LMS/RVT/S01012

Data Validation Package

October 2012
Alternate Water Supply System Sampling at the Riverton, Wyoming, Processing Site

February 2013

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Contents

Sampling Event Summary 1
Locations of Flushing Hydrants and Isolation Valve 3
Data Assessment Summary 5
Water Sampling Field Activities Verification Checklist 7
Laboratory Performance Assessment 9
Sampling Quality Control Assessment 18
Certification 20

Attachment 1—Assessment of Anomalous Data

Potential Outliers Report

Attachment 2—Data Presentation

Alternate Water Supply System Quality Data

Attachment 3—Trip Report

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Sampling Event Summary

Site: Riverton, Wyoming, Processing Site

Sampling Period: October 23-24, 2012

Sampling was conducted in support of semiannual flushing of the alternate water supply system (AWSS) in accordance with the *Alternate Water Supply System Flushing Plan Riverton, Wyoming* (October 2012). Four dometic tap locations and seven hydrant locations on the AWSS were sampled. Domestic tap location 0814 was not sampled because the home was vacant. Two samples were collected at five hydrant locations – one sample 5 minutes into the flush and one sample at the end of the flush as specified in the plan. Only end of flush samples were collected at hydrant locations 0820 and 0834 because of the short flushing time. One field duplicate was collected during this event from hydrant location 0820.

Monitoring at hydrant and tap locations is performed to determine the effectiveness of the flushing program in reducing the radionuclide concentrations and maintaining them at acceptable levels. The flushing program is successful when the combined radium-226 and radium-228 concentrations are below the Federal drinking water maximum contaminant level of 5 picocuries per liter (pCi/L) and the uranium concentrations at all locations are below the maximum contaminant level of 0.03 milligrams per liter (mg/L). The effectiveness of the flushing program was demonstrated, with the maximum observed combined radium-226 and radium-228 concentration of 2.5 pCi/L and maximum observed uranium concentration of 0.0001 mg/L.

Sam Campbell, Site Lead
S. M. Stoller Corporation

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Locations of Flushing Hydrants and Isolation Valve

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Riverton, Wyoming	**Date(s) of Water Sampling**	October 23–24, 2012
Date(s) of Verification	January 29, 2013	**Name of Verifier**	Stephen Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List other documents, SOPs, instructions.		Alternate Water Supply System Flushing Plan Riverton, Wyoming.
2. Were the sampling locations specified in the planning documents sampled?	Yes	Domestic tap location 0814 was not sampled because the home was vacant. Only end of flush samples were collected at hydrant locations 0820 and 0834 because of the short flushing time.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on 10-19-2012.
4. Was an operational check of the field equipment conducted daily?	Yes	Operational checks were performed on October 23-24, 2012.
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Was the category of the well documented?	NA	
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	NA	Samples were collected from domestic taps or hydrants.
Did the water level stabilize prior to sampling?		
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?		
Was the flow rate less than 500 mL/min?		
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?		

Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	NA	Samples were collected from domestic taps or hydrants.
Was one pump/tubing volume removed prior to sampling?		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from location 0820.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	NA	
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	Location ID 2415 was used for the duplicate sample.
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample chilling was not required.
20. Were water levels measured at the locations specified in the planning documents?	NA	

Laboratory Performance Assessment

General Information

Report Number (RIN):	12104911
Sample Event:	October 23–24, 2012
Project:	Riverton, Wyoming, Alternate Water Supply System Flushing
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	110385
Analysis:	Metals and Radiochemistry
Validator:	Stephen Donivan
Review Date:	December 18, 2012

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/PRO/S04325, continually updated) "Standard Practice for Validation of Laboratory Data." The procedure was applied at Level 3, Data Validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Metals: U	LMM-02	SW-846 3005A	SW-846 6020A
Radium-226	GPC-A-018	PA SOP712R14	PA SOP724R10
Radium-228	GPC-A-020	PA SOP746R8	PA SOP724R10

