DATA VALIDATION REPORT

September 2016 Groundwater Sampling Event
Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

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ACRONYMS

%	percent
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
APS	Arizona Public Service
CCR	coal combustion residual
CLP	Contract Laboratory Program
COC	chain of custody
EPA	United States Environmental Protection Agency
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
SM	Standard Method
TestAmerica	TestAmerica Laboratories, Inc.
TDS	total dissolved solids

DATA VALIDATION REPORT - REVISION 1.0

Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

1.0 INTRODUCTION

Arizona Public Service (APS) collected 17 water samples September 12 and 13, 2016, from the Four Corners Power Plant, located in Farmington, New Mexico. APS submitted the samples to TestAmerica Laboratories, Inc. (TestAmerica), located in Phoenix, Arizona, where they were assigned to sample delivery groups J69590-1, J69591-1, and J69593-1. TestAmerica analyzed the samples for total metals and mercury by United States Environmental Protection Agency (EPA) Methods 200.7, 200.8, and 245.1; anions by EPA Method 300.0; total dissolved solids (TDS) by Standard Method (SM) 2540C; and pH by SM 4500B. TestAmerica subcontracted the samples to Radiation Safety Engineering, Inc., where they were analyzed for radium 226/228 using GammaRay HPGE. A list of these samples by field sample identification (ID), sample collection date, and the laboratory sample IDs is presented in Table 1.

2.0 DATA VALIDATION METHODOLOGY

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) performed an EPA Stage 2A validation on these samples, which 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 the laboratory's analytical report and does not include review or validation of the raw analytical data. This data validation report also does not include review or validation of the data from Radiation Safety Engineering, Inc. due to the lack of QC data. This data validation has been performed in general accordance with:

- AECOM, Inc., 2015. Final Sampling and Analysis Plan Coal Combustion Residual (CCR) Groundwater Monitoring, Four Corners Power Plant, Arizona Public Service, Farmington, New Mexico, December 2015.
- EPA, 2004. SW 846 Test Methods for Evaluating Solid Wastes, Update IIIB.
- EPA, 2014. EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Superfund Data Review, EPA-540 R 013 001.

The CLP guidelines were written specifically for the CLP, and have been modified for the purposes of this data review where they differ from method-specific QC requirements.

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.

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 they accompany. 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 QUALIFIERS THAT MAY BE ADDED 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 QUALIFICATION REASON CODES

The following reason codes were applied to the data during data validation:

FD Field duplicate RPD exceeded established criteria. Potential sampling or analytical imprecision.

HT Holding time exceeded.

NS Sensitivity criteria not met; the reporting limit (RL) is above the applicable National Primary Drinking Water Regulation Maximum Contaminant Level (MCL).

SE Excessive RPD between redundant analytical results. Potential analytical imprecision.

UC Result exceeds upper calibration limit.

6.0 CHAIN OF CUSTODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION

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.

7.0 SPECIFIC DATA VALIDATION FINDINGS

Results from these samples may be considered usable with the limitations and exceptions described in Sections 7.1 through 8.0.

7.1 METALS BY EPA METHODS 200.7, 200.8, AND 245.1

Total metals and mercury results generated by TestAmerica may be considered usable with the limitations described in Sections 7.1.1 through 7.1.6.

7.1.1 Holding Times

All samples were analyzed for metals within the SAP-specified holding time of 28 days for mercury and 180 days for the additional metals.

7.1.2 Laboratory Blanks

Target analytes were not detected in the laboratory blanks associated with the analysis of these samples.

7.1.3 Laboratory Control Sample Accuracy and Precision

LCS and LCSD recoveries were within the SAP-specified 80 to 120 percent (%) limits and RPDs between the LCS and LCSD results were less than the laboratory-specified maximum of 20%.

7.1.4 Matrix Spikes/Matrix Spike Duplicates

TestAmerica performed MS and MSD analyses on project sample FC-CCR-MW68-916 for total metals and mercury by EPA methods 200.8 and 245.1, respectively. MS/MSD recoveries were within laboratory-specified limits, and RPDs between MS and MSD results were less than the laboratory-specified maximum of 20%.

