

WM-00060

Data Validation Package

March 2013

Groundwater and Surface Water
Sampling at the Riverton, Wyoming,
Processing Site

June 2013



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

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Sampling Event Summary

Site: Riverton, Wyoming, Processing Site

Sampling Period: March 26-28, 2013

This quarterly event comprised sampling 18 monitoring wells, 9 surface water locations, and 8 domestic wells at the Riverton, Wyoming, Processing Site. Sampling and analyses were conducted as specified in the *Sampling and Analysis Plan for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated). Water levels were measured at all sampled monitoring wells and 15 additional monitoring wells that were not sampled.

Sampling was also 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* (January 2013). Four domestic tap locations and eight hydrant locations on the AWSS were sampled. Domestic tap location 0814 was not sampled because the home was vacant. Two samples were collected at six 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 0834 and 0843 because of the short flushing time.

Monitoring at hydrant and tap locations is performed to determine the effectiveness of the flushing program in reducing the naturally occurring radionuclide concentrations and maintaining them at acceptable levels. The flushing program is considered successful when 1) 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 2) the uranium concentrations at all locations are below the maximum contaminant level of 0.03 milligram per liter (mg/L). The effectiveness of the flushing program was demonstrated, with the maximum observed combined radium-226 and radium-228 concentration of 3.09 pCi/L and maximum observed uranium concentration of 0.0001 mg/L.

Concentrations of molybdenum and uranium in samples collected from semi-confined aquifer monitoring wells were below their respective U.S. Environmental Protection Agency (EPA) (Title 40 *Code of Federal Regulations* [CFR] Part 192) groundwater standard.

The EPA groundwater standards for molybdenum and uranium were exceeded in samples collected from surficial aquifer monitoring wells listed in Table 1. Time-concentration graphs are included in the Data Presentation section.

Table 1. Riverton Wells with Samples that Equaled or Exceeded EPA Groundwater Standards in March 2013

Analyte	Standard ^a	Location	Concentration in mg/L
Molybdenum	0.1	0707	0.88
		0716	0.12
		0722R	0.11
		0789	0.64
Uranium	0.044	0707	0.79
		0716	0.25
		0718	0.14
		0722R	0.53
		0789	1.9
		0826	0.044

^a Standards are listed in 40 CFR 192.02 Table 1 to Subpart A.
mg/L = milligrams per liter

Results from domestic wells (Table 2) did not indicate any impacts from the Riverton site. Concentrations of molybdenum in samples collected from domestic wells were two orders of magnitude below the EPA groundwater standard, and uranium concentrations in samples collected from domestic wells were one to three orders of magnitude below the drinking water standard.

Table 2. Concentrations of Molybdenum and Uranium in Samples from Domestic Wells

Analyte	Standard ^a	Location	Concentration in mg/L
Molybdenum	0.1	0405	0.005
		0422	0.002
		0430	0.002
		0436	0.003
		0460	0.003
		0828	0.003
		0841	0.004
		0842	0.003
Uranium	0.03	0405	ND
		0422	0.003
		0430	0.00003
		0436	0.00004
		0460	0.00005
		0828	0.00006
		0841	0.0009
		0842	0.0004

^a Standards are listed in 40 CFR 192.02 Table 1 to Subpart A (molybdenum) and EPA's National Primary Drinking Water Regulations (uranium).
mg/L = milligrams per liter
ND = not detected

Surface water uranium results were compared to statistical benchmark values derived using historical data from the Little Wind River location 0794, which is located upstream of the site and represents background conditions. As shown in Table 3, the benchmark value was exceeded only in the oxbow lake (0747), which was formed by a shift in the river path in 1994. Hydraulic and water quality data indicate that the oxbow lake is fed by the discharge of contaminated groundwater; therefore, elevated concentrations are expected. At the time of this sampling event, water was not flowing from the river into the lake. All other surface water locations had uranium concentrations below the benchmark value, which indicates minimal site-related impact on the water quality of the Little Wind River and of the other surface water features. Time-concentration graphs of molybdenum and uranium results at all surface water locations are included in the Data Presentation section.


Table 3. Comparison of Surface Water Concentrations (March 2013) to Benchmark

Location		Uranium Concentration (mg/L)
Benchmark		0.010
0794	Little Wind River, Benchmark Location	0.0069
0796	Little Wind River	0.0066
0811	Little Wind River	0.0075
0812	Little Wind River	0.0099
0747	Oxbow Lake	0.12
0810	Constructed Wetlands	0.0056
0822	West Side Irrigation Ditch	0.0051
0823	Gravel Pit Pond	0.0070
0749	Sulfuric acid plant ditch	0.0024

mg/L = milligrams per liter

The sample collected at the ditch that discharges from the Chemtrade sulfuric acid plant (0749) continues to have elevated concentrations of sulfate (1,800 mg/L). The elevated sulfate concentration in the sulfuric acid plant effluent has affected the sulfate concentration downstream in the west side irrigation ditch (1,400 mg/L at location 0822).

Water samples from location 0822 (west side irrigation ditch) were analyzed for radium-226 and radium-228 in response to potentially elevated concentrations of these constituents in the sediments within the ditch. The radium-226 and radium-228 concentrations were slightly above the respective Decision Level Concentrations (DLC) with a combined 226+228 concentration of 1.1 pCi/L. Historically, the combined radium concentration at this location has been low, averaging 1.1 pCi/L, indicating no impact to water quality in the ditch.



 Sam Campbell
 Site Lead, S.M. Stoller Corporation

7/1/2013

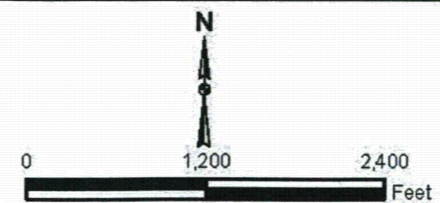
 Date

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LEGEND

- WELL TO BE SAMPLED
- WELL TO BE SAMPLED - WATER LEVEL ONLY
- FLUSHING LOCATION
- SURFACE LOCATION TO BE SAMPLED
- - - SITE BOUNDARY



U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AC02-07LW00200
Planned Sampling Map Riverton, WY, Processing Site March 2013	
DATE PREPARED: July 1, 2013	FILENAME: S0991300

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Riverton, Wyoming, Processing Site, Sample Locations

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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	March 26-28, 2013
Date(s) of Verification	June 18, 2013	Name of Verifier	Gretchen Baer

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List any Program Directives or other documents, SOPs, instructions.	Yes	Work Order letter dated March 6, 2013, and 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 0834 and 0843 because of the short flushing time.
3. Were calibrations conducted as specified in the above-named documents?	Yes	Pre-trip calibrations were performed on March 25, 2013.
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	Yes	Yes
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Were wells categorized correctly?	Yes	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	

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?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Duplicate samples were collected from locations 0460, 0707, and 0837.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	Yes	
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were the true identities of the QC samples documented?	Yes	
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	Additional filtered samples were collected for iron analysis at monitoring wells 0707, 0710, 0716, and 0789 per DOE request.
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	Water levels were measured at all sampled monitoring wells and 15 additional monitoring wells.

Laboratory Performance Assessment

General Information

Report Number (RIN): 13035189
 Sample Event: March 26-28, 2013
 Site(s): Riverton, Wyoming
 Laboratory: ALS Laboratory Group, Fort Collins, Colorado
 Work Order No.: 1304050
 Analysis: Metals, Wet Chemistry, and Radiochemistry
 Validator: Gretchen Baer
 Review Date: June 18, 2013

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/POL/S04325, continually updated) "Standard Practice for Validation of Environmental 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 4.

Table 4. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Iron, Manganese	LMM-01	SW-846 3005A	SW-846 6010B
Molybdenum, Uranium	LMM-02	SW-846 3005A	SW-846 6020A
Radium-226	GPC-A-018	PA SOP712	PA SOP724
Radium-228	GPC-A-020	PA SOP749	PA SOP724
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056

Data Qualifier Summary

Analytical results were qualified as listed in Table 5. Refer to the sections below for an explanation of the data qualifiers applied.

Table 5. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1304050-1	0405	Sulfate	J	CCV frequency not compliant
1304050-2	0422	Manganese	U	Less than 5 times the calibration blank
1304050-2	0422	Sulfate	J	CCV frequency not compliant
1304050-3	0430	Sulfate	J	CCV frequency not compliant
1304050-4	0436	Sulfate	J	CCV frequency not compliant
1304050-5	0460	Sulfate	J	CCV frequency not compliant
1304050-10	0710	Iron	J	Reporting limit verification > 130%
1304050-12	0716	Iron	J	Reporting limit verification > 130%
1304050-27	0789	Iron	J	Reporting limit verification > 130%
1304050-33	0813	Radium-226	J	Less than the determination limit

Table 5 (continued). Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1304050-33	0813	Radium-228	J	Less than the determination limit
1304050-34	0815	Radium-228	J	Less than the determination limit
1304050-35	0816	Radium-226	J	Less than the determination limit
1304050-35	0816	Radium-228	J	Less than the determination limit
1304050-36	0818	Radium-228	J	Less than the determination limit
1304050-37	0818	Radium-228	J	Less than the determination limit
1304050-39	0819	Radium-228	J	Less than the determination limit
1304050-41	0820	Radium-228	U	Less than the decision level
1304050-45	0823	Sulfate	J	Exceeded holding time
1304050-51	0830	Radium-228	J	Less than the determination limit
1304050-52	0830	Radium-228	J	Less than the determination limit
1304050-53	0834	Radium-228	J	Less than the determination limit
1304050-54	0837	Radium-226	J	Less than the determination limit
1304050-54	0837	Radium-228	J	Less than the determination limit
1304050-57	0843	Radium-228	J	Less than the determination limit
1304050-60	Equipment Blank	Sulfate	J	Exceeded holding time

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 61 water samples on April 3, 2013, accompanied by a Chain of Custody (COC) form. The COC 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 with the following exception. The laboratory noted that a bottle collected at location 0834 was mislabeled with an incorrect ticket number; the laboratory corrected the error and proceeded with analysis.

Preservation and Holding Times

The sample shipment was received cool and intact with the temperature inside the iced cooler at 0.8 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses with one exception. A metals bottle for location 0707 was received unpreserved and was acidified by the laboratory upon receipt. No data qualification or further corrective action is required. All samples were analyzed within the applicable holding times with two exceptions. Due to laboratory error, two samples exceeded the 28-day holding time for sulfate analysis. The associated results are qualified with a "J" flag (estimated).

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all metal 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 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 6010, Iron, Manganese

Calibrations for iron and manganese were performed on April 25 and 26, 2013, 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 or only slightly above 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency with all calibration checks meeting 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, with one exception. The iron check results were above the acceptance range. Results less than 5 times the PQL and above the MDL are qualified with a "J" flag (estimated).

Method SW-846 6020, Molybdenum, Uranium

Calibrations for molybdenum and uranium were performed on April 26, 2013, 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 with all calibration checks meeting 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.

Method SW-846 9056, Sulfate

The calibration for sulfate was performed using five calibration standards on April 3, 2013. The calibration curve correlation coefficient value was greater than 0.995 and the absolute value of the intercept was less than 3 times the MDL. Initial and continuing calibration verification checks were not made at the required frequency. All results not bracketed by a continuing calibration verification (CCV) sample are qualified with a "J" flag as estimated values. All calibration checks met the acceptance criteria.

Radium-226

Instrument calibration was performed in December 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 in 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 and Wet Chemistry

All method blank and calibration blank results associated with the samples were below the PQLs for all analytes. All method, initial calibration, and continuing calibration blank results associated with the samples were below the PQLs with the exception of some blank results for sulfate. The samples associated with these blanks had sulfate concentrations greater than 10 times the blank so no further qualification is necessary. In cases where a blank concentration exceeds the MDL, the associated sample results are qualified with a "U" flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

Radiochemistry

The radium-226 and radium-228 method blank results were below the DLC.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples 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. The spike recoveries met the acceptance criteria for all analytes evaluated.

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. The serial dilution results met the acceptance criteria.

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.

Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. All peak integrations were satisfactory.

Electronic Data Deliverable (EDD) File

A revised EDD file arrived on June 24, 2013. This EDD file included corrections made by the laboratory to the sulfate results. 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: 13035189 Lab Code: PAR Validator: Gretchen Baer Validation Date: 6/10/2013
Project: Riverton Analysis Type: Metals General Chem Rad Organics
of Samples: 61 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
- Detection Limits
- Field/Trip Blanks
- Field Duplicates

There are 2 holding time failures.

The reported detection limits are equal to or below contract requirements.

There were 2 trip/equipment blanks evaluated.

There were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM

RIN: 13035189 Lab Code: PAR

Non-Compliance Report: Holding Times

Project: Riverton

Validation Date: 6/10/2013

Ticket	Location	Lab Sample ID	Method Code	Holding Times			Criteria			Reported Dates		
				Collection to Preparation	Preparation to Analysis	Collection to Analysis	Collection to Preparation	Preparation to Analysis	Collection to Analysis	Collection Date	Preparation Date	Analysis Date
LEX 030	0823	1304050-45	MIS-A-044			34			28	03/27/2013	04/30/2013	04/30/2013
LEX 041	2433	1304050-60	MIS-A-044			33			28	03/28/2013	04/30/2013	04/30/2013

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 13035189

Lab Code: PAR

Date Due: 5/1/2013

Matrix: Water

Site Code: RVT01

Date Completed: 4/30/2013

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
SULFATE	04/03/2013	0.600	0.9998								
SULFATE	04/23/2013			OK	OK	OK	100.00				
SULFATE	04/24/2013			OK	OK	OK	93.00				
SULFATE	04/24/2013			OK	OK	OK	95.00				
SULFATE	04/30/2013			OK	OK	OK	96.00	88.0	93.0	5.00	

SAMPLE MANAGEMENT SYSTEM Metals Data Validation Worksheet

RIN: 13035189

Lab Code: PAR

Date Due: 5/1/2013

Matrix: Water

Site Code: RVT01

Date Completed: 4/30/2013

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	CCV	CCB								
Iron	ICP/ES	04/25/2013	13.0000	0.9991	OK	OK	OK	101.0				103.0		134.0
Iron	ICP/ES	04/25/2013										105.0		140.0
Iron	ICP/ES	04/25/2013										106.0		134.0
Manganese	ICP/ES	04/26/2013	-1.4800	1.0000	OK	OK	OK	106.0	99.0	96.0	3.0	92.0		109.0
Manganese	ICP/ES	04/26/2013			OK	OK	OK	108.0	104.0	99.0	4.0	91.0	0.0	108.0
Manganese	ICP/ES	04/25/2013	-0.3600	1.0000	OK	OK	OK	105.0	103.0	105.0	1.0	98.0	4.0	112.0
Manganese	ICP/ES	04/25/2013										95.0		108.0
Manganese	ICP/ES	04/25/2013										97.0		109.0
Manganese	ICP/ES	04/25/2013										97.0		105.0
Molybdenum	ICP/MS	04/26/2013			OK	OK	OK	95.0	96.0	101.0	6.0	97.0		99.0
Molybdenum	ICP/MS	04/26/2013			OK	OK	OK	95.0	98.0	96.0	2.0			
Molybdenum	ICP/MS	04/26/2013	-0.0010	1.0000	OK	OK	OK	99.0	101.0	100.0	1.0			
Uranium	ICP/MS	04/26/2013			OK	OK	OK	100.0	104.0	104.0	0.0	105.0	8.0	100.0
Uranium	ICP/MS	04/26/2013			OK	OK	OK	99.0	101.0	99.0	1.0		9.0	
Uranium	ICP/MS	04/26/2013	0.0000	1.0000	OK	OK	OK	100.0	99.0	97.0	2.0			
Uranium	ICP/MS	04/26/2013			OK	OK	OK	97.0	94.0	102.0	5.0			

