L	

		T				1	
T + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 +							
Test Statistic: 0.381							
For 10% significance level, 0.0027 is not an outlier	-						
For 5% significance level, 0.0027 is not an outlier.							
For 1% significance level, 0.0027 is not an outlier.							
Dixon's Outlier Test for Cobalt (mw-70)							
Total N = 18							
Number NDs = 2							
Number Detects = 16							
10% critical value: 0.454							
5% critical value: 0.507							
1% critical value: 0.595							
Note: NDs excluded from Outlier Test							
1.010. 1100 Oxoldddd llolli Oddidi 163t							
Data Value 0.0077 is a Potential Outlier (Upper	Та						
1. Data value 0.0077 is a Fotential Outlief (Opper	19						
Test Statistic: 0.109							
1 651 Statistic. U. 103							
5 400/ · · · · · · · · · · · · · · · · · ·							
For 10% significance level, 0.0077 is not an outlier	-						
For 5% significance level, 0.0077 is not an outlier.							
For 1% significance level, 0.0077 is not an outlier.							
	_						
2. Data Value 0.0022 is a Potential Outlier (Lower	Та						
Test Statistic: 0.180							
For 10% significance level, 0.0022 is not an outlier							
For 5% significance level, 0.0022 is not an outlier.							
For 1% significance level, 0.0022 is not an outlier.							
No Outlier Test for Lead (background)							
No Outlier Test for Lead (mw-66)							
No Outlier Test for Lead (mw-67)							
· · · ·							
No Outlier Test for Lead (mw-68)							
,							
No Outlier Test for Lead (mw-69)							
No Outlier Test for Lead (mw-70)							
110 Guilor Foot for Edda (IIIW-70)							
Rosner's Outlier Test for 1 Outliers in L	ithium (hack	around)					
1.031013 Oddiel Test for T Oddiels III L	um (Dack	ground)					
Total NI 45							
Total N 45							
Number NDs 6							
Number Detects 39							
Mean of Detects 0.337							

	OD -	f Datasta	0.0605	1		I	ı	T.	I	T.
		of Detects								
		er of data	39							
	f suspected		1							
s not includ	ded in the f	ollowing:								
,			1							
			Potential	Obs.	Test					
#	Mean	sd	outlier	Number			/alue (1%)			
1	0.337	0.0597	0.21	12	2.126	3.03	3.37			
For 5% Sig	nificance L	_evel, there	e is no Pote	ential Outli	er					
For 1% Sig	Inificance L	_evel, there	e is no Pote	ential Outli	er					
Dixor	n's Outlier	Test for Lit	hium (mw-	66)						
Total N = 1	8									
Number NI	Ds = 1									
Number De	etects = 17									
10% critica										
5% critical								<u> </u>		
1% critical										
Note: NDs			r Test							
11010.1120	OXOIGGOG I		. 1001							
1. Data Va	due 0 5 is s	a Potential	Outlier (Llr	ner Tail\?						
i. Data ve	1100 0.0 13 0	a i otolitiai	Oddiici (Op	poi raily:						
Test Statis	tic: 0.636									
1 est otatis	iic. 0.000									
For 10% si	anificance	level 0.5 i	e an outlier	•						
For 5% sig	-			•						
For 1% sig										
1 01 1 70 Sig	Tillicance is	5vei, 0.5 is	an outlier.							
2. Data Va	luo 0 24 is	a Potentia	LOutlier (L	wor Toil\2						
Z. Dala Va	iue 0.24 is	a Polentia	i Outilei (Li	JWEI I all)						
Test Statis	+i.a. 0 222									
rest statis	uc. 0.333									
Far 100/ ai	:fi	level 0.24	is not on a	utlian						
For 10% si For 5% sig	•	-								
For 1% sig										
FOI 1% SIG	nincance is	evei, 0.24 i	s not an ou	uier.						
Diver	ala Oudliau	T4 f 1 !4	h / /	C7\						
DIXOI	n's Outlier	lest for Lit	hium (mw-	0/)						
T-4-1 N - 4	0									
Total N = 1										
Number NI										
Number De										
10% critica										
5% critical										
1% critical										
Note: NDs	excluded f	rom Outlie	r Test							
1. Data Va	alue 0.55 is	a Potentia	al Outlier (L	Jpper Tail)						
Test Statis	tic: 0.250									

For 10% significance level, 0.55 is not an outlier.				
For 5% significance level, 0.55 is not an outlier.				
For 1% significance level, 0.55 is not an outlier.				
2. Data Value 0.25 is a Potential Outlier (Lower Tail)?				
Test Statistic: 0.250				
For 10% significance level, 0.25 is not an outlier.				
For 5% significance level, 0.25 is not an outlier.				
For 1% significance level, 0.25 is not an outlier.				
1 of 170 digrimediace level, 0.20 is not an outlier.				
Dixon's Outlier Test for Lithium (mw-68)				
Dixon's Oddier Test for Eldfidin (filw-08)				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.577				
Note: NDs excluded from Outlier Test				
<ol> <li>Data Value 0.4 is a Potential Outlier (Upper Tail)?</li> </ol>				
Test Statistic: 0.182				
For 10% significance level, 0.4 is not an outlier.				
For 5% significance level, 0.4 is not an outlier.				
For 1% significance level, 0.4 is not an outlier.				
2. Data Value 0.22 is a Potential Outlier (Lower Tail)?				
,				
Test Statistic: 0.438				
For 10% significance level, 0.22 is not an outlier.				
For 5% significance level, 0.22 is not an outlier.				
For 1% significance level, 0.22 is not an outlier.				
1 of 170 significance level, 0.22 is not an outlier.				
Dixon's Outlier Test for Lithium (mw-69)				
Dixon's Oddier Test for Lithidili (IIIW-09)				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.577				
Note: NDs excluded from Outlier Test				
1. Data Value 0.52 is a Potential Outlier (Upper Tail)	-		 	 -
Test Statistic: 0.143				