MS and MSD analyses for other metals were performed on batch samples not related to this project. It is not possible to evaluate data usability based on the MS/MSD performance of unrelated samples.

7.1.5 Analytical Sensitivity

Amec Foster Wheeler compared RLs for antimony, arsenic, barium, beryllium, cadmium, chromium, selenium, thallium, and mercury against applicable MCLs to confirm that the RLs were sufficiently low to meet the MCLs. Non-detect results were reported to RLs less than the applicable MCLs, with the following exception:

- The RL for antimony was greater than the MCL in the analysis of sample FC-CCR-MW49A-916, due to sample dilution. Amec Foster Wheeler UJ qualified the non-detect antimony result from this sample because the sensitivity criteria were not met. (UJ-NS)

Boron, calcium, cobalt, lithium, and molybdenum 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.

7.1.6 Data Reporting and Analytical Procedures

TestAmerica initially digested samples for boron and calcium analysis on September 22, 2016. When the digestates were analyzed, results were uncharacteristically low. The laboratory performed a second digestion of the samples on October 6, and analyzed the second set of digestates on October 8 and 10, 2016. This analysis yielded higher results, similar to historical values. The laboratory re-analyzed the initial digestates on October 13, 2016, and found the results were similar to those obtained from October 8 and 10, 2016. TestAmerica could not identify a cause for the low original results, which were rejected by the laboratory.

The laboratory reported two sets of higher results in their revised report dated October 19, 2016: those obtained from October 8 and October 10 from the second digestion and on October 13 from the re-analysis of the original digestion. When multiple results are reported for the same analyte, they are shown in Table 2A, along with a calculation of the RPD between the results. Precision values were less than 20%, or the differences between the detected concentrations were less than the RLs, indicating general agreement between results.

In the samples analyzed on October 13, 2016, boron was detected in samples FC-CCR-MW66-916 (110 milligrams per liter [mg/L]), FC-CCR-MW68-916 (120 mg/L), FC-CCR-MW69-916 (110 mg/L), and FC-CCR-MW70-916 (93 mg/L) at concentrations greater than the upper calibration range. Amec Foster Wheeler J qualified the boron results from these samples because they are outside of the quantitative range. (J-UC) Results from the earlier analysis of the second digestion were not qualified.

7.2 ANIONS BY EPA METHOD 300.0

Fluoride, chloride, and sulfate results generated by TestAmerica may be considered usable with the limitations described in Sections 7.2.1 through 7.2.7.

7.2.1 Holding Times

Samples were analyzed for anions within the SAP-specified holding time of 28 days, with the following exceptions:

- TestAmerica reported two sets of chloride and sulfate results from samples FC-CCR-MW60-916 and FC-CCR-MW100-916. One set of results from each sample was analyzed after the holding time expired. Amec Foster Wheeler J qualified chloride and sulfate results from the latter analyses of these samples because of the missed analytical holding times. (J-HT)

7.2.2 Laboratory Blanks

Fluoride, chloride, and sulfate were not detected in the laboratory blanks associated with the analysis of these samples.

7.2.3 Laboratory Control Samples

LCS LCSD recoveries were within the laboratory-specified 90 to 110% limits and RPDs between the LCS and LCSD results were less than the laboratory-specified maximum values.

7.2.4 Matrix Spikes/Matrix Spike Duplicates

TestAmerica performed MS and MSD analyses on samples FC-CCR-MW65-916 for fluoride. Recoveries were within the laboratory-specified 80 to 120% limits, and RPDs between MS and MSD results were less than 20%.

7.2.5 Laboratory Duplicates

TestAmerica did not perform duplicate analyses of any of the samples covered in this report.

7.2.6 Analytical Sensitivity

Amec Foster Wheeler compared RLs for fluoride against the MCL to confirm that the RLs were sufficiently low to meet the MCL. Non-detect results were reported at RLs less than the applicable 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.