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1210385-1	0813	Radium-226	J	Less than the determination limit
1210385-2	0815	Radium-226	J	Less than the determination limit
1210385-2	0815	Radium-228	J	Less than the determination limit
1210385-3	0816	Radium-226	J	Less than the determination limit
1210385-3	0816	Radium-228	U	Less than the decision level
1210385-4	0818	Radium-226	J	Less than the determination limit
1210385-4	0818	Radium-228	J	Less than the determination limit
1210385-5	0818	Radium-228	J	Less than the determination limit
1210385-6	0819	Radium-228	J	Less than the determination limit
1210385-7	0819	Radium-228	J	Less than the determination limit
1210385-8	0820	Radium-228	J	Field duplicate precision

Table 2 (continued). Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1210385-10	0821	Radium-228	J	Less than the determination limit
1210385-11	0829	Radium-226	J	Less than the determination limit
1210385-11	0829	Radium-228	J	Less than the determination limit
1210385-12	0829	Radium-228	J	Less than the determination limit
1210385-13	0830	Radium-226	J	Less than the determination limit
1210385-13	0830	Radium-228	J	Less than the determination limit
1210385-14	0830	Radium-226	J	Less than the determination limit
1210385-14	0830	Radium-228	J	Less than the determination limit
1210385-15	0834	Radium-228	J	Less than the determination limit
1210385-16	0837	Radium-228	J	Less than the determination limit
1210385-17	0820 Duplicate	Radium-228	J	Less than the determination limit

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 17 water samples on October 26, 2012, accompanied by a Chain of Custody form. The Chain of Custody form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents had no errors or omissions.

Preservation and Holding Times

The sample shipment was received cool and intact with the temperature inside the iced cooler at 3.8 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses with the following exception. Sample 0820 had a pH value of 2.5 when received. The sample was acidified upon receipt to a pH value less than 2 and allowed to equilibrate prior to analysis. All analyses were performed within the required holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all metal, organic, and wet chemical analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL.

For radiochemical analytes (those measured by radiometric counting) the MDL and PQL are not applicable, and these results are evaluated using the minimum detectable concentration (MDC), Decision Level Concentration (DLC), and Determination Limit (DL). The MDC is a measure of radiochemical method performance and was calculated and reported as specified in *Quality Systems for Analytical Services*. The DLC is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, and is estimated as 3 times the one-sigma total propagated uncertainty. Results that are greater than the MDC, but less than the DLC are qualified with a "U" flag (not detected). The

DL for radiochemical results is the lowest concentration that can be reliably measured, and is defined as 3 times the MDC. Results not previously "U" qualified that are less than the DL are qualified with a "J" flag as estimated values.

The reported MDLs for all metal, organic, and wet chemical analytes, and MDCs for radiochemical analytes demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods. All calibration and laboratory spike standards were prepared from independent sources.

Method SW-846 6020, Uranium
Calibrations for uranium were performed on October 29, 2012, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in 10 verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Radium-226
Instrument calibration was performed on August 2012. Daily instrument checks met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples.

Radium-228
Instrument calibration was performed on October 2012. Daily instrument checks met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis.

Metals
All uranium method blank and calibration blank results associated with the samples were below MDL.

Radiochemistry
The radium-226 and radium-228 method blank results were below the decision level concentration.

Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Analysis

ICP interference check samples ICSA and ICSAB were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) samples are used to measure method performance in the sample matrix. Spike samples were analyzed for manganese, molybdenum, sulfate, and uranium. The MS/MSD analyses resulted in acceptable recovery and precision for all analytes.

Laboratory Replicate Analysis

Laboratory replicate sample results demonstrate acceptable laboratory precision. The relative percent difference values for the non-radiochemical sample replicates and matrix spike replicates were less than 20 percent for results that are greater than 5 times the PQL, indicating acceptable precision. The radiochemical relative error ratio (calculated using the one-sigma total propagated uncertainty) for the laboratory control sample replicates was less than three, indicating acceptable precision.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. All control sample results were acceptable.