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 13035189 Lab Code: PAR Date Due: 5/1/2013
 Matrix: Water Site Code: RVT01 Date Completed: 4/30/2013

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
0813	Radium-226	04/25/2013			104.0			
0813	Radium-228	04/11/2013			94.7			
0815	Radium-226	04/25/2013			101.0			
0815	Radium-228	04/11/2013			94.2			
0816	Radium-226	04/25/2013			88.3			
0816	Radium-228	04/15/2013			94.0			
0818	Radium-226	04/25/2013			102.0			
0818	Radium-226	04/25/2013			100.0			
0818	Radium-228	04/15/2013			97.0			
0818	Radium-228	04/15/2013			96.1			
0819	Radium-226	04/25/2013			97.6			
0819	Radium-226	04/25/2013			101.0			
0819	Radium-228	04/15/2013			95.5			
0819	Radium-228	04/15/2013			92.9			
0820	Radium-226	04/25/2013			102.0			
0820	Radium-226	04/25/2013			97.6			
0820	Radium-228	04/15/2013			95.7			
0820	Radium-228	04/15/2013			96.0			
0821	Radium-226	04/25/2013			97.9			
0821	Radium-226	04/25/2013			99.1			
0821	Radium-228	04/15/2013			95.2			
0821	Radium-228	04/15/2013			94.2			
0822	Radium-226	04/25/2013			94.4			
0822	Radium-228	04/15/2013			92.2			
0829	Radium-226	04/25/2013			96.6			
0829	Radium-226	04/25/2013			95.0			
0829	Radium-228	04/15/2013			93.0			
0829	Radium-228	04/15/2013			96.4			
0830	Radium-226	04/25/2013			88.7			
0830	Radium-226	04/25/2013			96.6			
0830	Radium-228	04/15/2013			91.3			
0830	Radium-228	04/26/2013			97.7			

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 13035189 Lab Code: PAR Date Due: 5/1/2013
 Matrix: Water Site Code: RVT01 Date Completed: 4/30/2013

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
0834	Radium-226	04/25/2013			95.8			
0834	Radium-228	04/24/2013			103.0			
0837	Radium-226	04/25/2013			95.8			
0837	Radium-228	04/24/2013			103.0			
0843	Radium-226	04/25/2013			93.8			
0843	Radium-228	04/24/2013			104.0			
2469	Radium-226	04/25/2013			97.3			
2469	Radium-228	04/24/2013			103.0			
Blank	Radium-226	04/25/2013	0.0743	U	94.4			
Blank	Radium-228	04/11/2013	0.0270	U	96.7			
Blank	Radium-228	04/15/2013	0.0391	U	97.3			
Blank	Radium-228	04/24/2013	-0.0031	U	103.0			
Blank	Radium-228	04/26/2013	0.2660	U	103.0			
Blank_Spike	Radium-226	04/25/2013			96.0	103.00		
Blank_Spike	Radium-228	04/11/2013			97.1	107.00		
Blank_Spike	Radium-228	04/15/2013			98.0	110.00		
Blank_Spike	Radium-228	04/24/2013			102.0	102.00		
Blank_Spike	Radium-228	04/26/2013			102.0	105.00		
Blank_Spike_Du	Radium-226	04/25/2013			93.2	105.00		0.07
Blank_Spike_Du	Radium-228	04/11/2013			94.9	112.00		0.40
Blank_Spike_Du	Radium-228	04/15/2013			98.0	112.00		0.10
Blank_Spike_Du	Radium-228	04/24/2013			98.9	95.10		0.20

Sampling Quality Control Assessment

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

Sampling Protocol

Surface water locations were sampled using a peristaltic pump and tubing reel or by container immersion. Monitoring wells were sampled using a peristaltic pump and dedicated tubing. Domestic wells (0405, 0422, 0430, 0436, 0460, 0828, 0841, and 0842), AWWWS hydrants (0818, 0819, 0820, 0821, 0829, 0830, 0834, and 0843), and AWWWS taps (0813, 0815, 0816, and 0837) were sampled by filling bottles at the discharge point.

Sample results for all monitoring wells met the Category I or II low-flow sampling criteria and were qualified with an "F" flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. Wells 0705, 0719, and 0730 were classified as Category II and were further qualified with a "Q" flag, indicating the data are qualitative because of the sampling technique.

Equipment Blank

An equipment blank was collected after decontamination of the non-dedicated sampling equipment used at some surface water locations. Sulfate and uranium were detected in the equipment blank. All associated sulfate and uranium sample results were greater than 5 times the blank, so no further qualification is required. The equipment blank results indicate adequate decontamination of the sampling equipment.

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. Duplicate samples were collected from locations 0460, 0707, and 0837. For non-radiochemical measurements, the relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. The RPD is not used to evaluate results that are less than 5 times the PQL. For these results (RPD is NA on the Field Duplicates report), the range should be no greater than the PQL. For radiochemical measurements, the relative error ratio (the ratio of the absolute difference between the sample and duplicate results and the sum of the 1-sigma uncertainties) is used to evaluate duplicate results and should be less than 3. All duplicate results met these criteria, demonstrating acceptable precision.

SAMPLE MANAGEMENT SYSTEM
Validation Report: Equipment/Trip Blanks

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RIN: 13035189 Lab Code: PAR Project: Riverton Validation Date: 6/10/2013

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	1304050-60	SW6020	Uranium	0.03	B	0.029	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
1304050-22	LEX 022	0747	120	10		
1304050-23	LEX 023	0749	2.4	10		
1304050-28	LEX 024	0794	6.9	10		
1304050-29	LEX 025	0796	6.6	10		
1304050-30	LEX 026	0810	5.6	10		
1304050-31	LEX 027	0811	7.5	10		
1304050-32	LEX 028	0812	9.9	10		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	1304050-60	SW9056	SULFATE	0.69		0.5	MG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
1304050-22	LEX 022	0747	340	10		
1304050-23	LEX 023	0749	930	10		
1304050-28	LEX 024	0794	330	5		
1304050-29	LEX 025	0796	310	20		
1304050-30	LEX 026	0810	400	20		
1304050-31	LEX 027	0811	350	5		
1304050-32	LEX 028	0812	350	5		

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

Page 1 of 1

RIN: 13035189 Lab Code: PAR Project: Riverton Validation Date: 6/10/2013

Duplicate: 2175

Sample: 0460

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Manganese	2.2	B		1	0.69	B		1	NA		UG/L
Molybdenum	2.9			10	3			10	3.39		UG/L
SULFATE	160			5	170			5	6.06		MG/L
Uranium	0.05	B		10	0.06	B		10	NA		UG/L

Duplicate: 2353

Sample: 0707

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Manganese	1200			1	1100			1	8.70		UG/L
Molybdenum	880			50	920			10	4.44		UG/L
SULFATE	2600			50	2700			50	3.77		MG/L
Uranium	790			50	810			10	2.50		UG/L

Duplicate: 2469

Sample: 0837

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Radium-226	0.43		0.22	1	0.48		0.232	1		0.3	pCi/L
Radium-228	0.518		0.286	1	0.397	U	0.272	1		0.6	pCi/L
Uranium	0.08	B		10	0.1			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: Steve Donivan 6-28-2013
Steve Donivan Date

Data Validation Lead: Gretchen Baer 6/28/13
Gretchen Baer Date

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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. The review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

Two laboratory results were identified as potentially anomalous. The manganese result for surface water location 0812 had a concentration higher than previously observed. Recent results for manganese indicate upward trending at this location since 2010. The uranium result for AWSS tap location 0813 was identified as a potential outlier because there is low variability in the few historical data points at this location. There were no errors identified with the laboratory data, and the results from this sampling event are acceptable as qualified.

Potential anomalies in the field parameters were also examined for patterns of repeated high or low bias, which suggest a systematic error due to instrument malfunction. At 19 locations, the oxidation-reduction potential field measurement was higher than previously observed (10 of these measurements were at AWSS locations). All operational checks for oxidation-reduction potential of the field equipment were in compliance; the field measurements from this sampling event are acceptable as qualified.

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Data Validation Outliers Report - No Field Parameters

Comparison: All Historical Data

Laboratory: ALS Laboratory Group

RIN: 13035189

Report Date: 6/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RVT01	0710	0001	03/27/2013	Iron	0.0069	B	JF	0.17		J	0.03	U	10	8	NA	
RVT01	0718	N001	03/27/2013	Uranium	0.14		F	0.549			0.15		F	30	0	NA
RVT01	0784	N001	03/27/2013	Sulfate	2000		F	3400		F	2100		F	15	0	NA
RVT01	0788	N001	03/28/2013	Molybdenum	0.017		F	0.037		F	0.02		F	23	0	No
RVT01	0794	0001	03/27/2013	Manganese	0.12			0.09			0.0051	B		34	2	NA
RVT01	0810	N001	03/26/2013	Manganese	0.49			0.34			0.024			17	0	NA
RVT01	0811	0001	03/28/2013	Molybdenum	0.0021			0.0017			0.00032	U		16	6	No
RVT01	0811	0001	03/28/2013	Sulfate	350			311			46			18	0	No
RVT01	0811	0001	03/28/2013	Uranium	0.0075			0.00745			0.00096			18	0	No
RVT01	0812	0001	03/28/2013	Manganese	0.16			0.072			0.0067			16	0	Yes
RVT01	0812	0001	03/28/2013	Molybdenum	0.0023			0.00196	B		0.00032	U		16	6	No
RVT01	0812	0001	03/28/2013	Sulfate	350			308			46			18	0	NA
RVT01	0812	0001	03/28/2013	Uranium	0.0099			0.0097			0.001			18	0	No
RVT01	0813	N001	03/26/2013	Uranium	0.00011			0.0001			0.000089	B	U	7	5	Yes
RVT01	0815	N001	03/26/2013	Radium-228	0.488		J	0.889		J	0.535		J	6	3	No
RVT01	0818	N001	03/26/2013	Radium-228	0.494		J	2.31			0.582		J	14	4	No
RVT01	0818	N002	03/26/2013	Radium-228	0.443		J	2.31			0.582		J	14	4	No
RVT01	0820	N002	03/26/2013	Radium-228	0.374		U	7.93			0.541		J	12	3	NA
RVT01	0820	N001	03/26/2013	Radium-228	0.39	U		7.93			0.541		J	12	3	NA

Data Validation Outliers Report - No Field Parameters

Comparison: All Historical Data

Laboratory: ALS Laboratory Group

RIN: 13035189

Report Date: 6/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RVT01	0821	N002	03/26/2013	Radium-228	0.42	U		1.73		J	0.575		J	14	2	No
RVT01	0824	N001	03/28/2013	Sulfate	330		F	240		F	65		F	12	0	No
RVT01	0826	N001	03/28/2013	Molybdenum	0.019		F	0.0468		F	0.02		F	13	0	NA
RVT01	0834	N001	03/26/2013	Radium-228	0.473		J	1.08		J	0.621		U	6	3	No

Data Validation Outliers Report - Field Parameters Only

Comparison: All Historical Data

Laboratory: Field Measurements

RIN: 13035189

Report Date: 6/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RVT01	0422	N001	03/27/2013	Oxidation Reduction Potential	265.2			193			65.3			6	0	No
RVT01	0422	N001	03/27/2013	pH	7.48			8.05			7.6			6	0	No
RVT01	0430	N001	03/27/2013	Temperature	5.56			22.2			6.5			26	0	No
RVT01	0436	N001	03/27/2013	Alkalinity, Total (as CaCO ₃)	216			174			140			18	0	Yes
RVT01	0436	N001	03/27/2013	Oxidation Reduction Potential	258			239			33			17	0	No
RVT01	0460	N001	03/27/2013	Temperature	11.3			28.87			11.5			19	0	No
RVT01	0718	N001	03/27/2013	Alkalinity, Total (as CaCO ₃)	318		F	474		F	347			27	0	No
RVT01	0718	N001	03/27/2013	pH	6.86		F	7.3		F	6.94		F	28	0	No
RVT01	0719	N001	03/27/2013	pH	6.97		FQ	8.42			7.42		FQ	28	0	Yes
RVT01	0720	N001	03/27/2013	Alkalinity, Total (as CaCO ₃)	95		F	350		F	183		F	19	0	Yes
RVT01	0720	N001	03/27/2013	pH	7		F	7.4		F	7.01		F	24	0	NA
RVT01	0721	N001	03/27/2013	pH	8.31		F	8.97		F	8.32			23	0	No
RVT01	0722R	N001	03/28/2013	Dissolved Oxygen	0.53		F	3.14		F	0.57		F	6	0	No
RVT01	0722R	N001	03/28/2013	Oxidation Reduction Potential	260		F	231		F	-55		F	12	0	No
RVT01	0722R	N001	03/28/2013	Temperature	8		F	15.13		F	9.84		F	12	0	No
RVT01	0729	N001	03/28/2013	Temperature	7.2		F	15.7		F	7.5			22	0	No
RVT01	0730	N001	03/28/2013	Temperature	9.7		FQ	14.65		FQ	10			20	0	No
RVT01	0747	N001	03/28/2013	Dissolved Oxygen	13.05			11.43			0.83			7	0	No
RVT01	0747	N001	03/28/2013	Oxidation Reduction Potential	228.5			207			-14.8			25	0	No

Data Validation Outliers Report - Field Parameters Only

Comparison: All Historical Data

Laboratory: Field Measurements

RIN: 13035189

Report Date: 6/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum		Historical Minimum		Number of Data Points		Statistical Outlier		
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data		N	N Below Detect
RVT01	0784	N001	03/27/2013	Dissolved Oxygen	1.86		F	1.74		F	0.09		F	5	0	No
RVT01	0784	N001	03/27/2013	Specific Conductance	3756		F	6270		F	4039		F	14	0	No
RVT01	0784	N001	03/27/2013	Temperature	6.21		F	15.07		F	9.6		F	14	0	Yes
RVT01	0789	N001	03/28/2013	Oxidation Reduction Potential	223.8		F	217.3		F	-61		F	15	0	No
RVT01	0789	N001	03/28/2013	Turbidity	9.83		F	9.54			1.05		F	15	0	No
RVT01	0794	N001	03/27/2013	Oxidation Reduction Potential	372.6			223.1			20.5			24	0	Yes
RVT01	0794	N001	03/27/2013	pH	6.88			8.7			6.9			32	0	Yes
RVT01	0796	0001	03/26/2013	Alkalinity, Total (as CaCO ₃)	270			232			73			32	0	Yes
RVT01	0810	N001	03/26/2013	pH	7.95			9.5			8.15			18	0	No
RVT01	0812	0001	03/28/2013	Alkalinity, Total (as CaCO ₃)	202			190			60			14	0	No
RVT01	0812	N001	03/28/2013	Oxidation Reduction Potential	212			202			-74			18	0	No
RVT01	0813	N001	03/26/2013	Oxidation Reduction Potential	550			278			114			6	0	Yes
RVT01	0813	N001	03/26/2013	Temperature	8			22.5			8.25			6	0	No
RVT01	0815	N001	03/26/2013	Dissolved Oxygen	2.4			8.7			4.49			5	0	No
RVT01	0815	N001	03/26/2013	Oxidation Reduction Potential	505			348.4			141			6	0	No
RVT01	0815	N001	03/26/2013	Specific Conductance	620			660			623			6	0	No
RVT01	0815	N001	03/26/2013	Temperature	6.7			13.8			8.94			6	0	No
RVT01	0816	N001	03/26/2013	Oxidation Reduction Potential	560			351.4			10			6	0	No
RVT01	0816	N001	03/26/2013	Specific Conductance	620			747			622			6	0	No