7.2.7 Data Reporting and Analytical Procedures

TestAmerica reported two sets of chloride and sulfate results derived from two different dilutions in samples FC-CCR-MW60-916 and FC-CCR-MW100-916. Additionally, reports J69590-1 and J69591-1 present different fluoride analysis results or all samples (i.e., the same sample was analyzed twice because it was on two chain of custodies). When multiple results are reported for the same analyte/sample, they are shown in Table 2A, along with a calculation of the RPD between the results. Precision values were less than 20%, or the differences between the detected concentrations were less than the RLs, indicating general agreement between results. Exceptions are noted below.

- The RPDs for chloride and sulfate results were high at 53.3% and 53.2%, respectively in the analyses of sample FC-CCR-MW100-916. Amec Foster Wheeler J qualified the chloride and sulfate results from this sample because of the high RPDs between analytical results reported for the same sample. (J-SE)
- The RPDs between fluoride results reported in J69590-1 and J69591-1 were high in the analyses of samples FC-CCR-MW66-916 (34%), FC-CCR-MW67-916 (30%), FC-CCR-MW68-916 (52%), and FC-CCR-MW69-916 (37%). Amec Foster Wheeler J qualified the fluoride results from these samples because of the high RPDs between analytical results. (J-SE)

7.3 TOTAL DISSOLVED SOLIDS BY SM 2540C

TDS results generated by TestAmerica may be considered usable with the limitations described in Sections 7.3.1 through 7.3.5.

7.3.1 Holding Times

All samples were analyzed for TDS within the SAP-specified holding time of 7 days, with the following exception:

- Samples FC-CCR-MW7-916, FC-CCR-MW8-916, FC-CCR-MW49A-916, FC-CCR-MW60-916, FC-CCR-MW67-916, FC-CCR-MW68-916, FC-CCR-MW69-916, FC-CCR-MW72-916, and FC-CCR-MW100-916 were originally analyzed within holding time. However, the residue exceeded the method upper limit. These samples were re-analyzed at a smaller volume after the holding time had expired. Amec Foster Wheeler J qualified the TDS results from the second analysis of the samples because of the missed analytical hold time. (J-HT)

7.3.2 Laboratory Blanks

TDS was not detected in the laboratory blanks at concentrations above the reporting limit.

7.3.3 Laboratory Control Sample Accuracy and Precision

LCS and LCSD recoveries were within the laboratory-specified 90 to 110% limits and RPDs between the LCS and LCSD results were less than the laboratory-specified maximum of 10%.

7.3.4 Laboratory Duplicates

TestAmerica performed duplicate analyses on project samples FC-CCR-MW61-916 and FC-CCR-MW100-916. RPD between source and duplicate result was less than laboratory-specified maximum of 10%.

7.3.5 Data Reporting and Analytical Procedures

TestAmerica reported multiple TDS results for samples FC-CCR-MW60-916 and FC-CCR-MW100-916. When multiple results are reported for the same analyte, they are shown in Table 2A, along with a calculation of the RPD between the results. Precision values were less than 20%, or the differences between the detected concentrations were less than the RLs, indicating general agreement between results.

7.4 pH BY SM 4500B

pH results generated by TestAmerica may be considered usable with the limitations described in Sections 7.4.1 through 7.4.4.

7.4.1 Holding Times

All samples were analyzed for pH on September 16, 3 to 4 days after the method-specified 15 minute hold time had passed. Amec Foster Wheeler J qualified the pH results from these samples because of the missed hold time. (J-HT)

7.4.2 Laboratory Control Sample Accuracy

LCS recovery was within the laboratory-specified 98.5 to 101.5% limits.

7.4.3 Laboratory Duplicates

TestAmerica performed duplicate analyses on samples FC-CCR-MW7-916 and FC-CCR-MW67-916. RPDs between source and duplicate results were less than laboratory-specified maximum of 5%.

7.4.4 Data Reporting and Analytical Procedures

There were no data anomalies associated with the pH analysis of these samples.

7.5 RADIOCHEMICAL ANALYSES

It was not possible to evaluate data usability for the radiochemical analyses due to a lack of laboratory QC.

7.5.1 Analytical Sensitivity

Amec Foster Wheeler compared RLs for total radium analysis against the MCL to confirm that the RLs were sufficiently low to meet the MCL. Non-detect results were reported to RLs less than the applicable MCL.