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated when the concentration of the undiluted sample is greater than 50 times the MDL. Serial dilution data were not evaluated because all sample results were less than 50 times the MDL.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL (MDC for radiochemistry) and PQL for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

The EDD file was received on November 26, 2012. The Sample Management System EDD validation module was used to verify that the EDD files were complete and in compliance with requirements. The module compares the contents of the files to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 12104911 Lab Code: PAR Validator: Stephen Donivan Validation Date: 12/18/2012

Project: Riverton Analysis Type: ☑ Metals ☐ General Chem ☑ Rad ☐ Organics

# of Samples: 17 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	The reported detection limits are equal to or below contract requirements.
☐ Field/Trip Blanks	
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 12104911 **Lab Code:** PAR **Date Due:** 11/23/2012

Matrix: Water **Site Code:** RVT01 **Date Completed:** 11/26/2012

Analyte	Method Type	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	ICV	CCV	ICB	CCB								
Uranium	ICP/MS	10/29/2012	0.0000	0.9998	OK	OK	OK	OK	OK	104.0	101.0	106.0	4.0	102.0		110.0

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 12104911 **Lab Code:** PAR **Date Due:** 11/23/2012

Matrix: Water **Site Code:** RVT01 **Date Completed:** 11/26/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
0813	Radium-226	11/16/2012			103.0			
0815	Radium-226	11/16/2012			91.5			
0816	Radium-226	11/16/2012			91.0			
0818	Radium-226	11/16/2012			91.6			
0818	Radium-226	11/16/2012			89.6			
0819	Radium-226	11/16/2012			86.1			
0819	Radium-226	11/16/2012			87.4			
0820	Radium-226	11/16/2012			88.8			
0821	Radium-226	11/16/2012			90.0			
0821	Radium-226	11/16/2012			88.9			
0829	Radium-226	11/16/2012			85.7			
0829	Radium-226	11/16/2012			89.3			
0830	Radium-226	11/16/2012			91.5			
0830	Radium-226	11/16/2012			90.3			
0834	Radium-226	11/16/2012			93.8			
0837	Radium-226	11/16/2012			86.6			
2415	Radium-226	11/16/2012			84.4			
Blank_Spike	Radium-226	11/16/2012			90.3	113.00		
Blank_Spike_Du	Radium-226	11/16/2012			88.1	118.00		0.20
Blank	Radium-226	11/16/2012	0.0770	U	91.2			
0813	Radium-228	11/12/2012			98.3			
0815	Radium-228	11/12/2012			95.4			
0816	Radium-228	11/12/2012			96.9			
0818	Radium-228	11/12/2012			94.9			
0818	Radium-228	11/12/2012			96.7			
0819	Radium-228	11/12/2012			96.0			
0819	Radium-228	11/12/2012			93.9			
0820	Radium-228	11/12/2012			95.1			
0821	Radium-228	11/12/2012			95.9			
0821	Radium-228	11/12/2012			99.7			
0829	Radium-228	11/12/2012			98.3			
0829	Radium-228	11/12/2012			98.8			

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 12104911 **Lab Code:** PAR **Date Due:** 11/23/2012

Matrix: Water **Site Code:** RVT01 **Date Completed:** 11/26/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
0830	Radium-228	11/12/2012			97.1			
0830	Radium-228	11/12/2012			92.4			
0834	Radium-228	11/12/2012			95.9			
0837	Radium-228	11/12/2012			95.8			
2415	Radium-228	11/12/2012			95.2			
Blank_Spike	Radium-228	11/12/2012			97.3	105.00		
Blank_Spike_Du	Radium-228	11/12/2012			97.1	112.00		0.40
Blank	Radium-228	11/12/2012	0.0730	U	94.9			

Sampling Quality Control Assessment

The following information summarizes and assesses quality control for this sampling event.

Sampling Protocol

Samples were collected by filling bottles from a flowing domestic tap or hydrant.

Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. A duplicate sample was collected from location 0820. The relative percent difference values for the non-radiochemical sample replicates and matrix spike replicates were less than 20 percent for results that are greater than 5 times the PQL, indicating acceptable precision. The field duplicate radiochemical relative error ratio (calculated using the one-sigma total propagated uncertainty) for radium-228 was greater than three, indicating reduced precision. The associated sample and duplicate radium-228 results are qualified with a "J" flag as estimated values.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 12104911 Lab Code: PAR Project: Riverton Validation Date: 12/18/2012

Duplicate: 2415 Sample: 0820

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Radium-226	1.09		0.417	1	1.4		0.508	1		0.9	pCi/L
Radium-228	1.43		0.437	1	0.541		0.246	1		3.5	pCi/L
Uranium	0.11			10	0.09	B		10	NA		UG/L

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the SEEPro database reports are defined on the last page of each report. All data in this package are considered validated and available for use.

Laboratory Coordinator: Stephen Donivan 2-14-2013
Stephen Donivan

Data Validation Lead: Stephen Donivan 2-14-2013
Stephen Donivan

Attachment 1
Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

Potential outliers are measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected. Potential outliers may result from transcription errors, data-coding errors, or measurement system problems. However, outliers may also represent true extreme values of a distribution and indicate more variability in the population than was expected.

Statistical outlier tests give probabilistic evidence that an extreme value does not "fit" with the distribution of the remainder of the data and is therefore a statistical outlier. These tests should only be used to identify data points that require further investigation. The tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set.

There are three steps involved in identifying extreme values or outliers:

1. Identify extreme values that may be potential outliers by generating the Outliers Report using the Sample Management System from data in the environmental database. The application compares the new data set (in standard environmental database units) with historical data and lists the new data that fall outside the historical data range. A determination is also made if the data are normally distributed using the Shapiro-Wilk Test.
2. Apply the appropriate statistical test. Dixon's Extreme Value test is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed.
3. Scientifically review statistical outliers and decide on their disposition.

There were no potential outliers identified, and the data for this event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters
Comparison: All Historical Data
Laboratory: ALS Laboratory Group
RIN: 12104911
Report Date: 01/29/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum	Qualifiers		Historical Minimum	Qualifiers		Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RVT01	0815	N001	10/24/2012	Radium-228	0.535		J	0.889		J	0.682	U		5	3	No
RVT01	0816	N001	10/24/2012	Radium-226	0.433		J	0.718	U		0.461		J	5	4	No
RVT01	0818	N001	10/23/2012	Radium-228	0.582		J	2.31			0.63	U		12	4	No
RVT01	0820	N002	10/23/2012	Radium-228	0.541		J	7.93			0.594	U		10	3	No
RVT01	0829	N002	10/23/2012	Radium-228	0.47		J	0.907		J	0.587	U		8	5	No
RVT01	0834	N001	10/23/2012	Radium-226	1.18			0.562		J	0.252	U		5	4	No

STATISTICAL TESTS:
The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test
Outliers are identified using Dixon's Test when there are 25 or fewer data points.
Outliers are identified using Rosner's Test when there are 26 or more data points.
See Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S, February 2006.

Attachment 2
Data Presentation

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Alternate Water Supply System
Quality Data