Data Validation Outliers Report - Field Parameters Only

Comparison: All Historical Data

Laboratory: Field Measurements

RIN: 13035189

Report Date: 6/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier		
					Result	Qualifiers		Result	Qualifiers		Result	Qualifiers			N	N Below Detect
						Lab	Data		Lab	Data		Lab	Data			
RVT01	0816	N001	03/26/2013	Temperature	5.4			16.23			11.5			6	0	Yes
RVT01	0818	N002	03/26/2013	Alkalinity, Total (as CaCO ₃)	236			175			157			6	0	Yes
RVT01	0818	N001	03/26/2013	Alkalinity, Total (as CaCO ₃)	195			175			157			6	0	No
RVT01	0818	N001	03/26/2013	Chlorine, Total Residual	0.78			0.75			0.03			10	0	No
RVT01	0818	N001	03/26/2013	Oxidation Reduction Potential	540			354			93			13	0	Yes
RVT01	0818	N002	03/26/2013	Oxidation Reduction Potential	570			354			93			13	0	Yes
RVT01	0819	N001	03/26/2013	Alkalinity, Total (as CaCO ₃)	195			191			148			6	0	No
RVT01	0819	N001	03/26/2013	Chlorine, Total Residual	0.77			0.71			0.04			10	0	No
RVT01	0819	N002	03/26/2013	Chlorine, Total Residual	0.8			0.71			0.04			10	0	No
RVT01	0819	N001	03/26/2013	Oxidation Reduction Potential	600			379.4			126			11	0	No
RVT01	0819	N002	03/26/2013	Oxidation Reduction Potential	570			379.4			126			11	0	No
RVT01	0819	N001	03/26/2013	Temperature	6.3			17.56			6.9			11	0	No
RVT01	0820	N002	03/26/2013	Alkalinity, Total (as CaCO ₃)	162			160			134			5	0	No
RVT01	0820	N001	03/26/2013	Alkalinity, Total (as CaCO ₃)	172			160			134			5	0	No
RVT01	0820	N002	03/26/2013	Chlorine, Total Residual	0.8			0.69			0.14			8	0	No
RVT01	0820	N001	03/26/2013	Chlorine, Total Residual	0.81			0.69			0.14			8	0	No
RVT01	0820	N002	03/26/2013	Oxidation Reduction Potential	610			461.3			165.4			11	0	No
RVT01	0820	N001	03/26/2013	Oxidation Reduction Potential	565			461.3			165.4			11	0	No
RVT01	0821	N001	03/26/2013	Alkalinity, Total (as CaCO ₃)	184			180			130			6	0	No

Data Validation Outliers Report - Field Parameters Only

Comparison: All Historical Data

Laboratory: Field Measurements

RIN: 13035189

Report Date: 6/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RVT01	0821	N001	03/26/2013	Chlorine, Total Residual	0.77			0.68			0.04			10	0	No
RVT01	0821	N002	03/26/2013	Chlorine, Total Residual	0.78			0.68			0.04			10	0	No
RVT01	0821	N001	03/26/2013	Oxidation Reduction Potential	575			453			45			13	0	No
RVT01	0821	N002	03/26/2013	Oxidation Reduction Potential	585			453			45			13	0	No
RVT01	0821	N001	03/26/2013	Temperature	6.7			17.84			7.07			13	0	No
RVT01	0822	N001	03/27/2013	Oxidation Reduction Potential	302.1			198			-21			18	0	No
RVT01	0823	N001	03/27/2013	Alkalinity, Total (as CaCO ₃)	192			139			41			13	0	No
RVT01	0823	N001	03/27/2013	pH	7.95			9.43			7.97			17	0	No
RVT01	0824	N001	03/28/2013	pH	7.01		F	7.35		F	7.05		F	12	0	No
RVT01	0824	N001	03/28/2013	Specific Conductance	1264		F	1187		F	568		F	12	0	No
RVT01	0826	N001	03/28/2013	Temperature	6.79		F	11.69		F	8.97		F	12	0	No
RVT01	0826	N001	03/28/2013	Turbidity	8.61		F	4.98		F	1.08		F	12	0	Yes
RVT01	0828	N001	03/27/2013	Oxidation Reduction Potential	258.9			236			15			15	0	No
RVT01	0828	N001	03/27/2013	pH	6.68			9			8.44			15	0	Yes
RVT01	0828	N001	03/27/2013	Temperature	6.52			18.08			9.65			15	0	No
RVT01	0829	N001	03/26/2013	Chlorine, Total Residual	0.16			0.71			0.21			8	0	No
RVT01	0829	N002	03/26/2013	Chlorine, Total Residual	0.82			0.71			0.21			8	0	No
RVT01	0829	N002	03/26/2013	Oxidation Reduction Potential	535			323			123.6			10	0	Yes
RVT01	0829	N001	03/26/2013	Oxidation Reduction Potential	350			323			123.6			10	0	No

Data Validation Outliers Report - Field Parameters Only

Comparison: All Historical Data

Laboratory: Field Measurements

RIN: 13035189

Report Date: 6/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier		
					Result	Qualifiers		Result	Qualifiers		Result	Qualifiers			N	N Below Detect
						Lab	Data		Lab	Data		Lab	Data			
RVT01	0829	N002	03/26/2013	pH	8.99			8.81			6.69			10	0	No
RVT01	0829	N001	03/26/2013	pH	8.9			8.81			6.69			10	0	No
RVT01	0829	N002	03/26/2013	Specific Conductance	605			731			612			10	0	No
RVT01	0829	N001	03/26/2013	Temperature	5.9			16.43			7			10	0	Yes
RVT01	0830	N001	03/26/2013	Chlorine, Total Residual	0.82			0.78			0.22			8	0	No
RVT01	0830	N001	03/26/2013	Oxidation Reduction Potential	605			332.1			179			10	0	Yes
RVT01	0830	N002	03/26/2013	Oxidation Reduction Potential	590			332.1			179			10	0	Yes
RVT01	0830	N002	03/26/2013	Specific Conductance	615			665			617			10	0	Yes
RVT01	0830	N002	03/26/2013	Temperature	8.9			16.3			10.87			10	0	Yes
RVT01	0830	N001	03/26/2013	Temperature	10.8			16.3			10.87			10	0	No
RVT01	0830	N002	03/26/2013	Turbidity	2.15			1.83			0.31			10	0	No
RVT01	0834	N001	03/26/2013	Oxidation Reduction Potential	565			488.8			162			5	0	No
RVT01	0834	N001	03/26/2013	Temperature	7.8			13.56			7.85			5	0	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.

NA: Data are not normally or lognormally distributed.

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Attachment 2
Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0405 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	-	47			#		
Dissolved Oxygen	mg/L	03/28/2013	N001	-	4.23			#		
Manganese	mg/L	03/28/2013	N001	-	0.002	B		#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	-	0.0051			#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	-	150			#		
pH	s.u.	03/28/2013	N001	-	9.12			#		
Specific Conductance	umhos /cm	03/28/2013	N001	-	1001			#		
Sulfate	mg/L	03/28/2013	N001	-	350		J	#	5	
Temperature	C	03/28/2013	N001	-	10.9			#		
Turbidity	NTU	03/28/2013	N001	-	1.79			#		
Uranium	mg/L	03/28/2013	N001	-	0.000029	U		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0422 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	-	174			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	-	2.83			#		
Manganese	mg/L	03/27/2013	N001	-	0.00039	B	U	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	-	0.0015			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	-	265.2			#		
pH	s.u.	03/27/2013	N001	-	7.48			#		
Specific Conductance	umhos /cm	03/27/2013	N001	-	494			#		
Sulfate	mg/L	03/27/2013	N001	-	68		J	#	2.5	
Temperature	C	03/27/2013	N001	-	13.97			#		
Turbidity	NTU	03/27/2013	N001	-	1.63			#		
Uranium	mg/L	03/27/2013	N001	-	0.0025			#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0430 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	-	186			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	-	3.24			#		
Manganese	mg/L	03/27/2013	N001	-	0.0044	B		#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	-	0.0024			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	-	59.8			#		
pH	s.u.	03/27/2013	N001	-	8.63			#		
Specific Conductance	umhos /cm	03/27/2013	N001	-	841			#		
Sulfate	mg/L	03/27/2013	N001	-	180		J	#	2.5	
Temperature	C	03/27/2013	N001	-	5.56			#		
Turbidity	NTU	03/27/2013	N001	-	2.91			#		
Uranium	mg/L	03/27/2013	N001	-	0.00003	B		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0436 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	-	216			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	-	3.55			#		
Manganese	mg/L	03/27/2013	N001	-	0.0018	B		#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	-	0.0032			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	-	258			#		
pH	s.u.	03/27/2013	N001	-	8.44			#		
Specific Conductance	umhos /cm	03/27/2013	N001	-	766			#		
Sulfate	mg/L	03/27/2013	N001	-	190		J	#	2.5	
Temperature	C	03/27/2013	N001	-	11.18			#		
Turbidity	NTU	03/27/2013	N001	-	4.64			#		
Uranium	mg/L	03/27/2013	N001	-	0.00004	B		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0460 WELL Koch Sulfuric Acid Plant

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	-	160			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	-	3.85			#		
Manganese	mg/L	03/27/2013	N001	-	0.0022	B		#	0.00011	
Manganese	mg/L	03/27/2013	N002	-	0.00069	B		#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	-	0.0029			#	0.00032	
Molybdenum	mg/L	03/27/2013	N002	-	0.003			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	-	175			#		
pH	s.u.	03/27/2013	N001	-	7.48			#		
Specific Conductance	umhos /cm	03/27/2013	N001	-	810			#		
Sulfate	mg/L	03/27/2013	N001	-	160		J	#	2.5	
Sulfate	mg/L	03/27/2013	N002	-	170			#	2.5	
Temperature	C	03/27/2013	N001	-	11.3			#		
Turbidity	NTU	03/27/2013	N001	-	1.45			#		
Uranium	mg/L	03/27/2013	N001	-	0.00005	B		#	0.000029	
Uranium	mg/L	03/27/2013	N002	-	0.00006	B		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0705 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	37.3 - 61.8	60		FQ	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	37.3 - 61.8	4.13		FQ	#		
Manganese	mg/L	03/28/2013	N001	37.3 - 61.8	0.0033	B	FQ	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	37.3 - 61.8	0.0027		FQ	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	37.3 - 61.8	206.1		FQ	#		
pH	s.u.	03/28/2013	N001	37.3 - 61.8	8.07		FQ	#		
Specific Conductance	umhos /cm	03/28/2013	N001	37.3 - 61.8	1221		FQ	#		
Sulfate	mg/L	03/28/2013	N001	37.3 - 61.8	430		FQ	#	5	
Temperature	C	03/28/2013	N001	37.3 - 61.8	9.26		FQ	#		
Turbidity	NTU	03/28/2013	N001	37.3 - 61.8	3.36		FQ	#		
Uranium	mg/L	03/28/2013	N001	37.3 - 61.8	0.0002		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0707 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	9.1 - 23.3	348		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	9.1 - 23.3	0.66		F	#		
Iron	mg/L	03/28/2013	0001	9.1 - 23.3	0.0049	U	F	#	0.0049	
Manganese	mg/L	03/28/2013	N001	9.1 - 23.3	1.2		F	#	0.00011	
Manganese	mg/L	03/28/2013	N002	9.1 - 23.3	1.1		F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	9.1 - 23.3	0.88		F	#	0.0016	
Molybdenum	mg/L	03/28/2013	N002	9.1 - 23.3	0.92		F	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	9.1 - 23.3	205.9		F	#		
pH	s.u.	03/28/2013	N001	9.1 - 23.3	6.92		F	#		
Specific Conductance	umhos/cm	03/28/2013	N001	9.1 - 23.3	4925		F	#		
Sulfate	mg/L	03/28/2013	N001	9.1 - 23.3	2600		F	#	25	
Sulfate	mg/L	03/28/2013	N002	9.1 - 23.3	2700		F	#	25	
Temperature	C	03/28/2013	N001	9.1 - 23.3	8.92		F	#		
Turbidity	NTU	03/28/2013	N001	9.1 - 23.3	1.72		F	#		
Uranium	mg/L	03/28/2013	N001	9.1 - 23.3	0.79		F	#	0.00015	
Uranium	mg/L	03/28/2013	N002	9.1 - 23.3	0.81		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0710 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	9.8 - 26.8	176		F	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	9.8 - 26.8	1.04		F	#		
Iron	mg/L	03/27/2013	0001	9.8 - 26.8	0.0069	B	JF	#	0.0049	
Manganese	mg/L	03/27/2013	N001	9.8 - 26.8	0.085		F	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	9.8 - 26.8	0.002		F	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	9.8 - 26.8	68.8		F	#		
pH	s.u.	03/27/2013	N001	9.8 - 26.8	7.41		F	#		
Specific Conductance	umhos /cm	03/27/2013	N001	9.8 - 26.8	519		F	#		
Sulfate	mg/L	03/27/2013	N001	9.8 - 26.8	84		F	#	2.5	
Temperature	C	03/27/2013	N001	9.8 - 26.8	7.41		F	#		
Turbidity	NTU	03/27/2013	N001	9.8 - 26.8	1.73		F	#		
Uranium	mg/L	03/27/2013	N001	9.8 - 26.8	0.0029		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0716 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	9.78 - 14.78	281		F	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	9.78 - 14.78	0.73		F	#		
Iron	mg/L	03/27/2013	0001	9.78 - 14.78	0.016	B	JF	#	0.0049	
Manganese	mg/L	03/27/2013	N001	9.78 - 14.78	0.17		F	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	9.78 - 14.78	0.12		F	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	9.78 - 14.78	47.1		F	#		
pH	s.u.	03/27/2013	N001	9.78 - 14.78	7.05		F	#		
Specific Conductance	umhos /cm	03/27/2013	N001	9.78 - 14.78	1414		F	#		
Sulfate	mg/L	03/27/2013	N001	9.78 - 14.78	420		F	#	5	
Temperature	C	03/27/2013	N001	9.78 - 14.78	5.96		F	#		
Turbidity	NTU	03/27/2013	N001	9.78 - 14.78	5.7		F	#		
Uranium	mg/L	03/27/2013	N001	9.78 - 14.78	0.25		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0717 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	45.1 - 55.1	205		F	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	45.1 - 55.1	0.47		F	#		
Manganese	mg/L	03/27/2013	N001	45.1 - 55.1	0.19		F	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	45.1 - 55.1	0.0093		F	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	45.1 - 55.1	-145.2		F	#		
pH	s.u.	03/27/2013	N001	45.1 - 55.1	7.67		F	#		
Specific Conductance	umhos /cm	03/27/2013	N001	45.1 - 55.1	1888		F	#		
Sulfate	mg/L	03/27/2013	N001	45.1 - 55.1	670		F	#	10	
Temperature	C	03/27/2013	N001	45.1 - 55.1	8.21		F	#		
Turbidity	NTU	03/27/2013	N001	45.1 - 55.1	1.7		F	#		
Uranium	mg/L	03/27/2013	N001	45.1 - 55.1	0.00006	B	F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0718 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	18.24 - 23.24	318		F	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	18.24 - 23.24	1.77		F	#		
Manganese	mg/L	03/27/2013	N001	18.24 - 23.24	0.39		F	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	18.24 - 23.24	0.063		F	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	18.24 - 23.24	254.7		F	#		
pH	s.u.	03/27/2013	N001	18.24 - 23.24	6.86		F	#		
Specific Conductance	umhos /cm	03/27/2013	N001	18.24 - 23.24	4657		F	#		
Sulfate	mg/L	03/27/2013	N001	18.24 - 23.24	2300		F	#	25	
Temperature	C	03/27/2013	N001	18.24 - 23.24	11.51		F	#		
Turbidity	NTU	03/27/2013	N001	18.24 - 23.24	2.02		F	#		
Uranium	mg/L	03/27/2013	N001	18.24 - 23.24	0.14		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0719 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	38.47 - 48.47	82		FQ	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	38.47 - 48.47	0.99		FQ	#		
Manganese	mg/L	03/27/2013	N001	38.47 - 48.47	0.052		FQ	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	38.47 - 48.47	0.012		FQ	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	38.47 - 48.47	157.8		FQ	#		
pH	s.u.	03/27/2013	N001	38.47 - 48.47	6.97		FQ	#		
Specific Conductance	umhos /cm	03/27/2013	N001	38.47 - 48.47	1227		FQ	#		
Sulfate	mg/L	03/27/2013	N001	38.47 - 48.47	440		FQ	#	5	
Temperature	C	03/27/2013	N001	38.47 - 48.47	12.1		FQ	#		
Turbidity	NTU	03/27/2013	N001	38.47 - 48.47	1.81		FQ	#		
Uranium	mg/L	03/27/2013	N001	38.47 - 48.47	0.00036		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0720 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	7.94 - 12.94	95		F	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	7.94 - 12.94	0.28		F	#		
Manganese	mg/L	03/27/2013	N001	7.94 - 12.94	0.0037	B	F	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	7.94 - 12.94	0.0013		F	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	7.94 - 12.94	413.8		F	#		
pH	s.u.	03/27/2013	N001	7.94 - 12.94	7		F	#		
Specific Conductance	umhos /cm	03/27/2013	N001	7.94 - 12.94	947		F	#		
Sulfate	mg/L	03/27/2013	N001	7.94 - 12.94	290		F	#	5	
Temperature	C	03/27/2013	N001	7.94 - 12.94	6.6		F	#		
Turbidity	NTU	03/27/2013	N001	7.94 - 12.94	0.84		F	#		
Uranium	mg/L	03/27/2013	N001	7.94 - 12.94	0.0095		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0721 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	44.43 - 54.43	93		F	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	44.43 - 54.43	0.57		F	#		
Manganese	mg/L	03/27/2013	N001	44.43 - 54.43	0.0039	B	F	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	44.43 - 54.43	0.0027		F	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	44.43 - 54.43	252.9		F	#		
pH	s.u.	03/27/2013	N001	44.43 - 54.43	8.31		F	#		
Specific Conductance	umhos /cm	03/27/2013	N001	44.43 - 54.43	877		F	#		
Sulfate	mg/L	03/27/2013	N001	44.43 - 54.43	270		F	#	5	
Temperature	C	03/27/2013	N001	44.43 - 54.43	10.19		F	#		
Turbidity	NTU	03/27/2013	N001	44.43 - 54.43	0.86		F	#		
Uranium	mg/L	03/27/2013	N001	44.43 - 54.43	0.0001		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0722R WELL Replacement well for destroyed well 0722.