			ı	ı	
F 100/ -i:fi					
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.					
0. D					
2. Data Value 0.27 is a Potential Outlier (Lower Tail)?					
T+ 04-4:-4: 0.102					
Test Statistic: 0.182					
E 400/ · · · · · · · · · · · · · · · · · ·					
For 10% significance level, 0.27 is not an outlier.					
For 5% significance level, 0.27 is not an outlier. For 1% significance level, 0.27 is not an outlier.					
For 1% significance level, 0.27 is not an outlier.					
Divon's Outlier Test for Lithium (mw 70)					
Dixon's Outlier Test for Lithium (mw-70)					
Total N = 18					
Number NDs = 1					
Number Nos = 1 Number Detects = 17					
10% critical value: 0.438					
5% critical value: 0.49					
1% critical value: 0.577					
Note: NDs excluded from Outlier Test					
Note: NDS excluded from Outlier Test					
Data Value 0.35 is a Potential Outlier (Upper Tail)					
1. Data value 0.00 is a 1 otoriual Cauler (Opper Tall)					
Test Statistic: 0.167					
For 10% significance level, 0.35 is not an outlier.					
For 5% significance level, 0.35 is not an outlier.					
For 1% significance level, 0.35 is not an outlier.					
2. Data Value 0.28 is a Potential Outlier (Lower Tail)?					
· · · · ·					
Test Statistic: 0.167					
For 10% significance level, 0.28 is not an outlier.					
For 5% significance level, 0.28 is not an outlier.					
For 1% significance level, 0.28 is not an outlier.					
No Outlier Test for Mercury (background)					
No Outlier Test for Mercury (mw-66)					
No Outlier Test for Mercury (mw-67)					
No Outlier Test for Mercury (mw-68)					
No Outlier Test for Mercury (mw-69)					
N. Outlier T. of M.					
No Outlier Test for Mercury (mw-70)					
Discola Codina Tantina M. I. I					
Dixon's Outlier Test for Molybdenum (background)					

_				
Total N = 45				
Number NDs = 22				
Number Detects = 23				
10% critical value: 0.374				
5% critical value: 0.421				
1% critical value: 0.505				
Note: NDs excluded from Outlier Test				
1. Data Value 0.011 is a Potential Outlier (Upper Tai				
(-)				
Test Statistic: 0.099				
1 000 010101010101010101010101010101010				
For 10% significance level, 0.011 is not an outlier.				
For 5% significance level, 0.011 is not an outlier.				
For 1% significance level, 0.011 is not an outlier.				
i or 170 significance level, 0.011 is not an outlier.				
2 Data Value 0 00062 is a Patantial Outlier // court				
2. Data Value 0.00062 is a Potential Outlier (Lower T				
Total Otalickies 0 007				
Test Statistic: 0.027				
For 10% significance level, 0.00062 is not an outlier.				
For 5% significance level, 0.00062 is not an outlier.				
For 1% significance level, 0.00062 is not an outlier.				
Dixon's Outlier Test for Molybdenum (mw-66)				
Total N = 18				
Number NDs = 0				
Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.561				
Note: NDs excluded from Outlier Test				
1. Data Value 0.039 is a Potential Outlier (Upper Tai				
, , ,				
Test Statistic: 0.615				
For 10% significance level, 0.039 is an outlier.				
For 5% significance level, 0.039 is an outlier.				
For 1% significance level, 0.039 is an outlier.				
. 5. 7.5 Significants for Si, 0.000 to an outilot.				
2. Data Value 0.01 is a Potential Outlier (Lower Tail)?				
2. Sala Falad 0.01 lo a 1 otolidal Oddioi (LOWEL Fall)				
Test Statistic: 0.231				
163t Otalislic. 0.231				
For 10% significance level 0.01 is not an auditor				
For 10% significance level, 0.01 is not an outlier.				
For 5% significance level, 0.01 is not an outlier.				
For 1% significance level, 0.01 is not an outlier.				
Dixon's Outlier Test for Molybdenum (mw-67)				