8.0 FIELD DUPLICATES

APS collected sample FC-CCR-MW100-916 as a field duplicate of sample FC-CCR-MW60-916. Target analyte detections are summarized in Table 2B. Precision values were less than the SAP-specified maximum of 20%, or the differences between the detected concentrations were less than the RLs, with the following exception:

- The RPD between sulfate results analyzed at 200-fold dilution was high for sample FR-CCR-MW60-916 and its field duplicate, FC-CCR-MW100-916. Amec Foster Wheeler J qualified the sulfate results from the 200-fold dilution of these samples because of potential sampling or analytical imprecision. (J-FD)

9.0 SUMMARY AND CONCLUSIONS

Amec Foster Wheeler reviewed 431 data records from field samples during this validation. All of the data generated are usable and of acceptable quality with the addition of qualifiers presented in Table 3. Qualifier definitions are summarized in Section 4.0, reason codes are summarized in Section 5.0, and qualified data are summarized below.

- Amec Foster Wheeler J qualified 46 records (11%) as being estimated concentrations because of hold time exceedances, high RPDs between redundant results, results above the upper calibration limit, insufficient analytical sensitivity, and field duplicate imprecision.

No records were rejected and 100% of the data should be considered valid with the addition of the qualifiers presented in Table 3.

REFERENCES

AECOM, 2015. Sampling and Analysis Plan CCR Groundwater Monitoring Four Corners Power Plant Arizona Public Service, Farmington, New Mexico, December 2015.

EPA, 2014. EPA CLP National Functional Guidelines for Inorganic Superfund Data Review, EPA-540 R 013 001.

EPA, 2004. SW 846 Test Methods for Evaluating Solid Wastes, Update IIIB.

LIMITATIONS

This report was prepared exclusively for Arizona Public Service by Amec Foster Wheeler Environment & Infrastructure, Inc. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Amec Foster Wheeler 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, Four Corners Power Plant site only, subject to the terms and conditions of its contract with Amec Foster Wheeler. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

TABLES

TABLE 1
Field Samples Submitted to Test America Laboratories, Inc.
Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

Field Sample ID	Collection Date	Test America Sample ID	Notes
FC-CCR-MW7-916	9/13/2016	550-69590, 69591, and 69593-1	
FC-CCR-MW8-916	9/13/2016	550-69590, 69591, and 69593-2	
FC-CCR-MW49A-916	9/13/2016	550-69590, 69591, and 69593-3	
FC-CCR-MW60-916	9/13/2016	550-69590, 69591, and 69593-4	
FC-CCR-MW61-916	9/13/2016	550-69590, 69591, and 69593-5	
FC-CCR-MW62-916	9/12/2016	550-69590, 69591, and 69593-6	
FC-CCR-MW63-916	9/12/2016	550-69590, 69591, and 69593-7	
FC-CCR-MW64-916	9/12/2016	550-69590, 69591, and 69593-8	
FC-CCR-MW65-916	9/12/2016	550-69590, 69591, and 69593-9	
FC-CCR-MW66-916	9/12/2016	550-69590, 69591, and 69593-10	
FC-CCR-MW67-916	9/13/2016	550-69590, 69591, and 69593-11	
FC-CCR-MW68-916	9/13/2016	550-69590, 69591, and 69593-12	
FC-CCR-MW69-916	9/13/2016	550-69590, 69591, and 69593-13	
FC-CCR-MW70-916	9/12/2016	550-69590, 69591, and 69593-14	
FC-CCR-MW71-916	9/12/2016	550-69590, 69591, and 69593-15	
FC-CCR-MW72-916	9/13/2016	550-69590, 69591, and 69593-16	
FC-CCR-MW100-916	9/13/2016	550-69590, 69591, and 69593-17	Field duplicate of FC-CCR-MW60-916

Notes:
ID = identification

TABLE 2A
Redundant Laboratory Results
Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