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General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0813 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/24/2012	N001	0.48			#		
Dissolved Oxygen	mg/L	10/24/2012	N001	5.25			#		
Oxidation Reduction Potential	mV	10/24/2012	N001	143			#		
pH	s.u.	10/24/2012	N001	7.32			#		
Radium-226	pCi/L	10/24/2012	N001	0.456		J	#	0.18	0.231
Radium-228	pCi/L	10/24/2012	N001	0.32	U		#	0.32	0.208
Specific Conductance	umhos /cm	10/24/2012	N001	684			#		
Temperature	C	10/24/2012	N001	15.01			#		
Turbidity	NTU	10/24/2012	N001	0.87			#		
Uranium	mg/L	10/24/2012	N001	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0815 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/24/2012	N001	0.43			#		
Dissolved Oxygen	mg/L	10/24/2012	N001	5.83			#		
Oxidation Reduction Potential	mV	10/24/2012	N001	348.4			#		
pH	s.u.	10/24/2012	N001	8.53			#		
Radium-226	pCi/L	10/24/2012	N001	0.385		J	#	0.2	0.223
Radium-228	pCi/L	10/24/2012	N001	0.535		J	#	0.33	0.252
Specific Conductance	umhos /cm	10/24/2012	N001	638			#		
Temperature	C	10/24/2012	N001	13.8			#		
Turbidity	NTU	10/24/2012	N001	0.27			#		
Uranium	mg/L	10/24/2012	N001	0.00009	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0816 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/24/2012	N001	0.42			#		
Dissolved Oxygen	mg/L	10/24/2012	N001	3.33			#		
Oxidation Reduction Potential	mV	10/24/2012	N001	351.4			#		
pH	s.u.	10/24/2012	N001	8.7			#		
Radium-226	pCi/L	10/24/2012	N001	0.433		J	#	0.2	0.237
Radium-228	pCi/L	10/24/2012	N001	0.338		U	#	0.34	0.226
Specific Conductance	umhos /cm	10/24/2012	N001	651			#		
Temperature	C	10/24/2012	N001	16.23			#		
Turbidity	NTU	10/24/2012	N001	0.28			#		
Uranium	mg/L	10/24/2012	N001	0.00008	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0818 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/23/2012	N001	0.03			#		
Chlorine, Total Residual	mg/L	10/23/2012	N002	0.51			#		
Dissolved Oxygen	mg/L	10/23/2012	N001	5.37			#		
Dissolved Oxygen	mg/L	10/23/2012	N002	5.77			#		
Oxidation Reduction Potential	mV	10/23/2012	N001	354			#		
Oxidation Reduction Potential	mV	10/23/2012	N002	319			#		
pH	s.u.	10/23/2012	N001	8.68			#		
pH	s.u.	10/23/2012	N002	8.63			#		
Radium-226	pCi/L	10/23/2012	N001	0.961			#	0.18	0.379
Radium-226	pCi/L	10/23/2012	N002	0.593		J	#	0.21	0.285
Radium-228	pCi/L	10/23/2012	N001	0.582		J	#	0.31	0.249
Radium-228	pCi/L	10/23/2012	N002	0.771		J	#	0.34	0.295
Specific Conductance	umhos /cm	10/23/2012	N001	629			#		
Specific Conductance	umhos /cm	10/23/2012	N002	650			#		
Temperature	C	10/23/2012	N001	14.25			#		
Temperature	C	10/23/2012	N002	13.16			#		
Turbidity	NTU	10/23/2012	N001	1.49			#		
Turbidity	NTU	10/23/2012	N002	0.75			#		
Uranium	mg/L	10/23/2012	N001	0.00011			#	0.000029	
Uranium	mg/L	10/23/2012	N002	0.00009	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0819 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/23/2012	N001	0.34			#		
Chlorine, Total Residual	mg/L	10/23/2012	N002	0.53			#		
Dissolved Oxygen	mg/L	10/23/2012	N001	6.54			#		
Dissolved Oxygen	mg/L	10/23/2012	N002	5.86			#		
Oxidation Reduction Potential	mV	10/23/2012	N001	353.6			#		
Oxidation Reduction Potential	mV	10/23/2012	N002	379.4			#		
pH	s.u.	10/23/2012	N001	8.5			#		
pH	s.u.	10/23/2012	N002	8.65			#		
Radium-226	pCi/L	10/23/2012	N001	1.03			#	0.2	0.404
Radium-226	pCi/L	10/23/2012	N002	1.58			#	0.2	0.55
Radium-228	pCi/L	10/23/2012	N001	0.913		J	#	0.34	0.321
Radium-228	pCi/L	10/23/2012	N002	0.693		J	#	0.32	0.27
Specific Conductance	umhos /cm	10/23/2012	N001	643			#		
Specific Conductance	umhos /cm	10/23/2012	N002	647			#		
Temperature	C	10/23/2012	N001	13.57			#		
Temperature	C	10/23/2012	N002	14.37			#		
Turbidity	NTU	10/23/2012	N001	0.97			#		
Turbidity	NTU	10/23/2012	N002	1.16			#		
Uranium	mg/L	10/23/2012	N001	0.00009	B		#	0.000029	
Uranium	mg/L	10/23/2012	N002	0.00009	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0820 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/23/2012	N001	0.66			#		
Dissolved Oxygen	mg/L	10/23/2012	N001	6.06			#		
Oxidation Reduction Potential	mV	10/23/2012	N001	461.3			#		
pH	s.u.	10/23/2012	N001	8.61			#		
Radium-226	pCi/L	10/23/2012	N001	1.09			#	0.2	0.417
Radium-226	pCi/L	10/23/2012	N002	1.4			#	0.21	0.508