Total N = 18				
Number NDs = 0				
Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.561				
Note: NDs excluded from Outlier Test				
Note: NDS excluded from Outlier Test				
1. Data Value 0.063 is a Potential Outlier (Upper Tai				
Test Statistic: 0.680				
For 10% significance level, 0.063 is an outlier.				
For 5% significance level, 0.063 is an outlier.				
For 1% significance level, 0.063 is an outlier.				
-				
2. Data Value 0.037 is a Potential Outlier (Lower Tail				
The second secon				
Test Statistic: 0.111				
Tool Oldiidiic. U. I I I				
For 100/ circuiticance level 0.007 in material at				
For 10% significance level, 0.037 is not an outlier.				
For 5% significance level, 0.037 is not an outlier.				
For 1% significance level, 0.037 is not an outlier.				
Dixon's Outlier Test for Molybdenum (mw-68)				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.577				
Note: NDs excluded from Outlier Test				
Note: NDS excluded from Outlier Test				
1 Data Value 0.040 is a Data-Mail Outline (User on Tail				
Data Value 0.012 is a Potential Outlier (Upper Tai				
T				
Test Statistic: 0.323				
For 10% significance level, 0.012 is not an outlier.	 			
For 5% significance level, 0.012 is not an outlier.	 	 	 	
For 1% significance level, 0.012 is not an outlier.				
2. Data Value 0.0051 is a Potential Outlier (Lower Ta				
,				
Test Statistic: 0.143				
For 10% significance level, 0.0051 is not an outlier.				
For 5% significance level, 0.0051 is not an outlier.				
_				
For 1% significance level, 0.0051 is not an outlier.				
Dixon's Outlier Test for Molybdenum (mw-69)				

			T	T	T	T	T
Total N = 18							
Number NDs = 0							
Number Detects = 18							
10% critical value: 0.424							
5% critical value: 0.475							
1% critical value: 0.561							
Note: NDs excluded from Outlier Test							
1. Data Value 0.017 is a Potential Outlier (Upper Tai							
Test Statistic: 0.333							
For 10% significance level, 0.017 is not an outlier.							
For 5% significance level, 0.017 is not an outlier.							
For 1% significance level, 0.017 is not an outlier.							
2. Data Value 0.013 is a Potential Outlier (Lower Tail							
·							
Test Statistic: 0.333							
For 10% significance level, 0.013 is not an outlier.							
For 5% significance level, 0.013 is not an outlier.							
For 1% significance level, 0.013 is not an outlier.							
-							
Dixon's Outlier Test for Molybdenum (mw-70)							
, , ,							
Total N = 18							
Number NDs = 1							
Number Detects = 17							
10% critical value: 0.438							
5% critical value: 0.49							
1% critical value: 0.577							
Note: NDs excluded from Outlier Test							
1. Data Value 0.027 is a Potential Outlier (Upper Tai							
,							
Test Statistic: 0.744							
For 10% significance level, 0.027 is an outlier.							
For 5% significance level, 0.027 is an outlier.							
For 1% significance level, 0.027 is an outlier.							
· · ·							
2. Data Value 0.0026 is a Potential Outlier (Lower Ta							
Test Statistic: 0.143							
For 10% significance level, 0.0026 is not an outlier.							
For 5% significance level, 0.0026 is not an outlier.							
For 1% significance level, 0.0026 is not an outlier.							
Rosner's Outlier Test for 1 Outliers in Sele	nium (bacl	(around)					
	(540)	·a · · · · /					

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		Total N	45							
	Nur	mber NDs	1							
	Numbe	er Detects	44							
	Mean o	of Detects	0.147							
	SDo	of Detects	0.101							
	Numb	er of data	44							
Number o	of suspecte	d outliers	1							
s not inclu	ded in the f	following:								
										+
			Potential	Obs.	Test	Critical	Critical			+
#	Mean	sd	outlier	Number	value	/alue (5%)	ralue (1%)			-
1	0.147	0.1	0.39	4	2.424	3.08	3.43			
	<b>0</b>	• • • • • • • • • • • • • • • • • • • •	0.00	- 1		0.00	00			-
For 5% Sig	anificance l	Level ther	e is no Pote	ntial Outli	ar					
1 01 0 70 010	grillicarice	Level, trier	C 13 110 1 Old	inda Oddic	<u> </u>					T
For 10/ Cir	anificance l	Lovel ther	e is no Pote	ntial Outli						
FOI 1% SI	gnilicance	Level, there	e is no Pole	muai Outile	er e					T
Dixon	n's Outlier T	est for Sel	enium (mw	-66)						
Total N = 1										
Number N										
Number D	etects = 11									
10% critica	al value: 0.	517								
5% critical	value: 0.5	76								
1% critical	value: 0.6	79								
Note: NDs	excluded f	from Outlie	r Test							
1. Data Va	alue 0.11 is	s a Potentia	al Outlier (L	pper Tail)						
Test Statis	stic: 0.996									+
										-
For 10% s	ignificance	level 0.11	is an outlie	ar .						-
	-		is an outlier							-
			is an outlier							-
. 5. 170 319	J	J. J. J. J. J. J. J. J. J. J. J. J. J. J	.c an oddiel	•						<del>                                     </del>
2 Date Va	alue O OO1e	ie a Doton	tial Outlier	(Lower To						1
L. Dala Va	1146 U.UU 10	is a FUICH		(LOWGI I B						-
Test Statis	stic: 0 222									-
i est statis	suc. 0.333									-
Far 100/	i maifie	level 0.00	16 in	:-tl:						
	-		)16 is not a							
_			6 is not an							
ror 1% sig	gniticance l	evei, 0.001	6 is not an	outlier.						1
										<u> </u>
Dixon	's Outlier T	est for Sel	enium (mw	-67)						
Total N = 1										
Number N	Ds = 1									
Number D	etects = 17	7								
	al value: 0.4									+
	value: 0.49									<del>                                     </del>
		-						1	1	