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	11.1 - 16.1	250		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	11.1 - 16.1	0.53		F	#		
Manganese	mg/L	03/28/2013	N001	11.1 - 16.1	0.02		F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	11.1 - 16.1	0.11		F	#	0.0016	
Oxidation Reduction Potential	mV	03/28/2013	N001	11.1 - 16.1	260		F	#		
pH	s.u.	03/28/2013	N001	11.1 - 16.1	6.88		F	#		
Specific Conductance	umhos /cm	03/28/2013	N001	11.1 - 16.1	1865		F	#		
Sulfate	mg/L	03/28/2013	N001	11.1 - 16.1	810		F	#	10	
Temperature	C	03/28/2013	N001	11.1 - 16.1	8		F	#		
Turbidity	NTU	03/28/2013	N001	11.1 - 16.1	1.06		F	#		
Uranium	mg/L	03/28/2013	N001	11.1 - 16.1	0.53		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0723 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	45.99 - 55.99	386		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	45.99 - 55.99	0.49		F	#		
Manganese	mg/L	03/28/2013	N001	45.99 - 55.99	0.59		F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	45.99 - 55.99	0.00032	U	F	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	45.99 - 55.99	50		F	#		
pH	s.u.	03/28/2013	N001	45.99 - 55.99	6.97		F	#		
Specific Conductance	umhos /cm	03/28/2013	N001	45.99 - 55.99	3985		F	#		
Sulfate	mg/L	03/28/2013	N001	45.99 - 55.99	1900		F	#	25	
Temperature	C	03/28/2013	N001	45.99 - 55.99	9.6		F	#		
Turbidity	NTU	03/28/2013	N001	45.99 - 55.99	0.82		F	#		
Uranium	mg/L	03/28/2013	N001	45.99 - 55.99	0.00004	B	F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0729 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	14.71 - 19.71	360		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	14.71 - 19.71	0.52		F	#		
Manganese	mg/L	03/28/2013	N001	14.71 - 19.71	0.01		F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	14.71 - 19.71	0.0028		F	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	14.71 - 19.71	160		F	#		
pH	s.u.	03/28/2013	N001	14.71 - 19.71	7.03		F	#		
Specific Conductance	umhos /cm	03/28/2013	N001	14.71 - 19.71	790		F	#		
Sulfate	mg/L	03/28/2013	N001	14.71 - 19.71	100		F	#	5	
Temperature	C	03/28/2013	N001	14.71 - 19.71	7.2		F	#		
Turbidity	NTU	03/28/2013	N001	14.71 - 19.71	1.09		F	#		
Uranium	mg/L	03/28/2013	N001	14.71 - 19.71	0.0077		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0730 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	38.62 - 48.62	340		FQ	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	38.62 - 48.62	0.77		FQ	#		
Manganese	mg/L	03/28/2013	N001	38.62 - 48.62	0.095		FQ	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	38.62 - 48.62	0.0045		FQ	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	38.62 - 48.62	190		FQ	#		
pH	s.u.	03/28/2013	N001	38.62 - 48.62	7.37		FQ	#		
Specific Conductance	umhos /cm	03/28/2013	N001	38.62 - 48.62	880		FQ	#		
Sulfate	mg/L	03/28/2013	N001	38.62 - 48.62	140		FQ	#	5	
Temperature	C	03/28/2013	N001	38.62 - 48.62	9.7		FQ	#		
Turbidity	NTU	03/28/2013	N001	38.62 - 48.62	4.49		FQ	#		
Uranium	mg/L	03/28/2013	N001	38.62 - 48.62	0.0063		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0784 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	1.65 - 6.65	149		F	#		
Dissolved Oxygen	mg/L	03/27/2013	N001	1.65 - 6.65	1.86		F	#		
Manganese	mg/L	03/27/2013	N001	1.65 - 6.65	0.43		F	#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	1.65 - 6.65	0.0079		F	#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	1.65 - 6.65	72.6		F	#		
pH	s.u.	03/27/2013	N001	1.65 - 6.65	7.54		F	#		
Specific Conductance	umhos /cm	03/27/2013	N001	1.65 - 6.65	3756		F	#		
Sulfate	mg/L	03/27/2013	N001	1.65 - 6.65	2000		F	#	25	
Temperature	C	03/27/2013	N001	1.65 - 6.65	6.21		F	#		
Turbidity	NTU	03/27/2013	N001	1.65 - 6.65	2.41		F	#		
Uranium	mg/L	03/27/2013	N001	1.65 - 6.65	0.0033		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0788 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)	Lab		Data	QA			
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	1.41	- 13.41	424		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	1.41	- 13.41	0.58		F	#		
Manganese	mg/L	03/28/2013	N001	1.41	- 13.41	0.14		F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	1.41	- 13.41	0.017		F	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	1.41	- 13.41	202.4		F	#		
pH	s.u.	03/28/2013	N001	1.41	- 13.41	7.04		F	#		
Specific Conductance	umhos/cm	03/28/2013	N001	1.41	- 13.41	3244		F	#		
Sulfate	mg/L	03/28/2013	N001	1.41	- 13.41	1400		F	#	10	
Temperature	C	03/28/2013	N001	1.41	- 13.41	8.77		F	#		
Turbidity	NTU	03/28/2013	N001	1.41	- 13.41	3.56		F	#		
Uranium	mg/L	03/28/2013	N001	1.41	- 13.41	0.042		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0789 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	6.2 - 18.2	464		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	6.2 - 18.2	0.85		F	#		
Iron	mg/L	03/28/2013	0001	6.2 - 18.2	0.014	B	JF	#	0.0049	
Manganese	mg/L	03/28/2013	N001	6.2 - 18.2	0.62		F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	6.2 - 18.2	0.64		F	#	0.0016	
Oxidation Reduction Potential	mV	03/28/2013	N001	6.2 - 18.2	223.8		F	#		
pH	s.u.	03/28/2013	N001	6.2 - 18.2	7.08		F	#		
Specific Conductance	umhos /cm	03/28/2013	N001	6.2 - 18.2	8809		F	#		
Sulfate	mg/L	03/28/2013	N001	6.2 - 18.2	4800		F	#	50	
Temperature	C	03/28/2013	N001	6.2 - 18.2	8.17		F	#		
Turbidity	NTU	03/28/2013	N001	6.2 - 18.2	9.83		F	#		
Uranium	mg/L	03/28/2013	N001	6.2 - 18.2	1.9		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0824 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	9.5 - 14.5	320		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	9.5 - 14.5	0.55		F	#		
Manganese	mg/L	03/28/2013	N001	9.5 - 14.5	0.0048	B	F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	9.5 - 14.5	0.003		F	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	9.5 - 14.5	220		F	#		
pH	s.u.	03/28/2013	N001	9.5 - 14.5	7.01		F	#		
Specific Conductance	umhos /cm	03/28/2013	N001	9.5 - 14.5	1264		F	#		
Sulfate	mg/L	03/28/2013	N001	9.5 - 14.5	330		F	#	5	
Temperature	C	03/28/2013	N001	9.5 - 14.5	8.56		F	#		
Turbidity	NTU	03/28/2013	N001	9.5 - 14.5	9.05		F	#		
Uranium	mg/L	03/28/2013	N001	9.5 - 14.5	0.02		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0826 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)	Lab		Data	QA			
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	N001	6.6	-	11.6		F	#		
Dissolved Oxygen	mg/L	03/28/2013	N001	6.6	-	11.6		F	#		
Manganese	mg/L	03/28/2013	N001	6.6	-	11.6		F	#	0.00011	
Molybdenum	mg/L	03/28/2013	N001	6.6	-	11.6		F	#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	6.6	-	11.6		F	#		
pH	s.u.	03/28/2013	N001	6.6	-	11.6		F	#		
Specific Conductance	umhos /cm	03/28/2013	N001	6.6	-	11.6		F	#		
Sulfate	mg/L	03/28/2013	N001	6.6	-	11.6		F	#	25	
Temperature	C	03/28/2013	N001	6.6	-	11.6		F	#		
Turbidity	NTU	03/28/2013	N001	6.6	-	11.6		F	#		
Uranium	mg/L	03/28/2013	N001	6.6	-	11.6		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0828 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	-	150			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	-	3.91			#		
Manganese	mg/L	03/27/2013	N001	-	0.0089			#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	-	0.003			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	-	258.9			#		
pH	s.u.	03/27/2013	N001	-	6.68			#		
Specific Conductance	umhos /cm	03/27/2013	N001	-	774			#		
Sulfate	mg/L	03/27/2013	N001	-	190			#	2.5	
Temperature	C	03/27/2013	N001	-	6.52			#		
Turbidity	NTU	03/27/2013	N001	-	0.82			#		
Uranium	mg/L	03/27/2013	N001	-	0.00006	B		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0841 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	-	214			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	-	2.79			#		
Manganese	mg/L	03/27/2013	N001	-	0.094			#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	-	0.0041			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	-	109.3			#		
pH	s.u.	03/27/2013	N001	-	7.67			#		
Specific Conductance	umhos /cm	03/27/2013	N001	-	874			#		
Sulfate	mg/L	03/27/2013	N001	-	240			#	2.5	
Temperature	C	03/27/2013	N001	-	11.9			#		
Turbidity	NTU	03/27/2013	N001	-	0.52			#		
Uranium	mg/L	03/27/2013	N001	-	0.00093			#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0842 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	-	176			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	-	5.81			#		
Manganese	mg/L	03/27/2013	N001	-	0.046			#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	-	0.0027			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	-	228.6			#		
pH	s.u.	03/27/2013	N001	-	7.75			#		
Specific Conductance	umhos /cm	03/27/2013	N001	-	779			#		
Sulfate	mg/L	03/27/2013	N001	-	160			#	2.5	
Temperature	C	03/27/2013	N001	-	9.19			#		
Turbidity	NTU	03/27/2013	N001	-	3.68			#		
Uranium	mg/L	03/27/2013	N001	-	0.00035			#	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.