Radium-228	pCi/L	10/23/2012	N001	1.43		J	#	0.39	0.437
Radium-228	pCi/L	10/23/2012	N002	0.541		J	#	0.31	0.246
Specific Conductance	umhos /cm	10/23/2012	N001	644			#		
Temperature	C	10/23/2012	N001	12.94			#		
Turbidity	NTU	10/23/2012	N001	1.8			#		
Uranium	mg/L	10/23/2012	N001	0.00011			#	0.000029	
Uranium	mg/L	10/23/2012	N002	0.00009	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0821 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/23/2012	N001	0.29			#		
Chlorine, Total Residual	mg/L	10/23/2012	N002	0.38			#		
Dissolved Oxygen	mg/L	10/23/2012	N001	6			#		
Dissolved Oxygen	mg/L	10/23/2012	N002	6.54			#		
Oxidation Reduction Potential	mV	10/23/2012	N001	448.8			#		
Oxidation Reduction Potential	mV	10/23/2012	N002	453			#		
pH	s.u.	10/23/2012	N001	8.35			#		
pH	s.u.	10/23/2012	N002	8.51			#		
Radium-226	pCi/L	10/23/2012	N001	0.726			#	0.2	0.323
Radium-226	pCi/L	10/23/2012	N002	0.91			#	0.2	0.372
Radium-228	pCi/L	10/23/2012	N001	0.931		J	#	0.38	0.339
Radium-228	pCi/L	10/23/2012	N002	1.33			#	0.38	0.413
Specific Conductance	umhos /cm	10/23/2012	N001	651			#		
Specific Conductance	umhos /cm	10/23/2012	N002	667			#		
Temperature	C	10/23/2012	N001	13.71			#		
Temperature	C	10/23/2012	N002	13.52			#		
Turbidity	NTU	10/23/2012	N001	1.43			#		
Turbidity	NTU	10/23/2012	N002	1.32			#		
Uranium	mg/L	10/23/2012	N001	0.00008	B		#	0.000029	
Uranium	mg/L	10/23/2012	N002	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0829 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/23/2012	N001	0.21			#		
Chlorine, Total Residual	mg/L	10/23/2012	N002	0.29			#		
Dissolved Oxygen	mg/L	10/23/2012	N001	5.44			#		
Dissolved Oxygen	mg/L	10/23/2012	N002	4.39			#		
Oxidation Reduction Potential	mV	10/23/2012	N001	126.6			#		
Oxidation Reduction Potential	mV	10/23/2012	N002	225.1			#		
pH	s.u.	10/23/2012	N001	8.05			#		
pH	s.u.	10/23/2012	N002	8.51			#		
Radium-226	pCi/L	10/23/2012	N001	0.693			#	0.18	0.305
Radium-226	pCi/L	10/23/2012	N002	0.469		J	#	0.22	0.257
Radium-228	pCi/L	10/23/2012	N001	0.765		J	#	0.33	0.289
Radium-228	pCi/L	10/23/2012	N002	0.47		J	#	0.38	0.265
Specific Conductance	umhos /cm	10/23/2012	N001	663			#		
Specific Conductance	umhos /cm	10/23/2012	N002	655			#		
Temperature	C	10/23/2012	N001	16.41			#		
Temperature	C	10/23/2012	N002	14.13			#		
Turbidity	NTU	10/23/2012	N001	0.48			#		
Turbidity	NTU	10/23/2012	N002	0.34			#		
Uranium	mg/L	10/23/2012	N001	0.00009	B		#	0.000029	
Uranium	mg/L	10/23/2012	N002	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0830 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/23/2012	N001	0.38			#		
Chlorine, Total Residual	mg/L	10/23/2012	N002	0.31			#		
Dissolved Oxygen	mg/L	10/23/2012	N001	7.07			#		
Dissolved Oxygen	mg/L	10/23/2012	N002	5.08			#		
Oxidation Reduction Potential	mV	10/23/2012	N001	181.2			#		
Oxidation Reduction Potential	mV	10/23/2012	N002	332.1			#		
pH	s.u.	10/23/2012	N001	8.48			#		
pH	s.u.	10/23/2012	N002	8.56			#		
Radium-226	pCi/L	10/23/2012	N001	0.569		J	#	0.2	0.275
Radium-226	pCi/L	10/23/2012	N002	0.545		J	#	0.19	0.267
Radium-228	pCi/L	10/23/2012	N001	0.871		J	#	0.39	0.336
Radium-228	pCi/L	10/23/2012	N002	0.855		J	#	0.35	0.314
Specific Conductance	umhos /cm	10/23/2012	N001	650			#		
Specific Conductance	umhos /cm	10/23/2012	N002	652			#		
Temperature	C	10/23/2012	N001	13.05			#		
Temperature	C	10/23/2012	N002	13.75			#		
Turbidity	NTU	10/23/2012	N001	0.31			#		
Turbidity	NTU	10/23/2012	N002	0.86			#		
Uranium	mg/L	10/23/2012	N001	0.00008	B		#	0.000029	
Uranium	mg/L	10/23/2012	N002	0.00008	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0834 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/23/2012	N001	0.53			#		
Dissolved Oxygen	mg/L	10/23/2012	N001	8.04			#		
Oxidation Reduction Potential	mV	10/23/2012	N001	488.8			#		
pH	s.u.	10/23/2012	N001	8.68			#		
Radium-226	pCi/L	10/23/2012	N001	1.18			#	0.19	0.433
Radium-228	pCi/L	10/23/2012	N001	0.812		J	#	0.37	0.315
Specific Conductance	umhos /cm	10/23/2012	N001	642			#		
Temperature	C	10/23/2012	N001	13.56			#		
Turbidity	NTU	10/23/2012	N001	1.36			#		
Uranium	mg/L	10/23/2012	N001	0.00008	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 01/29/2013
Location: 0837 DOMESTIC SUPPLY Domestic System, Tap Location