Note: NDs excluded from Outlier Test  1. Data Value 0.088 is a Potential Outlier (Upper Tai  Test Statistic: 0.115  For 10% significance level, 0.068 is not an outlier. For 15% significance level, 0.068 is not an outlier. For 15% significance level, 0.068 is not an outlier.  2. Data Value 0.0053 is a Potential Outlier (Lower Tai  Test Statistic: 0.189  For 10% significance level, 0.0053 is not an outlier. For 5% significance level, 0.0053 is not an outlier. For 15% significance level, 0.0053 is not an outlier. For 15% significance level, 0.0053 is not an outlier. For 15% significance level, 0.0053 is not an outlier.  Dixon's Outlier Test for Selenium (rmw-88)  Total N = 18  Number NDs = 0  Number Detects = 18  10% critical value: 0.424  15% critical value: 0.475  15% critical value: 0.475  15% critical value: 0.045  15 Data Value 0.37 is a Potential Outlier (Upper Tail)  Test Statistic: 0.308  For 10% significance level, 0.37 is not an outlier. For 15% significance level, 0.37 is not an outlier. For 15% significance level, 0.37 is not an outlier. For 15% significance level, 0.37 is not an outlier. For 15% significance level, 0.37 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier.	r			T	1	
Test Statistic: 0.115  Test Statistic: 0.115  For 10% significance level, 0.068 is not an outlier. For 15% significance level, 0.068 is not an outlier. For 15% significance level, 0.068 is not an outlier. Por 15% significance level, 0.068 is not an outlier.  2. Data Value 0.0053 is a Potential Outlier (Lower Ta)  Test Statistic: 0.189  For 10% significance level, 0.0053 is not an outlier. For 15% significance level, 0.0053 is not an outlier. For 15% significance level, 0.0053 is not an outlier. For 15% significance level, 0.0053 is not an outlier. For 15% significance level, 0.0053 is not an outlier.  Dibton's Outlier Test for Selenium (mw-68)  Total N = 18  Number NDs = 0  Number Detects = 18  10% critical value: 0.475 1% critical value: 0.475 1% critical value: 0.475 1% critical value: 0.361 Note: NDs excluded from Outlier Test  1. Data Value 0.37 is a Potential Outlier (Upper Tail) Test Statistic: 0.308  For 10% significance level, 0.37 is not an outlier. For 15% significance level, 0.37 is not an outlier. For 15% significance level, 0.37 is not an outlier. For 15% significance level, 0.37 is not an outlier. For 15% significance level, 0.45 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier. For 15% significance level, 0.045 is not an outlier.  Dix outlier Test for Selenium (mw-69)  Total N = 18  Number NDet etcls = 18  Number Detects = 18  Number Detects = 18  Number Detects = 18	1% critical value: 0.577					
Test Statistic: 0.115  For 10% significance level, 0.068 is not an outlier. For 1% significance level, 0.068 is not an outlier. For 1% significance level, 0.068 is not an outlier. For 1% significance level, 0.068 is not an outlier.  2. Data Value 0.0053 is a Potential Outlier (Lower Ta  Test Statistic: 0.189  For 10% significance level, 0.0053 is not an outlier. For 5% significance level, 0.0053 is not an outlier. For 1% significance level, 0.0053 is not an outlier. For 1% significance level, 0.0053 is not an outlier.  Dixon's Outlier Test for Selenium (mw-68)  Total N = 18  Number NDs = 0  Number Detects = 18  10% critical value: 0.424 9% critical value: 0.424 9% critical value: 0.451 Note: NDs excluded from Outlier Test  1. Data Value 0.37 is a Potential Outlier (Upper Tail)  Test Statistic: 0.308  For 10% significance level, 0.37 is not an outlier. For 1% significance level, 0.37 is not an outlier. For 1% significance level, 0.37 is not an outlier. For 1% significance level, 0.045 is not an outlier.	Note: NDs excluded from Outlier Test					
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For 5% significance level, 0.088 is not an outlier. For 1% significance level, 0.0083 is not an outlier.  2. Data Value 0.0053 is a Potential Outlier (Lower Ta  Test Statistic: 0.189  For 10% significance level, 0.0053 is not an outlier. For 5% significance level, 0.0053 is not an outlier. For 1% significance level, 0.0053 is not an outlier.  Dixon's Outlier Test for Selenium (mw-68)  Dixon's Outlier Test for Selenium (mw-68)  Total N = 18  Number NDs = 0  Number NDs = 0  Number Value: 0.475  % critical value: 0.475  % critical value: 0.561  Note: NDs excluded from Outlier Test  1. Data Value 0.37 is a Potential Outlier (Upper Tail)  Test Statistic: 0.308  For 10% significance level, 0.37 is not an outlier. For 5% significance level, 0.37 is not an outlier. For 5% significance level, 0.37 is not an outlier. For 5% significance level, 0.37 is not an outlier. For 5% significance level, 0.045 is not an outlier. For 5% significance level, 0.045 is not an outlier. For 5% significance level, 0.045 is not an outlier. For 5% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier. For 1% significance level, 0.045 is not an outlier.	Test Statistic: 0.115	1				
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	5% critical value: 0.475					