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Surface Water Quality Data

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Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0747 SURFACE LOCATION 8/26/97 State plane east changed from 594497.14 to an estimation close to river

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	0001	186			#		
Dissolved Oxygen	mg/L	03/28/2013	N001	13.05			#		
Manganese	mg/L	03/28/2013	0001	0.16			#	0.00011	
Molybdenum	mg/L	03/28/2013	0001	0.012			#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	228.5			#		
pH	s.u.	03/28/2013	N001	7.81			#		
Specific Conductance	umhos/cm	03/28/2013	N001	1048			#		
Sulfate	mg/L	03/28/2013	0001	340			#	5	
Temperature	C	03/28/2013	N001	16.39			#		
Turbidity	NTU	03/28/2013	N001	48.3			#		
Uranium	mg/L	03/28/2013	0001	0.12			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0749 SURFACE LOCATION 8/26/97 State plane east changed from 589532.71 to an estimation close to river

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	79			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	8.24			#		
Manganese	mg/L	03/27/2013	0001	0.059			#	0.00011	
Molybdenum	mg/L	03/27/2013	0001	0.01			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	76.6			#		
pH	s.u.	03/27/2013	N001	7.93			#		
Specific Conductance	umhos/cm	03/27/2013	N001	3041			#		
Sulfate	mg/L	03/27/2013	0001	1800			#	10	
Temperature	C	03/27/2013	N001	17.73			#		
Turbidity	NTU	03/27/2013	N001	11			#		
Uranium	mg/L	03/27/2013	0001	0.0024			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0794 SURFACE LOCATION 8/26/97 State plane north changed from 844178.27 to an estimation close to river

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	0001	170			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	12.36			#		
Manganese	mg/L	03/27/2013	0001	0.12			#	0.00011	
Molybdenum	mg/L	03/27/2013	0001	0.0016			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	372.6			#		
pH	s.u.	03/27/2013	N001	6.88			#		
Specific Conductance	umhos/cm	03/27/2013	N001	965			#		
Sulfate	mg/L	03/27/2013	0001	330			#	2.5	
Temperature	C	03/27/2013	N001	9.59			#		
Turbidity	NTU	03/27/2013	N001	27.3			#		
Uranium	mg/L	03/27/2013	0001	0.0069			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0796 SURFACE LOCATION Was possibly historically sampled ~900 ft E from current location

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	0001	270			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	11.46			#		
Manganese	mg/L	03/26/2013	0001	0.099			#	0.00011	
Molybdenum	mg/L	03/26/2013	0001	0.0016			#	0.00032	
Oxidation Reduction Potential	mV	03/26/2013	N001	140			#		
pH	s.u.	03/26/2013	N001	7.96			#		
Specific Conductance	umhos/cm	03/26/2013	N001	1050			#		
Sulfate	mg/L	03/26/2013	0001	310			#	10	
Temperature	C	03/26/2013	N001	2			#		
Turbidity	NTU	03/26/2013	N001	15.4			#		
Uranium	mg/L	03/26/2013	0001	0.0066			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0810 SURFACE LOCATION Gravel Pit Pond

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	508			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	9.47			#		
Manganese	mg/L	03/26/2013	N001	0.49			#	0.00011	
Molybdenum	mg/L	03/26/2013	N001	0.0013			#	0.00032	
Oxidation Reduction Potential	mV	03/26/2013	N001	133			#		
pH	s.u.	03/26/2013	N001	7.95			#		
Specific Conductance	umhos/cm	03/26/2013	N001	1601			#		
Sulfate	mg/L	03/26/2013	N001	400			#	10	
Temperature	C	03/26/2013	N001	2.9			#		
Turbidity	NTU	03/26/2013	N001	7.65			#		
Uranium	mg/L	03/26/2013	N001	0.0056			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0811 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	0001	162			#		
Dissolved Oxygen	mg/L	03/28/2013	N001	12.85			#		
Manganese	mg/L	03/28/2013	0001	0.14			#	0.00011	
Molybdenum	mg/L	03/28/2013	0001	0.0021			#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	190			#		
pH	s.u.	03/28/2013	N001	8.35			#		
Specific Conductance	umhos/cm	03/28/2013	N001	1010			#		
Sulfate	mg/L	03/28/2013	0001	350			#	2.5	
Temperature	C	03/28/2013	N001	14.1			#		
Turbidity	NTU	03/28/2013	N001	18.5			#		
Uranium	mg/L	03/28/2013	0001	0.0075			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0812 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/28/2013	0001	202			#		
Dissolved Oxygen	mg/L	03/28/2013	N001	12.16			#		
Manganese	mg/L	03/28/2013	0001	0.16			#	0.00011	
Molybdenum	mg/L	03/28/2013	0001	0.0023			#	0.00032	
Oxidation Reduction Potential	mV	03/28/2013	N001	212			#		
pH	s.u.	03/28/2013	N001	8.22			#		
Specific Conductance	umhos/cm	03/28/2013	N001	1006			#		
Sulfate	mg/L	03/28/2013	0001	350			#	2.5	
Temperature	C	03/28/2013	N001	8.55			#		
Turbidity	NTU	03/28/2013	N001	63.5			#		
Uranium	mg/L	03/28/2013	0001	0.0099			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0822 SURFACE LOCATION west-side irrigation ditch

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	174			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	11.16			#		
Manganese	mg/L	03/27/2013	N001	0.076			#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	0.0083			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	302.1			#		
pH	s.u.	03/27/2013	N001	8.04			#		
Radium-226	pCi/L	03/27/2013	N001	0.579			#	0.17	0.266
Radium-228	pCi/L	03/27/2013	N001	0.5	U		#	0.5	0.334
Specific Conductance	umhos/cm	03/27/2013	N001	2343			#		
Sulfate	mg/L	03/27/2013	N001	1400			#	25	
Temperature	C	03/27/2013	N001	16.69			#		
Turbidity	NTU	03/27/2013	N001	2.32			#		
Uranium	mg/L	03/27/2013	N001	0.0051			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0823 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/27/2013	N001	192			#		
Dissolved Oxygen	mg/L	03/27/2013	N001	10.86			#		
Manganese	mg/L	03/27/2013	N001	0.16			#	0.00011	
Molybdenum	mg/L	03/27/2013	N001	0.0016			#	0.00032	
Oxidation Reduction Potential	mV	03/27/2013	N001	100.6			#		
pH	s.u.	03/27/2013	N001	7.95			#		
Specific Conductance	umhos/cm	03/27/2013	N001	2712			#		
Sulfate	mg/L	03/27/2013	N001	1100		J	#	25	
Temperature	C	03/27/2013	N001	8.67			#		
Turbidity	NTU	03/27/2013	N001	2.61			#		
Uranium	mg/L	03/27/2013	N001	0.007			#	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.
- L Less than 3 bore volumes purged prior to sampling.
- U Parameter analyzed for but was not detected.

- G Possible grout contamination, pH > 9.
- Q Qualitative result due to sampling technique.
- X Location is undefined.
- J Estimated value.
- R Unusable result.

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

**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: 6/19/2013

Location: 0813 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	180			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.8			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	3.1			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	550			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.65			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	0.527		J	#	0.18	0.247
Radium-228	pCi/L	03/26/2013	N001	0 - 0	0.541		J	#	0.34	0.259
Specific Conductance	umhos /cm	03/26/2013	N001	0 - 0	625			#		
Temperature	C	03/26/2013	N001	0 - 0	8			#		
Turbidity	NTU	03/26/2013	N001	0 - 0	0.72			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.00011			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0815 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	176			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.83			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	2.4			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	505			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.68			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	0.433			#	0.14	0.217
Radium-228	pCi/L	03/26/2013	N001	0 - 0	0.488		J	#	0.33	0.245
Specific Conductance	umhos /cm	03/26/2013	N001	0 - 0	620			#		
Temperature	C	03/26/2013	N001	0 - 0	6.7			#		
Turbidity	NTU	03/26/2013	N001	0 - 0	0.59			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.00011			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0816 DOMESTIC SUPPLY

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	160			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.76			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	5.75			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	560			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.72			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	0.466		J	#	0.17	0.238
Radium-228	pCi/L	03/26/2013	N001	0 - 0	0.456		J	#	0.41	0.288
Specific Conductance	umhos/cm	03/26/2013	N001	0 - 0	620			#		
Temperature	C	03/26/2013	N001	0 - 0	5.4			#		
Turbidity	NTU	03/26/2013	N001	0 - 0	0.58			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.00008	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0818 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	195			#		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N002	0 - 0	236			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.78			#		
Chlorine, Total Residual	mg/L	03/26/2013	N002	0 - 0	0.72			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	2.2			#		
Dissolved Oxygen	mg/L	03/26/2013	N002	0 - 0	2.28			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	540			#		
Oxidation Reduction Potential	mV	03/26/2013	N002	0 - 0	570			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.73			#		
pH	s.u.	03/26/2013	N002	0 - 0	8.8			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	0.803			#	0.16	0.32
Radium-226	pCi/L	03/26/2013	N002	0 - 0	0.508			#	0.14	0.235
Radium-228	pCi/L	03/26/2013	N001	0 - 0	0.494		J	#	0.37	0.27
Radium-228	pCi/L	03/26/2013	N002	0 - 0	0.443		J	#	0.38	0.269
Specific Conductance	umhos/cm	03/26/2013	N001	0 - 0	625			#		
Specific Conductance	umhos/cm	03/26/2013	N002	0 - 0	640			#		
Temperature	C	03/26/2013	N001	0 - 0	7.4			#		
Temperature	C	03/26/2013	N002	0 - 0	10.7			#		

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0818 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Turbidity	NTU	03/26/2013	N001	0 - 0	1.2			#		
Turbidity	NTU	03/26/2013	N002	0 - 0	1.41			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.0001			#	0.000029	
Uranium	mg/L	03/26/2013	N002	0 - 0	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0819 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID	(Ft BLS)			Lab	Data		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0	- 0	195		#		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N002	0	- 0	172		#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0	- 0	0.77		#		
Chlorine, Total Residual	mg/L	03/26/2013	N002	0	- 0	0.8		#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0	- 0	2.27		#		
Dissolved Oxygen	mg/L	03/26/2013	N002	0	- 0	2.67		#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0	- 0	600		#		
Oxidation Reduction Potential	mV	03/26/2013	N002	0	- 0	570		#		
pH	s.u.	03/26/2013	N001	0	- 0	8.77		#		
pH	s.u.	03/26/2013	N002	0	- 0	8.76		#		
Radium-226	pCi/L	03/26/2013	N001	0	- 0	1.38		#	0.14	0.469
Radium-226	pCi/L	03/26/2013	N002	0	- 0	0.634		#	0.14	0.274
Radium-228	pCi/L	03/26/2013	N001	0	- 0	1.71		#	0.39	0.505
Radium-228	pCi/L	03/26/2013	N002	0	- 0	0.586		J #	0.38	0.291
Specific Conductance	umhos /cm	03/26/2013	N001	0	- 0	630		#		
Specific Conductance	umhos /cm	03/26/2013	N002	0	- 0	625		#		
Temperature	C	03/26/2013	N001	0	- 0	6.3		#		
Temperature	C	03/26/2013	N002	0	- 0	8.1		#		

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0819 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)	Lab		Data	QA			
Turbidity	NTU	03/26/2013	N001	0	- 0	2.11			#		
Turbidity	NTU	03/26/2013	N002	0	- 0	1.44			#		
Uranium	mg/L	03/26/2013	N001	0	- 0	0.0001			#	0.000029	
Uranium	mg/L	03/26/2013	N002	0	- 0	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0820 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft	BLS)			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0	- 0	172				#		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N002	0	- 0	162				#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0	- 0	0.81				#		
Chlorine, Total Residual	mg/L	03/26/2013	N002	0	- 0	0.8				#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0	- 0	1.8				#		
Dissolved Oxygen	mg/L	03/26/2013	N002	0	- 0	1.81				#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0	- 0	565				#		
Oxidation Reduction Potential	mV	03/26/2013	N002	0	- 0	610				#		
pH	s.u.	03/26/2013	N001	0	- 0	8.57				#		
pH	s.u.	03/26/2013	N002	0	- 0	8.62				#		
Radium-226	pCi/L	03/26/2013	N001	0	- 0	0.482				#	0.14	0.232
Radium-226	pCi/L	03/26/2013	N002	0	- 0	0.576				#	0.14	0.261
Radium-228	pCi/L	03/26/2013	N001	0	- 0	0.39		U		#	0.39	0.257
Radium-228	pCi/L	03/26/2013	N002	0	- 0	0.374			U	#	0.37	0.25
Specific Conductance	umhos /cm	03/26/2013	N001	0	- 0	620				#		
Specific Conductance	umhos /cm	03/26/2013	N002	0	- 0	620				#		
Temperature	C	03/26/2013	N001	0	- 0	8.5				#		
Temperature	C	03/26/2013	N002	0	- 0	8.3				#		

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0820 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Turbidity	NTU	03/26/2013	N001	0 - 0	0.74			#		
Turbidity	NTU	03/26/2013	N002	0 - 0	0.81			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.00012			#	0.000029	
Uranium	mg/L	03/26/2013	N002	0 - 0	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0821 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	184			#		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N002	0 - 0	172			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.77			#		
Chlorine, Total Residual	mg/L	03/26/2013	N002	0 - 0	0.78			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	2.48			#		
Dissolved Oxygen	mg/L	03/26/2013	N002	0 - 0	2.52			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	575			#		
Oxidation Reduction Potential	mV	03/26/2013	N002	0 - 0	585			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.63			#		
pH	s.u.	03/26/2013	N002	0 - 0	8.78			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	1.03			#	0.18	0.386
Radium-226	pCi/L	03/26/2013	N002	0 - 0	0.601			#	0.14	0.265
Radium-228	pCi/L	03/26/2013	N001	0 - 0	1.23			#	0.38	0.407
Radium-228	pCi/L	03/26/2013	N002	0 - 0	0.42	U		#	0.42	0.255
Specific Conductance	umhos/cm	03/26/2013	N001	0 - 0	620			#		
Specific Conductance	umhos/cm	03/26/2013	N002	0 - 0	620			#		
Temperature	C	03/26/2013	N001	0 - 0	6.7			#		
Temperature	C	03/26/2013	N002	0 - 0	8.2			#		

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0821 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Turbidity	NTU	03/26/2013	N001	0 - 0	2.32			#		
Turbidity	NTU	03/26/2013	N002	0 - 0	1.31			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.00008	B		#	0.000029	
Uranium	mg/L	03/26/2013	N002	0 - 0	0.00009	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0829 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	165			#		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N002	0 - 0	165			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.16			#		
Chlorine, Total Residual	mg/L	03/26/2013	N002	0 - 0	0.82			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	3.31			#		
Dissolved Oxygen	mg/L	03/26/2013	N002	0 - 0	7.67			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	350			#		
Oxidation Reduction Potential	mV	03/26/2013	N002	0 - 0	535			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.9			#		
pH	s.u.	03/26/2013	N002	0 - 0	8.99			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	0.559			#	0.16	0.257
Radium-226	pCi/L	03/26/2013	N002	0 - 0	0.58			#	0.14	0.258
Radium-228	pCi/L	03/26/2013	N001	0 - 0	0.49	U		#	0.49	0.322
Radium-228	pCi/L	03/26/2013	N002	0 - 0	0.51	U		#	0.51	0.311
Specific Conductance	umhos/cm	03/26/2013	N001	0 - 0	640			#		
Specific Conductance	umhos/cm	03/26/2013	N002	0 - 0	605			#		
Temperature	C	03/26/2013	N001	0 - 0	5.9			#		
Temperature	C	03/26/2013	N002	0 - 0	9.7			#		

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0829 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Turbidity	NTU	03/26/2013	N001	0 - 0	2.25			#		
Turbidity	NTU	03/26/2013	N002	0 - 0	2.25			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.0001			#	0.000029	
Uranium	mg/L	03/26/2013	N002	0 - 0	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0830 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	180			#		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N002	0 - 0	210			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.82			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	2.57			#		
Dissolved Oxygen	mg/L	03/26/2013	N002	0 - 0	2.61			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	605			#		
Oxidation Reduction Potential	mV	03/26/2013	N002	0 - 0	590			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.71			#		
pH	s.u.	03/26/2013	N002	0 - 0	8.92			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	0.904			#	0.16	0.355
Radium-226	pCi/L	03/26/2013	N002	0 - 0	0.539			#	0.15	0.25
Radium-228	pCi/L	03/26/2013	N001	0 - 0	0.615		J	#	0.5	0.356
Radium-228	pCi/L	03/26/2013	N002	0 - 0	0.638		J	#	0.34	0.279
Specific Conductance	umhos /cm	03/26/2013	N001	0 - 0	630			#		
Specific Conductance	umhos /cm	03/26/2013	N002	0 - 0	615			#		
Temperature	C	03/26/2013	N001	0 - 0	10.8			#		
Temperature	C	03/26/2013	N002	0 - 0	8.9			#		
Turbidity	NTU	03/26/2013	N001	0 - 0	1.26			#		
Turbidity	NTU	03/26/2013	N002	0 - 0	2.15			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.0001			#	0.000029	
Uranium	mg/L	03/26/2013	N002	0 - 0	0.00008	B		#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0834 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0	-	0	192			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0	-	0	0.78			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0	-	0	2.53			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0	-	0	565			#		
pH	s.u.	03/26/2013	N001	0	-	0	8.73			#		
Radium-226	pCi/L	03/26/2013	N001	0	-	0	0.595			#	0.15	0.268
Radium-228	pCi/L	03/26/2013	N001	0	-	0	0.473		J	#	0.37	0.266
Specific Conductance	umhos/cm	03/26/2013	N001	0	-	0	620			#		
Temperature	C	03/26/2013	N001	0	-	0	7.8			#		
Turbidity	NTU	03/26/2013	N001	0	-	0	0.65			#		
Uranium	mg/L	03/26/2013	N001	0	-	0	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site