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Chlorine, Total Residual	mg/L	10/24/2012	N001	0.51			#		
Dissolved Oxygen	mg/L	10/24/2012	N001	6.96			#		
Oxidation Reduction Potential	mV	10/24/2012	N001	355.1			#		
pH	s.u.	10/24/2012	N001	8.22			#		
Radium-226	pCi/L	10/24/2012	N001	1.37			#	0.21	0.498
Radium-228	pCi/L	10/24/2012	N001	0.754		J	#	0.37	0.303
Specific Conductance	umhos /cm	10/24/2012	N001	646			#		
Temperature	C	10/24/2012	N001	11.23			#		
Turbidity	NTU	10/24/2012	N001	0.62			#		
Uranium	mg/L	10/24/2012	N001	0.00009	B		#	0.000029	

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

*	Replicate analysis not within control limits.
>	Result above upper detection limit.
A	TIC is a suspected aldol-condensation product.
B	Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
C	Pesticide result confirmed by GC-MS.
D	Analyte determined in diluted sample.
E	Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
H	Holding time expired, value suspect.
I	Increased detection limit due to required dilution.
J	Estimated
N	Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
P	> 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
U	Analytical result below detection limit.
W	Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
X,Y,Z	Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

F	Low flow sampling method used.	G	Possible grout contamination, pH > 9.	J	Estimated value.
L	Less than 3 bore volumes purged prior to sampling.	Q	Qualitative result due to sampling technique.	R	Unusable result.
U	Parameter analyzed for but was not detected.	X	Location is undefined.		