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1% critical value: 0.561							
Note: NDs excluded from Outlier Test							
1. Data Value 0.023 is a Potential Outlier (Upper Tai							
Test Statistic: 0.333							
For 10% significance level, 0.023 is not an outlier.							
For 5% significance level, 0.023 is not an outlier.							
For 1% significance level, 0.023 is not an outlier.							
2. Data Value 0.01 is a Potential Outlier (Lower Tail)?							
Test Statistic: 0.111							
For 10% significance level, 0.01 is not an outlier.							
For 5% significance level, 0.01 is not an outlier.							
For 1% significance level, 0.01 is not an outlier.							
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Dixon's Outlier Test for Selenium (mw-70)							
Bixone dullor reserver deleritatin (illiv 70)							
Total N = 18							
Number NDs = 0							
Number Detects = 18							
10% critical value: 0.424							
5% critical value: 0.475							
1% critical value: 0.473							
Note: NDs excluded from Outlier Test							
Note. NDS excluded from Outlier Test							
1 Data Value 0.26 is a Detential Outlier (Unner Tail)							
Data Value 0.26 is a Potential Outlier (Upper Tail)							
Test Statistic: 0.300							
Test Statistic: 0.300							
F 100/ -:::::							
For 10% significance level, 0.26 is not an outlier.							
For 5% significance level, 0.26 is not an outlier.							
For 1% significance level, 0.26 is not an outlier.							
2. Data Value 0.12 is a Batantial Continue # some Time							
2. Data Value 0.13 is a Potential Outlier (Lower Tail)							
T + 0: :: : 0 000							
Test Statistic: 0.300							
F 100/ -iif 1							
For 10% significance level, 0.13 is not an outlier.							
For 5% significance level, 0.13 is not an outlier.							
For 1% significance level, 0.13 is not an outlier.							
Rosner's Outlier Test for 1 Outliers in That	ıııum (back	(ground	T				
Total N 45							
Number NDs 20							
Number Detects 25							
Mean of Detects 6.3160E-4							

				1	T	T		T	
SD of Detects									
Number of data	25								
Number of suspected outliers	1								
s not included in the following:									
	Potential	Obs.	Test	Critical	Critical				
# Mean sd	outlier	Number	value	ralue (5%)	ralue (1%)				
1 6.3160E-4 3.1977E-4	0.0011	17	1.465	2.82	3.14				
For 5% Significance Level, ther	e is no Pote	ential Outlie	er				-		
For 1% Significance Level, ther	e is no Pote	ential Outlie	er						1
,									
Dixon's Outlier Test for Th	allium (mw-	-66)							
Dixono Catalor Toot for Th	amam (mw	00,							
Total N = 18									
Number NDs = 4									
Number NDS = 4 Number Detects = 14									1
10% critical value: 0.492									
5% critical value: 0.492									1
1% critical value: 0.546									
	<b>.</b>								
Note: NDs excluded from Outlie	er Lest								
4 5 . 1/1									
1. Data Value 0.0025 is a Pote	ntial Outlier	(Upper 18							
Test Statistic: 0.841									
E 400/ : : : :									
For 10% significance level, 0.00									
For 5% significance level, 0.002									
For 1% significance level, 0.002	25 is an out	ier.							
2. Data Value 0.00033 is a Pote	ential Outlie	r (Lower I							
Test Statistic: 0.081									
- 100/ : :5		.11							
For 10% significance level, 0.00									
For 5% significance level, 0.000									
For 1% significance level, 0.000	033 is not a	n outlier.							
Dixon's Outlier Test for Th	allium (mw-	·67)							
Total N = 18									
Number NDs = 4									
Number Detects = 14									
10% critical value: 0.492									
5% critical value: 0.546									
1% critical value: 0.641									
Note: NDs excluded from Outlie	er Test								
1. Data Value 0.00074 is a Pot	ential Outlie	er (Upper 1							
Test Statistic: 0.300									

Page 27 of 35

For 10% significance level, 0.00074 is not an outlier.				
For 5% significance level, 0.00074 is not an outlier.				
For 1% significance level, 0.00074 is not an outlier.				
2. Data Value 0.00031 is a Potential Outlier (Lower T				
·				
Test Statistic: 0.097				
For 10% significance level, 0.00031 is not an outlier.				
For 5% significance level, 0.00031 is not an outlier.				
For 1% significance level, 0.00031 is not an outlier.				
1 of 170 digrimediace level, 0.00001 is not all oddier.				
Divorto Outlier Test for Thellium (my 69)				
Dixon's Outlier Test for Thallium (mw-68)				
Total N = 18				
Number NDs = 3				
Number Detects = 15				
10% critical value: 0.472				
5% critical value: 0.525				
1% critical value: 0.616				
Note: NDs excluded from Outlier Test				
1. Data Value 0.00093 is a Potential Outlier (Upper 1				
Test Statistic: 0.294				
For 10% significance level, 0.00093 is not an outlier.				
For 5% significance level, 0.00093 is not an outlier.				
For 1% significance level, 0.00093 is not an outlier.				
2. Data Value 0.00048 is a Potential Outlier (Lower T				
Test Statistic: 0.314				
For 10% significance level, 0.00048 is not an outlier.				
For 5% significance level, 0.00048 is not an outlier.				
For 1% significance level, 0.00048 is not an outlier.				
Dixon's Outlier Test for Thallium (mw-69)				
Total N = 18				
Number NDs = 9				
Number Detects = 9				
10% critical value: 0.441				
5% critical value: 0.512				
1% critical value: 0.635				
Note: NDs excluded from Outlier Test				
NOTE: NOS excluded IfOM Outlier Test				
4. Data Value 0.00047 to a Batter if 1.0 all 1.0				
Data Value 0.00047 is a Potential Outlier (Upper 1)				
Test Statistic: 0.500				