REPORT DATE: 6/19/2013

Location: 0837 DOMESTIC SUPPLY Domestic System, Tap Location

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N001	0 - 0	194			#		
Chlorine, Total Residual	mg/L	03/26/2013	N001	0 - 0	0.81			#		
Dissolved Oxygen	mg/L	03/26/2013	N001	0 - 0	8.23			#		
Oxidation Reduction Potential	mV	03/26/2013	N001	0 - 0	480			#		
pH	s.u.	03/26/2013	N001	0 - 0	8.85			#		
Radium-226	pCi/L	03/26/2013	N001	0 - 0	0.43		J	#	0.15	0.22
Radium-226	pCi/L	03/26/2013	N002	0 - 0	0.48			#	0.15	0.232
Radium-228	pCi/L	03/26/2013	N001	0 - 0	0.518		J	#	0.39	0.286
Radium-228	pCi/L	03/26/2013	N002	0 - 0	0.4	U		#	0.4	0.272
Specific Conductance	umhos /cm	03/26/2013	N001	0 - 0	630			#		
Temperature	C	03/26/2013	N001	0 - 0	8			#		
Turbidity	NTU	03/26/2013	N001	0 - 0	0.77			#		
Uranium	mg/L	03/26/2013	N001	0 - 0	0.00008	B		#	0.000029	
Uranium	mg/L	03/26/2013	N002	0 - 0	0.0001			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013
 Location: 0843 DOMESTIC SUPPLY

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	03/26/2013	N002	0	-	0	172			#		
Chlorine, Total Residual	mg/L	03/26/2013	N002	0	-	0	0.74			#		
Dissolved Oxygen	mg/L	03/26/2013	N002	0	-	0	9.06			#		
Oxidation Reduction Potential	mV	03/26/2013	N002	0	-	0	590			#		
pH	s.u.	03/26/2013	N002	0	-	0	8.36			#		
Radium-226	pCi/L	03/26/2013	N002	0	-	0	0.812			#	0.19	0.332
Radium-228	pCi/L	03/26/2013	N002	0	-	0	1.01		J	#	0.38	0.364
Specific Conductance	umhos/cm	03/26/2013	N002	0	-	0	625			#		
Temperature	C	03/26/2013	N002	0	-	0	6.4			#		
Turbidity	NTU	03/26/2013	N002	0	-	0	2.38			#		
Uranium	mg/L	03/26/2013	N002	0	-	0	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.

Equipment Blank Data

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BLANKS REPORT

LAB: PARAGON/ALS LABORATORY GROUP (Fort Collins, CO)

RIN: 13035189

Report Date: 6/19/2013

Parameter	Site Code	Location ID	Sample		Units	Result	Qualifiers		Detection Limit	Uncertainty	Sample Type
			Date	ID			Lab	Data			
Manganese	RVT01	0999	03/28/2013	N001	mg/L	0.00011	U		0.00011		E
Molybdenum	RVT01	0999	03/28/2013	N001	mg/L	0.00032	U		0.00032		E
Sulfate	RVT01	0999	03/28/2013	N001	mg/L	0.69		J	0.5		E
Uranium	RVT01	0999	03/28/2013	N001	mg/L	0.00003	B		0.000029		E

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

SAMPLE TYPES:

- E Equipment Blank.

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Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE RVT01, Riverton Processing Site
 REPORT DATE: 6/19/2013

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
0101	O	4946.58	03/27/2013	10:32:00	11.00	4935.58
0110	O	4950.19	03/27/2013	10:33:00	14.43	4935.76
0111	O	4946.87	03/27/2013	10:30:00	11.11	4935.76
0700	U	4951.38	03/27/2013	17:02:00	5.99	4945.39
0702	D	4931.00	03/27/2013	13:30:00	6.47	4924.53
0705	D	4930.80	03/28/2013	13:40:18	6.70	4924.10
0707	D	4931.00	03/28/2013	14:00:14	5.67	4925.33
0709	D	4930.70	03/27/2013	13:35:00	5.00	4925.70
0710	U	4947.90	03/27/2013	11:40:57	7.10	4940.80
0716	O	4939.12	03/27/2013	09:20:52	9.23	4929.89
0717	O	4938.80	03/27/2013	08:55:51	9.00	4929.80
0718	D	4937.60	03/27/2013	16:50:14	7.85	4929.75
0719	D	4937.55	03/27/2013	16:30:00	7.57	4929.98
0720	C	4940.46	03/27/2013	15:45:22	5.65	4934.81
0721	C	4940.47	03/27/2013	15:25:40	7.78	4932.69
0722R		4937.06	03/28/2013	08:40:38	9.50	4927.56
0723	D	4936.01	03/28/2013	09:00:16	8.28	4927.73
0724	U	4941.36	03/27/2013	08:15:00	9.47	4931.89
0725	U	4941.66	03/27/2013	08:19:00	9.82	4931.84
0726	U	4942.00	03/27/2013	08:17:00	7.70	4934.30
0727	U	4951.69	03/27/2013	08:05:00	11.65	4940.04
0728	U	4946.01	03/27/2013	08:12:00	10.25	4935.76
0729	D	4932.75	03/28/2013	09:35:24	7.90	4924.85
0730	D	4933.08	03/28/2013	09:50:32	8.12	4924.96
0732	U	4945.07	03/27/2013	09:35:00	8.15	4936.92
0733	U	4946.76	03/27/2013	14:27:00	9.61	4937.15
0734	U	4946.08	03/27/2013	14:28:00	10.34	4935.74
0736	U	4946.00	03/27/2013	12:51:00	7.93	4938.07

STATIC WATER LEVELS (USEE700) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 6/19/2013

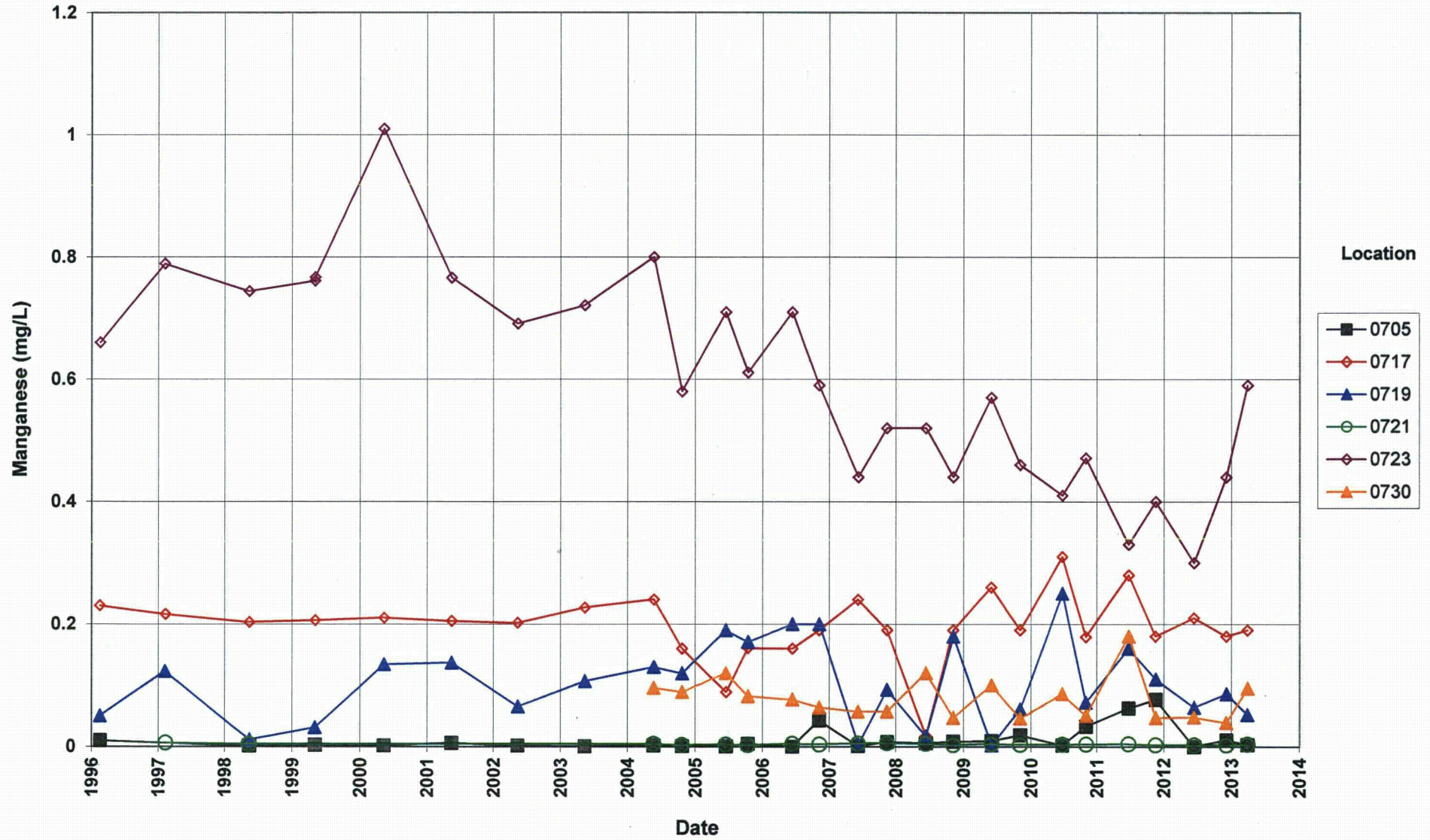
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
0784	U	4945.45	03/27/2013	09:55:34	6.50	4938.95
0788	C	4935.09	03/28/2013	13:15:47	8.57	4926.52
0789	D	4933.66	03/28/2013	16:10:42	9.28	4924.38
0824		4928.27	03/28/2013	11:00:23	6.36	4921.91
0826		4936.98	03/28/2013	12:45:19	7.05	4929.93