Sample	Method	Analyte	Average RL	Initial Analytical Result	Second Analytical Result	RPD	Notes
FC-CCR-MW7-916	EPA 300.0	Fluoride	0.40 mg/L	0.40 U	0.40 U	NC	± RL
	EPA 200.7	Boron	0.050 mg/L	10	10	0%	
		Calcium	2.0 mg/L	440	410	7%	
FC-CCR-MW8-916	EPA 300.0	Fluoride	0.40 mg/L	0.77	0.40 U	NC	± RL
	EPA 200.7	Boron	0.050 mg/L	19	18	5%	
		Calcium	2.0 mg/L	480	430	11%	
FC-CCR-MW49A-916	EPA 300.0	Fluoride	0.40 mg/L	0.65	0.40 U	NC	± RL
	EPA 200.7	Boron	0.050 mg/L	2.50	2.40	4%	
		Calcium	2.0 mg/L	440	400	10%	
FC-CCR-MW60-916	EPA 300.0	Chloride	300 mg/L	460	440	4%	
		Fluoride	0.40 mg/L	7.2	6.2	15%	
		Sulfate	300 mg/L	5,100	5,000	2%	
	EPA 200.7	Boron	0.050 mg/L	0.0039	0.0040	3%	
		Calcium	2.0 mg/L	0.020	0.022	10%	
	SM 2540C	Total Dissolved Solids	100 mg/L	8,600	8,500	1%	
FC-CCR-MW61-916	EPA 300.0	Fluoride	0.40 mg/L	1.3	1.1	17%	
	EPA 200.7	Boron	0.050 mg/L	39	40	3%	
		Calcium	2.0 mg/L	500	480	4%	
FC-CCR-MW62-916	EPA 300.0	Fluoride	0.40 mg/L	1.5	1.3	14%	
	EPA 200.7	Boron	0.050 mg/L	2.4	2.5	4%	
		Calcium	2.0 mg/L	590	570	3%	
FC-CCR-MW63-916	EPA 300.0	Fluoride	0.40 mg/L	2.1	2.0	5%	
	EPA 200.7	Boron	0.050 mg/L	1.9	2.0	5%	
		Calcium	2.0 mg/L	560	550	2%	
FC-CCR-MW64-916	EPA 300.0	Fluoride	0.40 mg/L	1.5	1.5	0%	
	EPA 200.7	Boron	0.050 mg/L	0.63	0.67	6%	
		Calcium	2.0 mg/L	88	90	2%	
FC-CCR-MW65-916	EPA 300.0	Fluoride	0.40 mg/L	2.0	2.0	0%	
	EPA 200.7	Boron	0.050 mg/L	0.82	0.83	1%	
		Calcium	2.0 mg/L	110	110	0%	
FC-CCR-MW66-916	**EPA 300.0**	**Fluoride**	**0.40 mg/L**	**12**	**17**	**34%**	**J-SE**
	EPA 200.7	Boron	0.275 mg/L	120	110	9%	
		Calcium	2.0 mg/L	510	470	8%	
FC-CCR-MW67-916	**EPA 300.0**	**Fluoride**	**2.2 mg/L**	**23**	**17**	**30%**	**J-SE**
	EPA 200.7	Boron	0.275 mg/L	110	110	0%	
		Calcium	2.0 mg/L	540	510	6%	
FC-CCR-MW68-916	**EPA 300.0**	**Fluoride**	**0.40 mg/L**	**9.7**	**5.7**	**52%**	**J-SE**
	EPA 200.7	Boron	0.275 mg/L	120	120	0%	
		Calcium	2.0 mg/L	510	480	6%	
FC-CCR-MW69-916	**EPA 300.0**	**Fluoride**	**0.40 mg/L**	**16**	**11**	**37%**	**J-SE**
	EPA 200.7	Boron	0.275 mg/L	120	110	9%	
		Calcium	2.0 mg/L	530	500	6%	
FC-CCR-MW70-916	EPA 300.0	Fluoride	0.40 mg/L	0.40 U	0.40 U	NC	± RL
	EPA 200.7	Boron	0.275 mg/L	96	93	3%	
		Calcium	2.0 mg/L	550	500	10%	
FC-CCR-MW71-916	EPA 300.0	Fluoride	0.40 mg/L	0.40 U	0.40 U	NC	± RL
	EPA 200.7	Boron	0.050 mg/L	0.55	0.58	5%	
		Calcium	2.0 mg/L	500	460	8%	