For 10% significance level, 0.00047 is an outlier.				
For 5% significance level, 0.00047 is not an outlier.				
For 1% significance level, 0.00047 is not an outlier.				
2. Data Value 0.00014 is a Potential Outlier (Lower T				
2. Data Value 0.00014 is a 1 otoridal Oddier (EOWOLL)				
T+ 0+-4-4 0 107				
Test Statistic: 0.167				
For 10% significance level, 0.00014 is not an outlier.				
For 5% significance level, 0.00014 is not an outlier.				
For 1% significance level, 0.00014 is not an outlier.				
Dixon's Outlier Test for Thallium (mw-70)				
Total N = 18				
Number NDs = 9				
Number Detects = 9				
10% critical value: 0.441				
5% critical value: 0.512				
1% critical value: 0.635				
Note: NDs excluded from Outlier Test				
Note. NDS excluded from Oddier Test				
1 Data Value 0 00057 is a Batantial Outlier (Users a				
1. Data Value 0.00057 is a Potential Outlier (Upper 1				
Test Statistic: 0.368				
For 10% significance level, 0.00057 is not an outlier.				
For 5% significance level, 0.00057 is not an outlier.				
For 1% significance level, 0.00057 is not an outlier.				
2. Data Value 0.00027 is a Potential Outlier (Lower T				
Test Statistic: 0.478				
For 10% significance level, 0.00027 is an outlier.				
For 5% significance level, 0.00027 is not an outlier.				
For 1% significance level, 0.00027 is not an outlier.				
Dixon's Outlier Test for Fluoride (background)				
Dixon's Outlier Test for Fluoride (background)				
Total N = 46				
Total N = 46				
Number NDs = 43				
Number Detects = 3				
10% critical value: 0.886				
5% critical value: 0.941				
1% critical value: 0.988				
Note: NDs excluded from Outlier Test				 
1. Data Value 0.44 is a Potential Outlier (Upper Tail)				
,				
Test Statistic: 0.500				
		1	1	

	1		1	
For 10% significance level, 0.44 is not an outlier.				
For 5% significance level, 0.44 is not an outlier.				
For 1% significance level, 0.44 is not an outlier.				
2. Data Value 0.2 is a Potential Outlier (Lower Tail)?				
Test Statistic: 0.500				
For 10% significance level, 0.2 is not an outlier.				
For 5% significance level, 0.2 is not an outlier.				
For 1% significance level, 0.2 is not an outlier.				
3 11 11 11 11 11 11 11 11 11 11 11 11 11				
Dixon's Outlier Test for Fluoride (mw-66)				
Dixon's Galler Test for Flacing (IIIW-00)				
Total N = 18				
Number NDs = 0				
Number Nos = 0  Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.475				
Note: NDs excluded from Outlier Test				
Note: NDs excluded from Outlier Lest				
1 Data Value 44 in a Data sind Outline (Une an Tail)				
Data Value 41 is a Potential Outlier (Upper Tail)?				
T + 00 +: :: 0.050				
Test Statistic: 0.652				
E 400/ : : : : 1 1 44 : : : : :				
For 10% significance level, 41 is an outlier.				
For 5% significance level, 41 is an outlier.				
For 1% significance level, 41 is an outlier.				
O. Data Value 47 to a Data attal Continue (Laure Tally)				
2. Data Value 17 is a Potential Outlier (Lower Tail)?				
T O				
Test Statistic: 0.111				
F 100/ -::::::				
For 10% significance level, 17 is not an outlier.				
For 5% significance level, 17 is not an outlier.				
For 1% significance level, 17 is not an outlier.				
Discoule Outline Test for Floorists (co. 07)				
Dixon's Outlier Test for Fluoride (mw-67)				
T-4-1 N = 10				
Total N = 18				
Number NDs = 0				
Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.561				
Note: NDs excluded from Outlier Test				
Data Value 37 is a Potential Outlier (Upper Tail)?				
Test Statistic: 0.600				