FLOW CODES: C CROSS GRADIENT D DOWN GRADIENT
 O ON SITE U UPGRADIENT

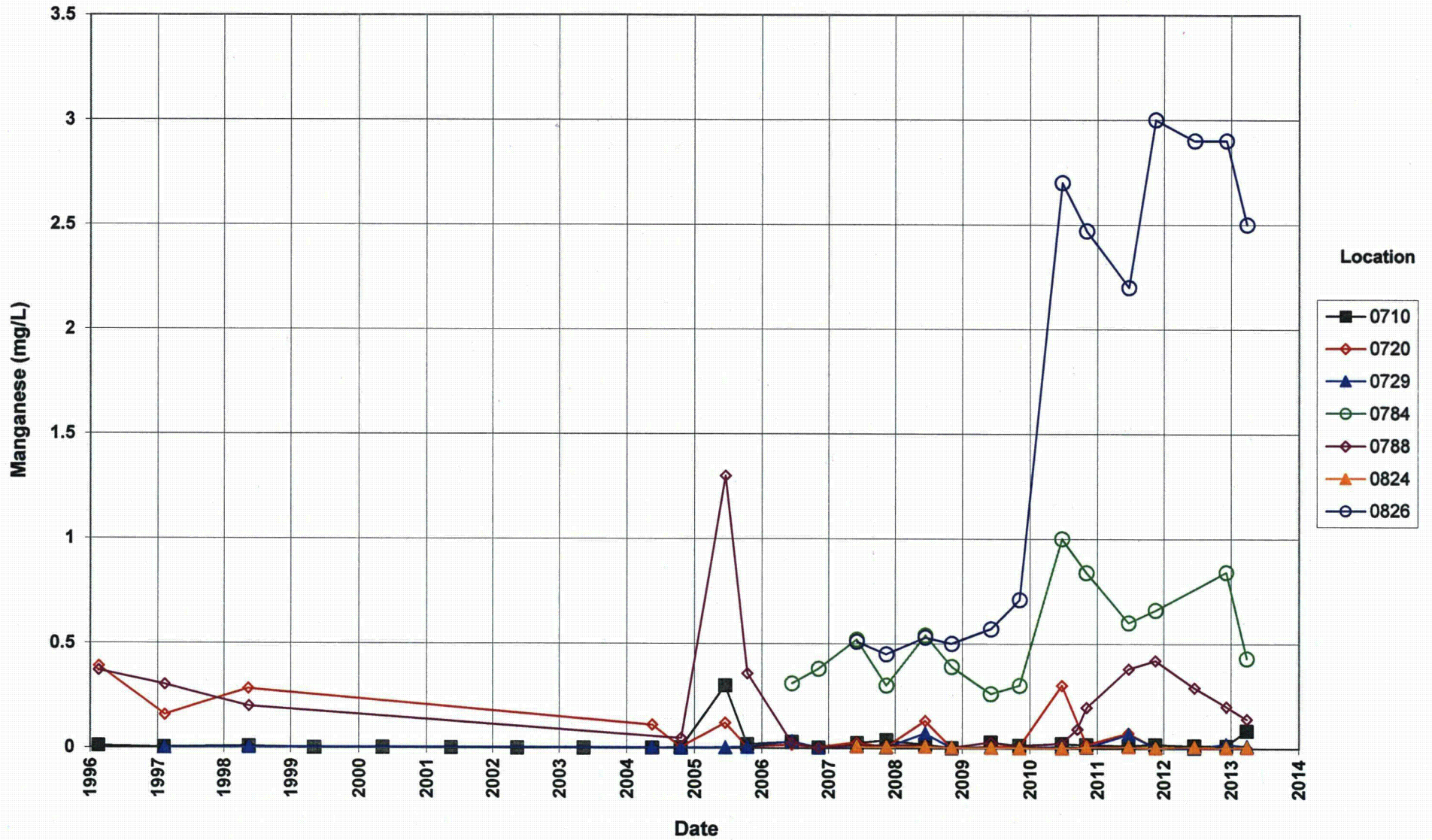
Time-Concentration Graphs

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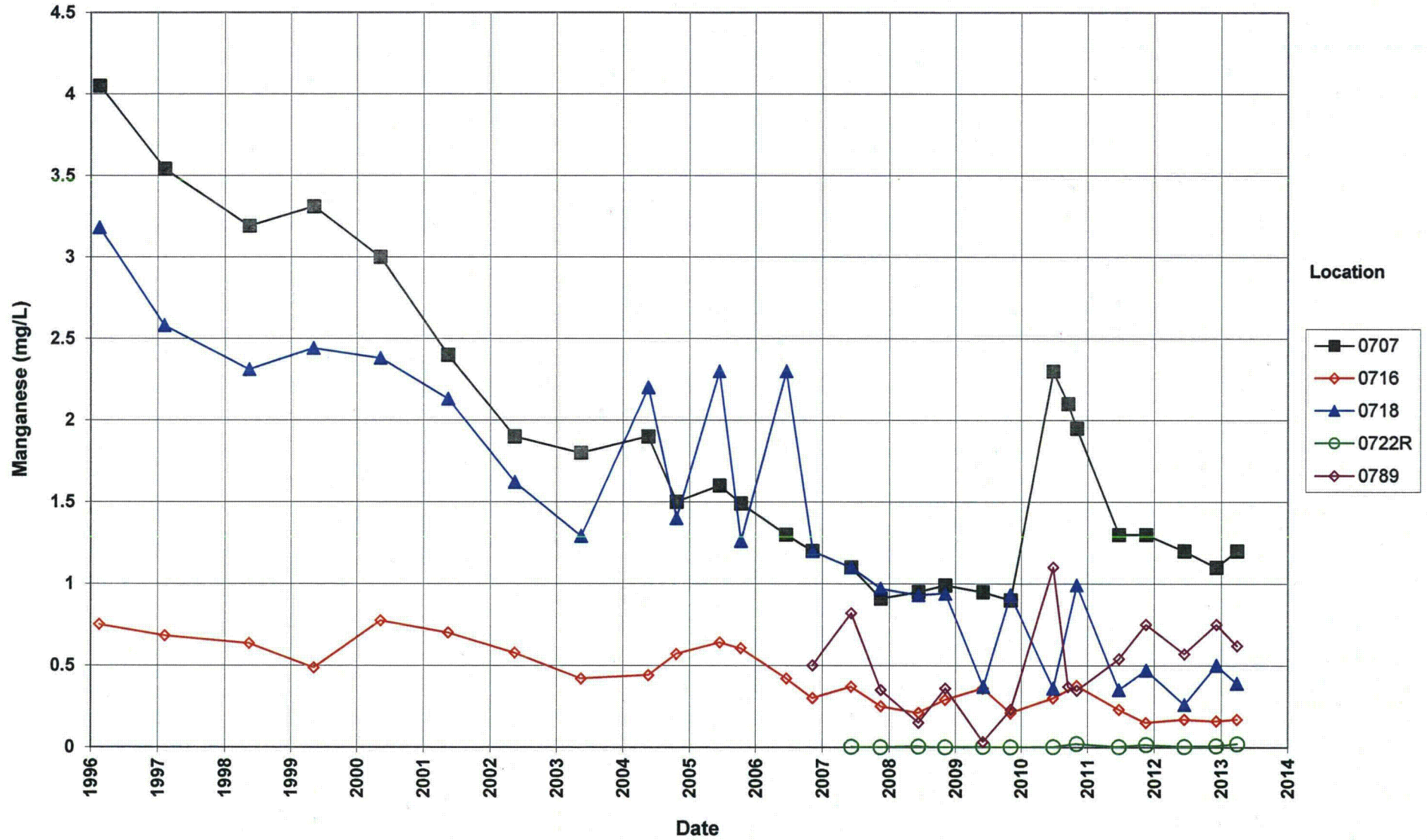
Riverton Processing Site Manganese Concentration Semi-Confined Aquifer Locations



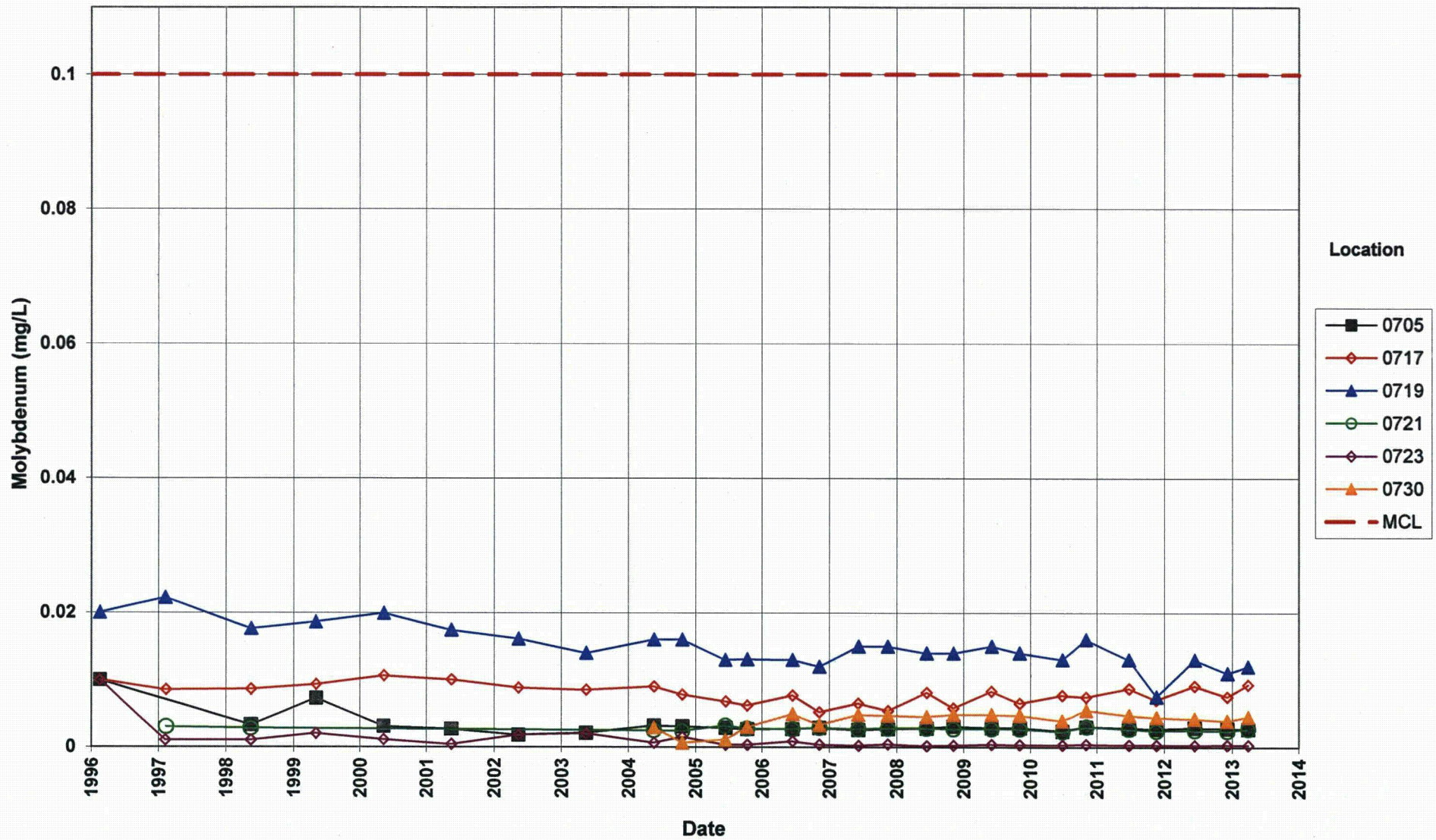
**Riverton Processing Site
Manganese Concentration
Surficial Aquifer Locations**



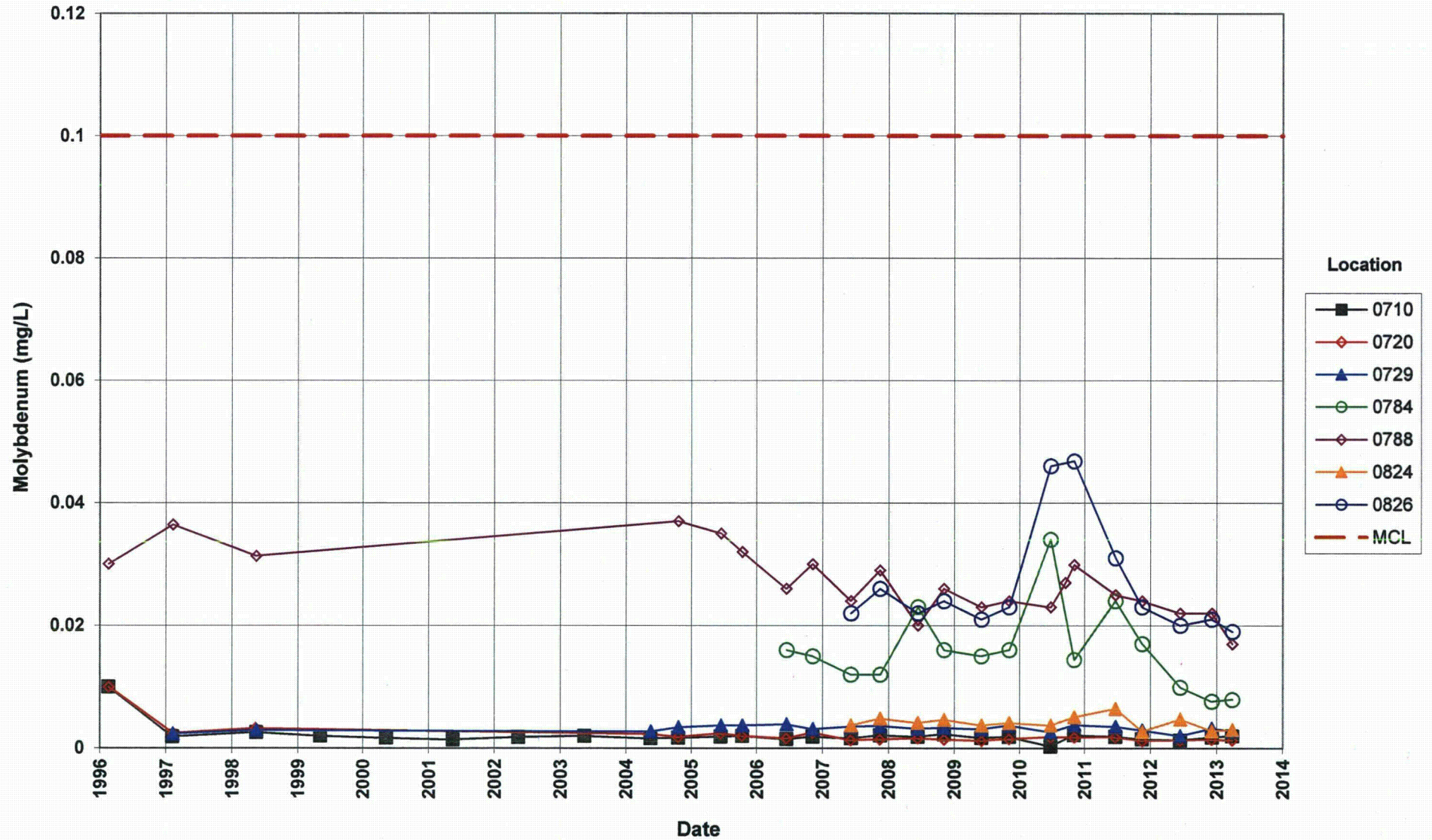
Riverton Processing Site
Manganese Concentration
Surficial Aquifer Locations



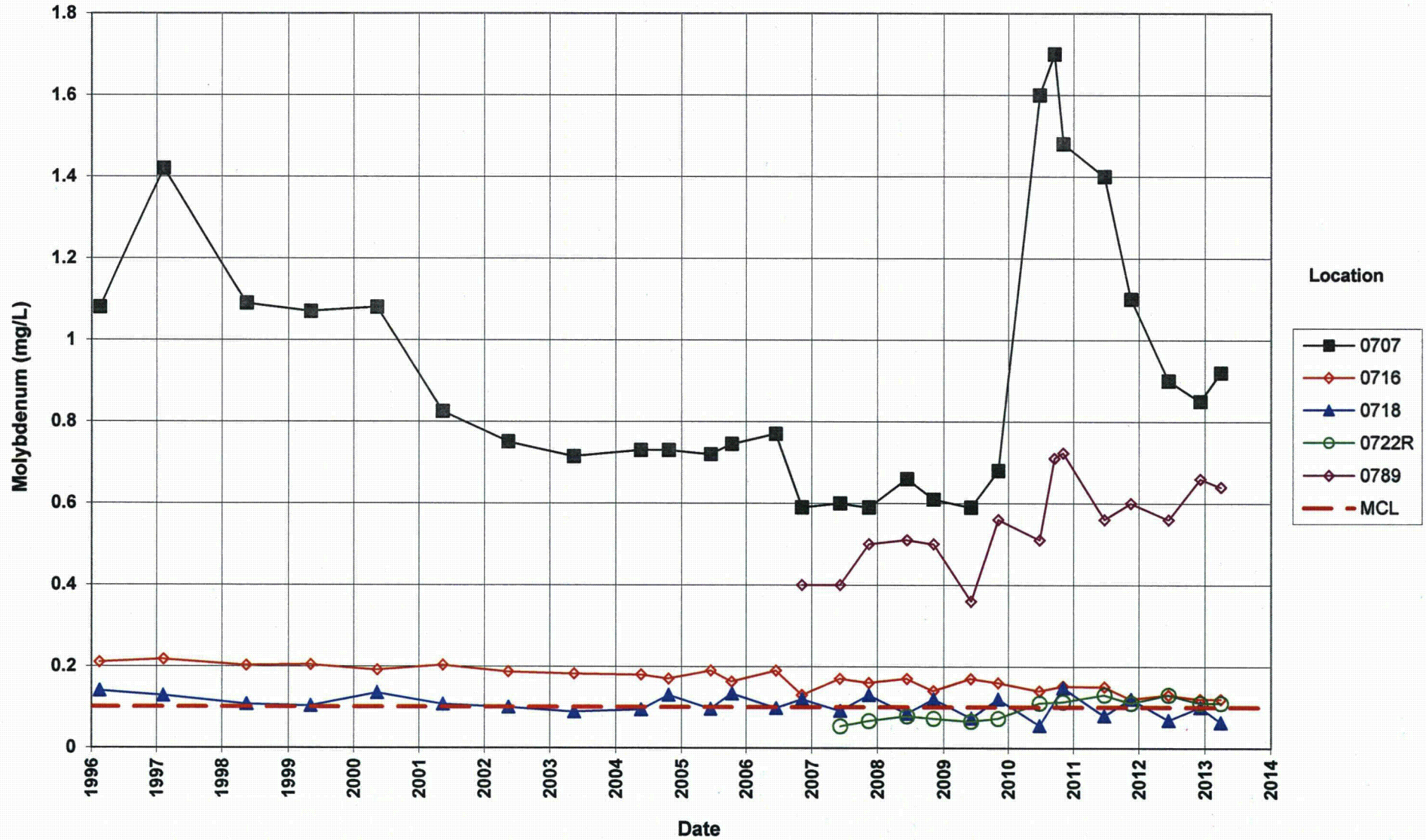
Riverton Processing Site
Molybdenum Concentration
Semi-confined Aquifer Locations
Maximum Concentration Limit (MCL) = 0.1 mg/L