QA QUALIFIER:

#	Validated according to quality assurance guidelines.

Attachment 3
Trip Report

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Stoller
Grand Junction Office

established 1959

Memorandum

Control Number N/A

DATE: October 30, 2012

TO: Distribution

FROM: Sam Campbell

SUBJECT: AWSS Flushing Trip Report

Site: Riverton, Wyoming, Processing Site

Dates of Sampling Event: October 23 and October 24, 2012

Team Members: David Atkinson and Sam Campbell.

Number of Locations Sampled: Sampling was conducted in support of semiannual flushing of the alternate water supply system (AWSS) in accordance with the *Alternate Water Supply System Flushing Plan Riverton, Wyoming.* Four domestic tap locations and seven hydrant locations on the AWSS were sampled. Two samples were collected at five hydrant locations – one sample 5 minutes into the flush and one sample at the end of the flush as specified in the plan. Only end of flush samples were collected at hydrant locations 0820 and 0834 because of the short flushing time.

Locations Not Sampled/Reason: Domestic tap location 0814 was not sampled because the home was vacant.

Location Specific Information: The hydrant at the 789 truck stop/casino was flushed during this event. This location should be included in the flushing program because it is a component of the AWSS. A sample was not collected at this location because of limited bottles; however, the Wind River Environmental Quality Commission collected samples at this location. The line feeding this portion of the system is 8-inch diameter pipe.

Field Variance: None.

Quality Control Sample Cross Reference: One field duplicate was collected from hydrant location 0820; the false ID assigned to the field duplicate was 2415.

Requisition Numbers Assigned: All samples were assigned to requisition index number (RIN) 12104911, and were shipped to the ALS Laboratory Group on October 25, 2012.

Water Level Measurements: None.

Well Inspection Summary: NA

Equipment: All field instrumentation functioned properly with no issues.

Stakeholder/Regulatory: Personnel from the Great Plains Utility Organization (Mike Quiver and Jerome Whiteplume) conducted the flushing activities. Split samples were collected at selected locations by WREQC personnel (Travis Shakespeare). Other visitors present during a portion of the flushing activities included personnel from the Tribal Engineer's Office (Travis Brockie and John Arneach), WREQC (Dean Goggles, Steve Babits, and Ryan Ortiz), and the Great Plains Utility Organization (Pat Moss).

Institutional Controls: NA

Access Issues: Access to hydrant locations and contacts with homeowners were made by the Great Plains Utility Organization.

Flushing Data:

ID	Flush Time (minutes)	Total Volume (gal)	Flow Rate (gal/min)
0818	42	20,800	495
0819	77	43,200	561
0820	6.5	3,200	492
0821	33.6	14,000	417
0829	41.5	20,400	492
0830	70	39,600	566
0834	2.13	1,000	469

Corrective Action Required/Taken: Flushing and sampling of the hydrant at the 789 truck stop/casino needs to be added to the flushing plan. Also, a note needs to be added to the flushing plan that only one sample should be collected from hydrant 0820 because of the short flush time.

(SEC/LB)

cc: (electronic)
April Gil, DOE
Bill Dam, USGS
Sam Campbell, Stoller
Clay Carpenter, Stoller
Steve Donivan, Stoller
Ken Karp, Stoller
Judy Miller, Stoller
EDD Delivery
rc-grand.juction
RVT 410.02(A)

Data Validation Packages for the Riverton, Wyoming, Processing Site, October and December 2012

The U.S. Department of Energy (DOE) has prepared Data Validation Packages containing the monitoring data generated from the alternate water supply system sampling event (October 2012) and the groundwater and surface water sampling event (December 2012) at the Riverton, Wyoming, Processing Site. These packages include worksheets and reports that document the sampling activities and validation procedures conducted. **At your request, you are receiving hard copies of these reports.**

The reports are also available for your review on the Internet at the DOE Office of Legacy Management (LM) website **www.lm.doe.gov**. From the LM website home page, select the Riverton Site from the drop-down list. The reports will be available on the Riverton Processing Site page of the LM website under Site Documents and Links.