TABLE 2A
Redundant Laboratory Results
Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

Sample	Method	Analyte	Average RL	Initial Analytical Result	Second Analytical Result	RPD	Notes
FC-CCR-MW72-916	EPA 300.0	Fluoride	0.40 mg/L	0.40 U	0.40 U	NC	± RL
	EPA 200.7	Boron	0.050 mg/L	0.22	0.24	9%	
		Calcium	2.0 mg/L	480	470	2%	
FC-CCR-MW100-916	**EPA 300.0**	**Chloride**	**300 mg/L**	**760**	**440**	**53%**	**J-SE**
		Fluoride	0.40 mg/L	6.0	6.4	6%	
		Sulfate	**300 mg/L**	**8,800**	**5,100**	**53%**	**J-SE**
	EPA 200.7	Boron	0.050 mg/L	67	65	3%	
		Calcium	2.0 mg/L	490	440	11%	
	SM 2540C	Total Dissolved Solids	100 mg/L	8,500	8,400	1%	

Notes:
mg/L = milligrams per liter
RL = reporting limit
RPD = relative percent difference

Methods:
EPA 300.0 = Ions
EPA 200.7 = Metals
SM2540C = Total Dissolved Solids
SM4500 = pH

Qualifier and Reason Code Definitions:
SE = Excessive RPD between redundant analytical results
J = The analyte was positively identified; the associated numerical value is approximate.

TABLE 2B
Field Duplicate Detections
Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

Method	Analyte	RL	Primary Sample Result	Field Duplicate Result	RPD	Notes
Samples FC-CCR-MW60-916 and FC-CCR-MW100-916						
EPA 300.0	Chloride **(1)**	400 mg/L	460	760	49%	± RL
	Chloride **(2)**	200 mg/L	440	440	0%	
	Fluoride, J69590-1	0.40 mg/L	7.2	6.0	18%	
	Fluoride, J69591-1	0.40 mg/L	6.2	6.4	3%	
	Sulfate (1)	**400 mg/L**	**5,000**	**8,800**	**55%**	**J-FD**
	Sulfate **(2)**	200 mg/L	5,100	5,100	0%	
EPA 200.7	Boron **(3)**	0.050 mg/L	66	67	2%	
	Boron **(4)**	0.050 mg/L	64	65	2%	
	Calcium **(3)**	2.0 mg/L	470	490	4%	
	Calcium **(4)**	2.0 mg/L	450	440	2%	
	Lithium	0.20 mg/L	0.76	0.77	1%	
EPA 200.8	Barium	0.0010 mg/L	0.019	0.020	5%	
	Cadmium	0.00050 mg/L	0.0021	0.0022	5%	
	Cobalt	0.0010 mg/L	0.32	0.33	3%	
	Lead	0.00050 mg/L	0.0014	0.0015	7%	
	Molybdenum	0.0010 mg/L	0.16	0.17	6%	
SM2540C	Total Dissolved Solids **(5)**	100 mg/L	8,600	8,500	1%	
	Total Dissolved Solids **(4)**	100 mg/L	8,500	8,400	1%	
SM4500	pH	1.7 SU	7.3	7.6	4%	

Notes:
mg/L = milligrams per liter
RL = reporting limit
RPD = relative percent difference
(1) = sample analyzed at 200-fold dilution on 9/22/2016
(2) = sample analyzed at 100-fold dilution on 10/13/2016
(3) = undiluted sample analyzed on 10/8/2016
(4) = undiluted sample analyzed on 10/13/2016
(5) = undiluted sample analyzed on 9/20/2016

Methods:
EPA 300.0 = Ions
EPA 200.7 = Metals
EPA 200.8 = Low Level Metals
SM2540C = Total Dissolved Solids
SM4500 = pH

Qualifier Definitions:
J = The analyte was positively identified; the associated numerical value is approximate.

Reason Codes:
FD = High field duplicate RPD. Potential analytical or sampling imprecision.