	ı		1		
For 10% significance level, 37 is an outlier.					
For 5% significance level, 37 is an outlier.					
For 1% significance level, 37 is an outlier.					
For 1% significance level, 37 is an outlier.					
2. Data Value 15 is a Potential Outlier (Lower Tail)?					
2. Data Value 15 is a Potential Outlier (Lower Tall)?					
T4 04-4-4-1-1 0 200					
Test Statistic: 0.200					
For 10% significance level, 15 is not an outlier.					
For 5% significance level, 15 is not an outlier.					
For 1% significance level, 15 is not an outlier.					
For 1% Significance level, 13 is not an outlier.					
Dixon's Outlier Test for Fluoride (mw-68)					
Dixort's Oduler Test for Fluoride (Illw-66)					
Total N = 18					
Number NDs = 0					
Number NDS = 0					
10% critical value: 0.424					
5% critical value: 0.475					
1% critical value: 0.475					
Note: NDs excluded from Outlier Test					
Note: NDS excluded from Outlier Test					
1 Data Value 14 is a Detential Outlier / Inner Tail\2					
1. Data Value 14 is a Potential Outlier (Upper Tail)?					
Test Statistic: 0.417					
Test Statistic. 0.417					
For 10% significance level, 14 is not an outlier.					
For 5% significance level, 14 is not an outlier.					
For 1% significance level, 14 is not an outlier.					
For 1% significance level, 14 is not an outlier.					
2. Data Value 5.5 is a Potential Outlier (Lower Tail)?					
2. Data value 5.5 is a Potential Outlier (Lower Tall)?					
Test Statistic: 0.236					
rest statistic. 0.230					
For 10% significance level, 5.5 is not an outlier.					
For 5% significance level, 5.5 is not an outlier.					
For 1% significance level, 5.5 is not an outlier.					
. 5. 170 digrimodrido lovol, 0.0 to flot dil oddior.					
Dixon's Outlier Test for Fluoride (mw-69)					
2.5 C Tallet 1 oct lot 1 lability (IIII oo)					
Total N = 18					
Number NDs = 0					
Number Detects = 18					
10% critical value: 0.424					
5% critical value: 0.475					
1% critical value: 0.561					
Note: NDs excluded from Outlier Test					
Data Value 29 is a Potential Outlier (Upper Tail)?					
The value at least estimate eather (opportun):					
Test Statistic: 0.500					
	1				

			ı	ı		ı	ı	
F100/ -iifi    20 i-								
For 10% significance level, 29 is								
For 5% significance level, 29 is								
For 1% significance level, 29 is	not an outlier.							
2. Data Value 9.6 is a Potential	Outlier (Lower Tail)?							
Test Statistic: 0.135								
For 10% significance level, 9.6 i								
For 5% significance level, 9.6 is								
For 1% significance level, 9.6 is	not an outlier.							
Dixon's Outlier Test for Flu	oride (mw-70)							
Total N = 18								
Number NDs = 4								
Number Detects = 14								
10% critical value: 0.492								
5% critical value: 0.546								
1% critical value: 0.641								
Note: NDs excluded from Outlie	r Test							
1. Data Value 3.2 is a Potential	Outlier (Upper Tail)?							
Test Statistic: 0.200								
For 10% significance level, 3.2 i	s not an outlier.							
For 5% significance level, 3.2 is	not an outlier.							
For 1% significance level, 3.2 is	not an outlier.							
2. Data Value 0.85 is a Potentia	l Outlier (Lower Tail)?							
Test Statistic: 0.415								
For 10% significance level, 0.85	is not an outlier.							
For 5% significance level, 0.85 i	s not an outlier.							
For 1% significance level, 0.85 i	s not an outlier.							
Rosner's Outlier Test for	1 Outliers in Combine	dRadium (	backgroun	d)				
Total N	46							
Number NDs	6							
Number Detects	40							
Mean of Detects	2.315							
SD of Detects	0.994							
Number of data	40							
Number of suspected outliers	1							
s not included in the following:					1			
igi								
						1		

			Potential	Obs.	Test	Critical	Critical			
#	Mean	sd	outlier	Number			ralue (1%)			
1	2.315	0.981	4.8	11	2.533	3.04				
- 1	2.313	0.961	4.0	11	2.555	3.04	3.30			
F F0/ O:	:C1		: : D-4-							
For 5% Sign	lificance Le	evel, there	e is no Pote	ential Outlie	r					
For 1% Sign	ificance Lo	evel, there	e is no Pote	ential Outlie	r		ı		1	1
Dixon's Outl	lier Test fo	r Combine	edRadium	(mw-66)						
Total N = 18	3									
Number NDs	s = 1									
Number Det	ects = 17									
10% critical	value: 0.43	38								
5% critical va	alue: 0.49									
1% critical va	alue: 0.57	7								
Note: NDs e	xcluded fr	om Outlie	r Test							
1. Data Valu	ue 5.1 is a	Potential	Outlier (Ur	per Tail)?						
			\	,						
Test Statistic	c: 0.333									
	0. 0.000									
For 10% sign	nificance l	evel 51 is	e not an ou	tlior						
For 5% signi										
For 1% signi										
For 1% Signi	ilicance le	vei, 5. i is	not an out	ier.						
0.0	0.41	D	0 11 11	. T. W.O.						
2. Data Valu	ie v.4 is a	Potentiai (	Outiler (Lov	wer raii)?						
T . O: .:	0.005									
Test Statistic	c: 0.235									
				-						
For 10% sign										
For 5% signi										
For 1% signi	ificance le	vel, 0.4 is	not an outl	ier.						
Dixon's Outl	lier Test fo	r Combine	edRadium	(mw-67)						
Total N = 18	3									
. 5.51 14 - 10										
Number NDs	s = 1									
Number NDs	ects = 17	38								
Number NDs Number Det	ects = 17 value: 0.4	38								
Number NDs Number Dete 10% critical	ects = 17 value: 0.43 alue: 0.49									
Number NDs Number Dete 10% critical va 5% critical va	ects = 17 value: 0.49 alue: 0.57	7	r Test							
Number NDs Number Dete 10% critical va 5% critical va 1% critical va	ects = 17 value: 0.49 alue: 0.57	7	r Test							
Number NDs Number Dete 10% critical va 5% critical va 1% critical va	value: 0.49 alue: 0.57 excluded from	7 om Outlie		oper Tail)?						
Number NDs Number Dete 10% critical va 5% critical va 1% critical va Note: NDs es	value: 0.49 alue: 0.57 excluded from	7 om Outlie		oper Tail)?						
Number NDs Number Dete 10% critical va 5% critical va 1% critical va Note: NDs e:	value: 0.43 alue: 0.49 alue: 0.57 excluded from the transfer of the transfer o	7 om Outlie		oper Tail)?						
Number NDs Number Dete 10% critical va 5% critical va 1% critical va Note: NDs es	value: 0.43 alue: 0.49 alue: 0.57 excluded from the transfer of the transfer o	7 om Outlie		oper Tail)?						
Number NDs Number Dete 10% critical va 1% critical va 1% critical va Note: NDs each  1. Data Valu Test Statistic	value: 0.4: alue: 0.49 alue: 0.57 excluded from the transfer of the transfer o	7 om Outlier Potential	Outlier (Up							
Number NDs Number Dete 10% critical va 1% critical va 1% critical va Note: NDs ea  1. Data Valu Test Statistic	value: 0.49 alue: 0.57 excluded fro  ue 4.2 is a  c: 0.333	7 om Outlier Potential	Outlier (Up	tlier.						
Number NDs Number Dete 10% critical va 1% critical va 1% critical va Note: NDs each  1. Data Valu Test Statistic	value: 0.4: alue: 0.49 alue: 0.57 excluded from the control of the	7 om Outlier Potential evel, 4.2 is	Outlier (Up	tlier.						

2. Data Value 0.9 is a Potential Outlier (Lower Tail)?				
Test Statistic: 0.250				
For 10% significance level, 0.9 is not an outlier.				
For 5% significance level, 0.9 is not an outlier.				
For 1% significance level, 0.9 is not an outlier.				
Dixon's Outlier Test for CombinedRadium (mw-68)				
<b>(</b> ,				
Total N = 18				
Number NDs = 1				
Number Detects = 17				
10% critical value: 0.438				
5% critical value: 0.49				
1% critical value: 0.49				
Note: NDs excluded from Outlier Test				
INDS excluded IfOffi Outlief Test				
1 Data Value 2.9 is a Datamaial Quality (Hanna Tail)				
1. Data Value 3.8 is a Potential Outlier (Upper Tail)?				
Test Statistic: 0.321				
For 10% significance level, 3.8 is not an outlier.				
For 5% significance level, 3.8 is not an outlier.				
For 1% significance level, 3.8 is not an outlier.				
2. Data Value 0.6 is a Potential Outlier (Lower Tail)?				
Test Statistic: 0.174				
For 10% significance level, 0.6 is not an outlier.				
For 5% significance level, 0.6 is not an outlier.				
For 1% significance level, 0.6 is not an outlier.				
Dixon's Outlier Test for CombinedRadium (mw-69)				
Total N = 18				
Number NDs = 0				
Number Detects = 18				
10% critical value: 0.424				
5% critical value: 0.475				
1% critical value: 0.561				
Note: NDs excluded from Outlier Test				
1. Data Value 6.7 is a Potential Outlier (Upper Tail)?				
,				
Test Statistic: 0.343				
For 10% significance level, 6.7 is not an outlier.				
For 5% significance level, 6.7 is not an outlier.				
For 1% significance level, 6.7 is not an outlier.				

2. Data Value 3.1 is a Potential Outlier (Lower Tail)?				
2. Data value 3.1 is a Potential Oddiel (Lower Tall)!				
Test Statistic: 0.042				
Test Statistic. 0.042				
For 10% significance level, 3.1 is not an outlier.				
For 5% significance level, 3.1 is not an outlier.				
For 1% significance level, 3.1 is not an outlier.				
1 of 170 significance level, 3.1 is not an outlier.				
Dixon's Outlier Test for CombinedRadium (mw-70)				
Total N = 18				
Number NDs = 2				
Number Detects = 16				
10% critical value: 0.454				
5% critical value: 0.507				
1% critical value: 0.595				
Note: NDs excluded from Outlier Test				
Data Value 3.3 is a Potential Outlier (Upper Tail)?				
Test Statistic: 0.389				
For 10% significance level, 3.3 is not an outlier.				
For 5% significance level, 3.3 is not an outlier.				
For 1% significance level, 3.3 is not an outlier.				
2. Data Value 1 is a Potential Outlier (Lower Tail)?				
T O i. ii. O. 040				
Test Statistic: 0.313				
For 10% significance level, 1 is not an outlier.				
For 5% significance level, 1 is not an outlier.				
For 1% significance level, 1 is not an outlier.				
		1		1