TABLE 3
Qualifiers Added During Data Validation
Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

Sample IDs	Methods	Analytes	Concentrations	Qualifiers and Reason Codes
FC-CCR-MW100-916	EPA 300.0	Chloride	440 mg/L	J HT, SE
		Chloride	760 mg/L	J SE
		Sufate	5,100 mg/L	J HT, SE
		Sufate	8,800 mg/L	J FD, SE
	SM2540C	Total Dissolved Solids	8,400 mg/L	J HT
	SM4500	pH	7.6 SU	J HT
FC-CCR-MW49A-916	EPA 200.8	Antimony	0.010 mg/L	UJ NS
	SM2540C	Total Dissolved Solids	28,000 mg/L	J HT
	SM4500	pH	7.4 SU	J HT
FC-CCR-MW60-916	EPA 300.0	Chloride	440 mg/L	J HT
		Sufate	5,100 mg/L	J HT
		Sulfate	5,000 mg/L	J FD
	SM2540C	Total Dissolved Solids	8,500 mg/L	J HT
	SM4500	pH	7.6 SU	J HT
FC-CCR-MW61-916	SM4500	pH	8.6 SU	J HT
FC-CCR-MW62-916	SM4500	pH	6.9 SU	J HT
FC-CCR-MW63-916	SM4500	pH	7.1 SU	J HT
FC-CCR-MW64-916	SM4500	pH	7.7 SU	J HT
FC-CCR-MW65-916	SM4500	pH	7.5 SU	J HT
FC-CCR-MW66-916	EPA 300.0	Fluoride, J69590	12 mg/L	J SE
		Fluoride, J69591	17 mg/L	J SE
	EPA 200.7	Boron	110 mg/L	J UC
	SM4500	pH	7.4 SU	J HT
FC-CCR-MW67-916	EPA 300.0	Fluoride, J69590	23 mg/L	J SE
		Fluoride, J69591	17 mg/L	J SE
	SM2540C	Total Dissolved Solids	16,000 mg/L	J HT
	SM4500	pH	7.3 SU	J HT
FC-CCR-MW68-916	EPA 300.0	Fluoride, J69590	9.7 mg/L	J SE
		Fluoride, J69591	5.7 mg/L	J SE
	EPA 200.7	Boron	120 mg/L	J UC
	SM2540C	Total Dissolved Solids	16,000 mg/L	J HT
	SM4500	pH	7.1 SU	J HT
FC-CCR-MW69-916	EPA 300.0	Fluoride, J69590	16 mg/L	J SE
		Fluoride, J69591	11 mg/L	J SE
	EPA 200.7	Boron	110 mg/L	J UC
	SM2540C	Total Dissolved Solids	17,000 mg/L	J HT
	SM4500	pH	7.1 SU	J HT
FC-CCR-MW70-916	EPA 200.7	Boron	93 mg/L	J UC
	SM4500	pH	7.0 SU	J HT
FC-CCR-MW71-916	SM4500	pH	7.2 SU	J HT
FC-CCR-MW72-916	SM2540C	Total Dissolved Solids	17,000 mg/L	J HT
	SM4500	pH	7.1 SU	J HT
FC-CCR-MW7-916	SM2540C	Total Dissolved Solids	10,000 mg/L	J HT
	SM4500	pH	7.3 SU	J HT

TABLE 3
Qualifiers Added During Data Validation
Four Corners Power Plant, Arizona Public Service
Farmington, New Mexico

Sample IDs	Methods	Analytes	Concentrations	Qualifiers and Reason Codes
FC-CCR-MW8-916	SM2540C	Total Dissolved Solids	15,000 mg/L	J HT
	SM4500	pH	7.2 SU	J HT

Notes:
mg/L = milligrams per liter
SU = standard units

Methods:
EPA 300.0 = Ions
EPA 200.7 = Metals
EPA 200.8 = Low Level Metals
SM2540C = Total Dissolved Solids
SM4500 = pH

Qualifier Definitions:
J = The analyte was positively identified; the associated numerical value is approximate.
UJ = The analyte was not detected above the RL. However, the RL is approximate.

Reason Codes:
FD = Field duplicate RPD exceeded established criteria
HT = Holding time exceeded
NS = Sensitivity criteria not met
SE = Excessive RPD between redundant analytical results.
UC = Result exceeds upper calibration limit.