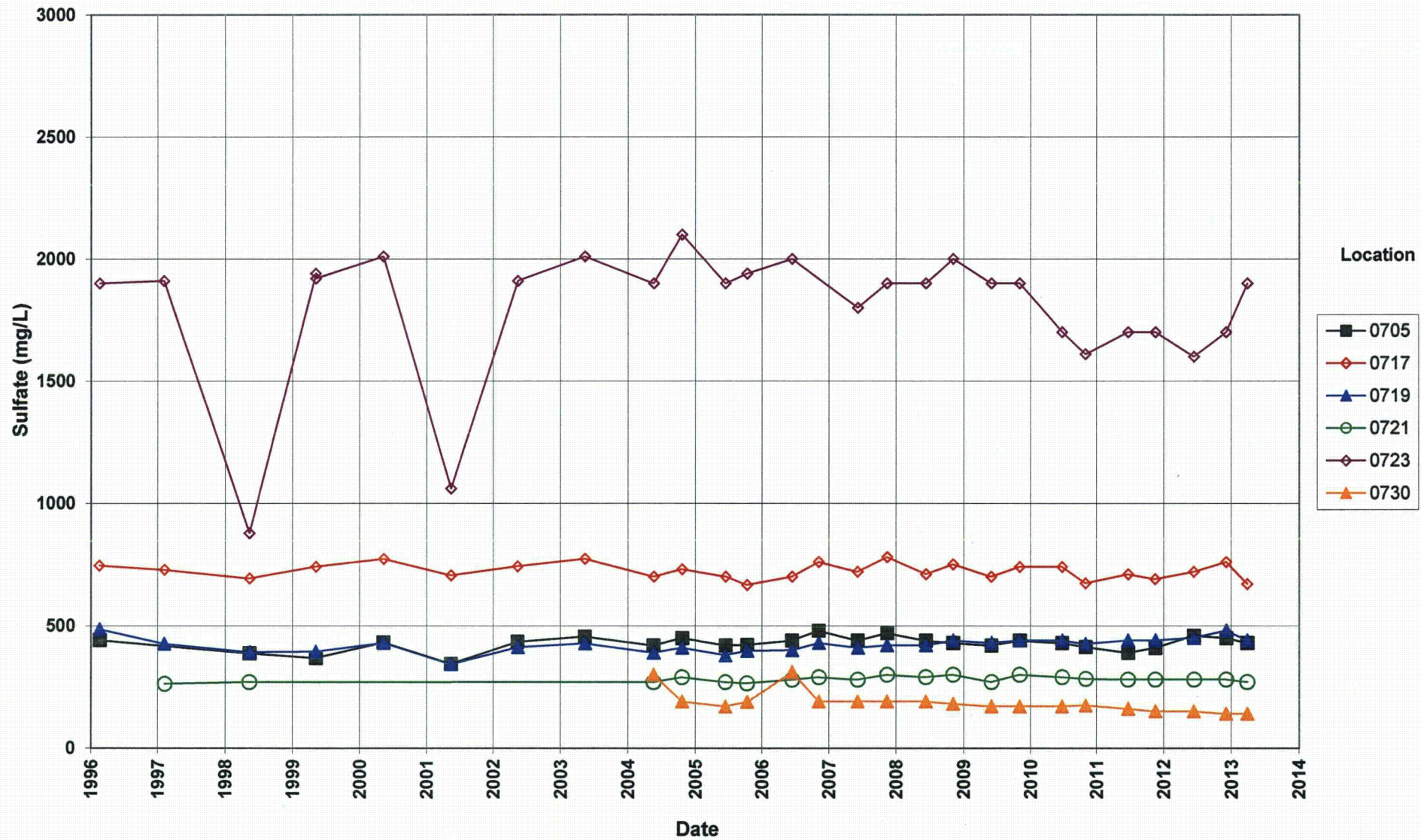
Riverton Processing Site
Molybdenum Concentration
 Surficial Aquifer Locations
 Maximum Concentration Limit (MCL) = 0.1 mg/L



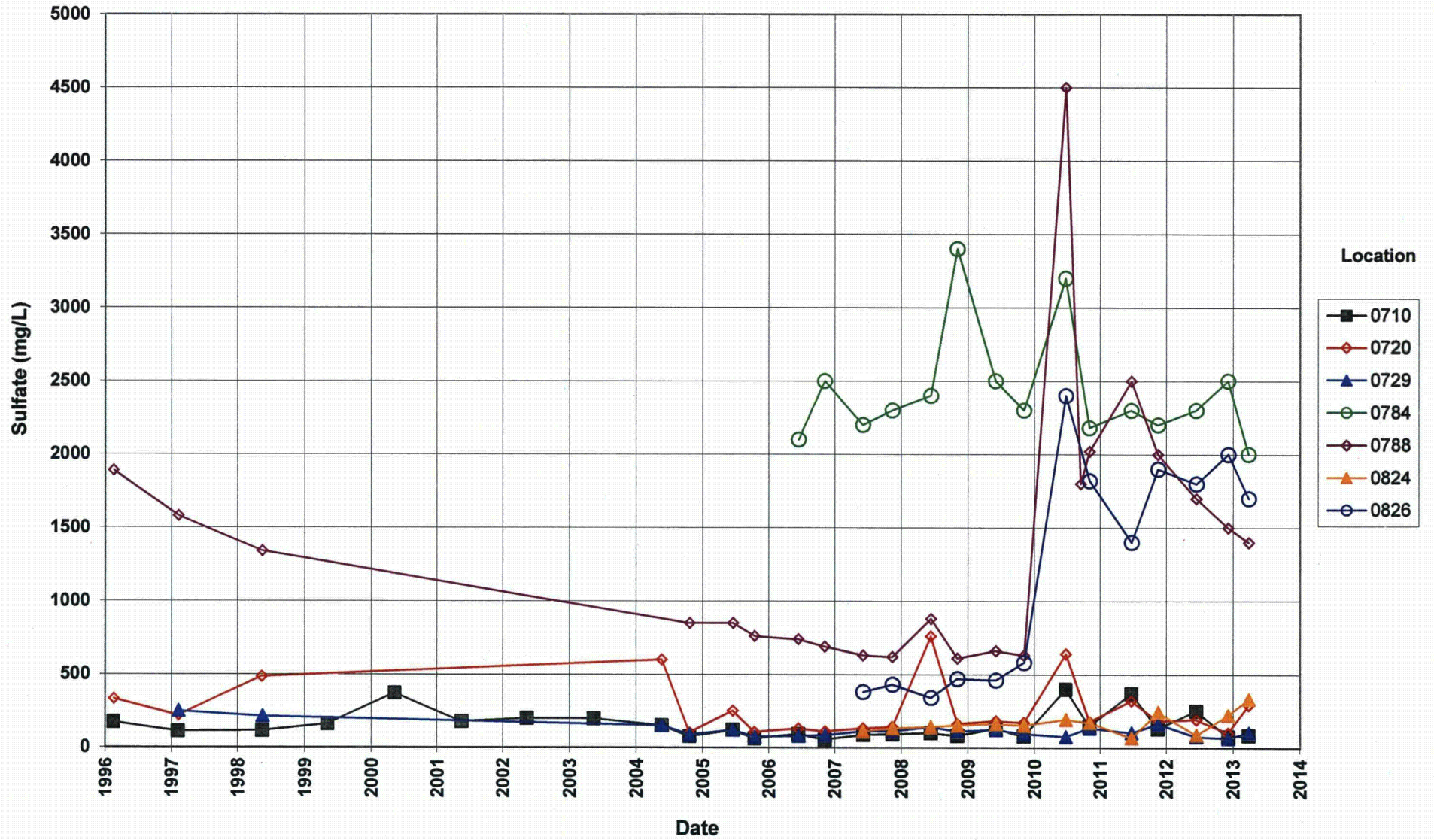
Riverton Processing Site
Molybdenum Concentration
 Surficial Aquifer Locations
 Maximum Concentration Limit (MCL) = 0.1 mg/L



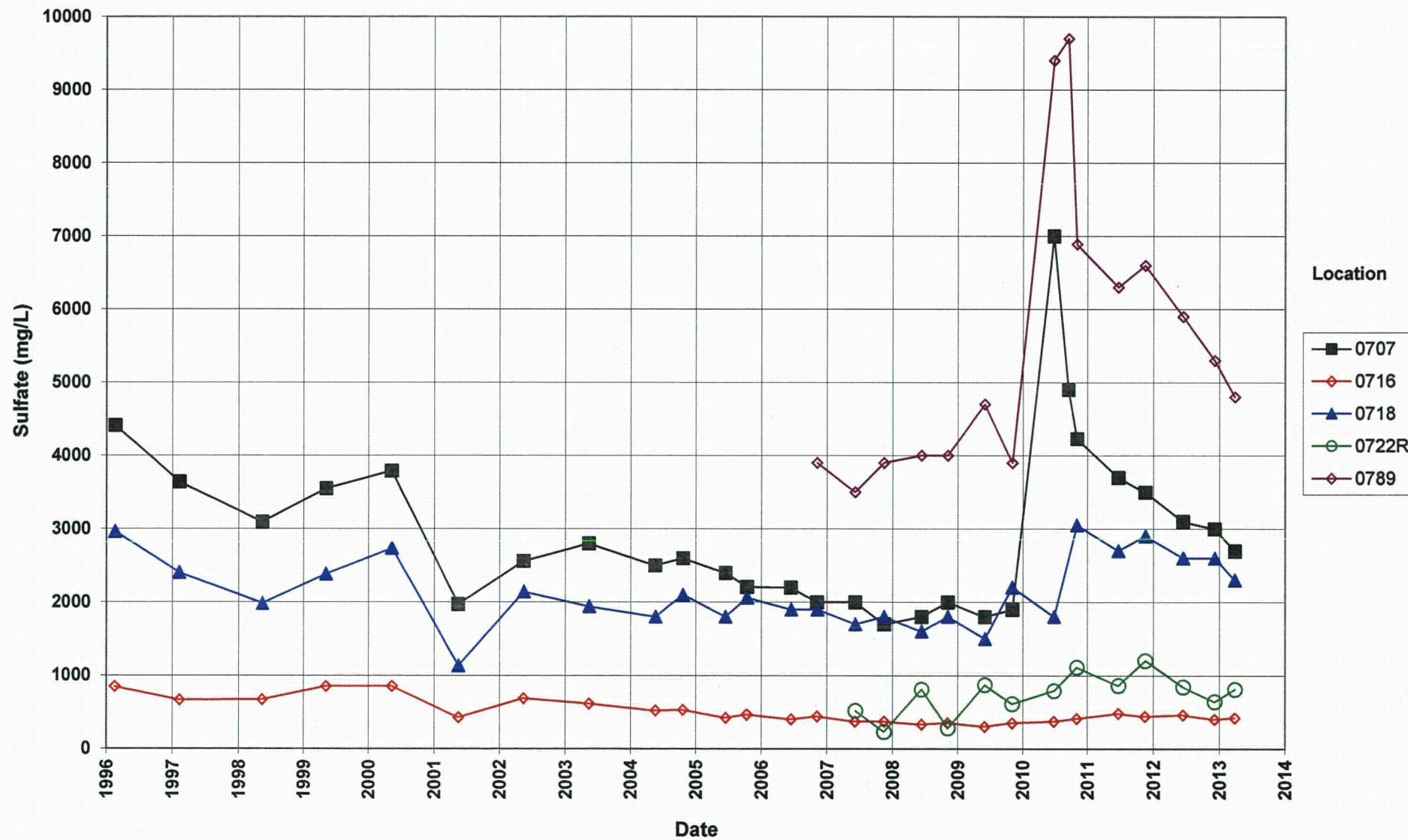
**Riverton Processing Site
Sulfate Concentration
Semi-Confined Aquifer Locations**



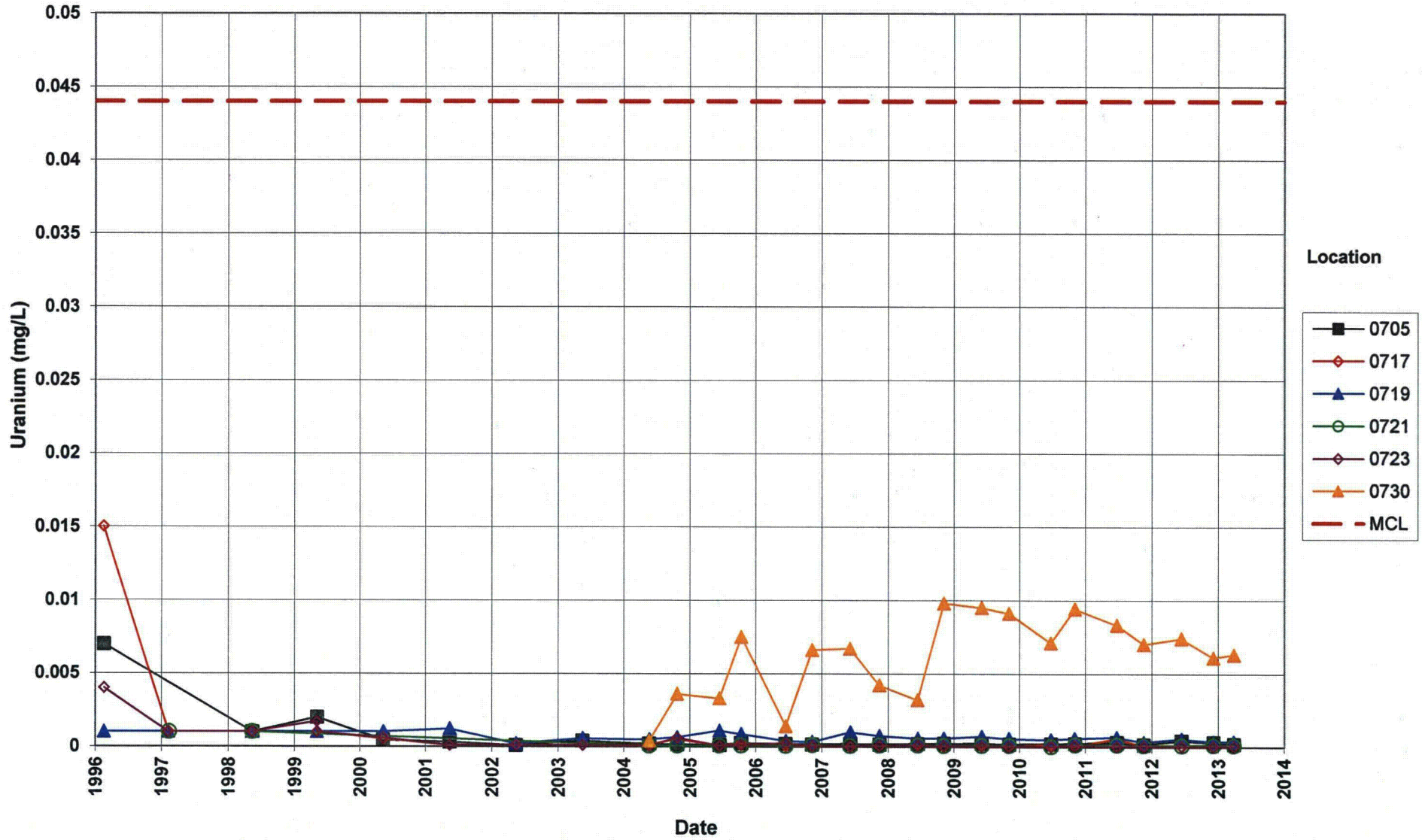
Riverton Processing Site
Sulfate Concentration
Surficial Aquifer Locations



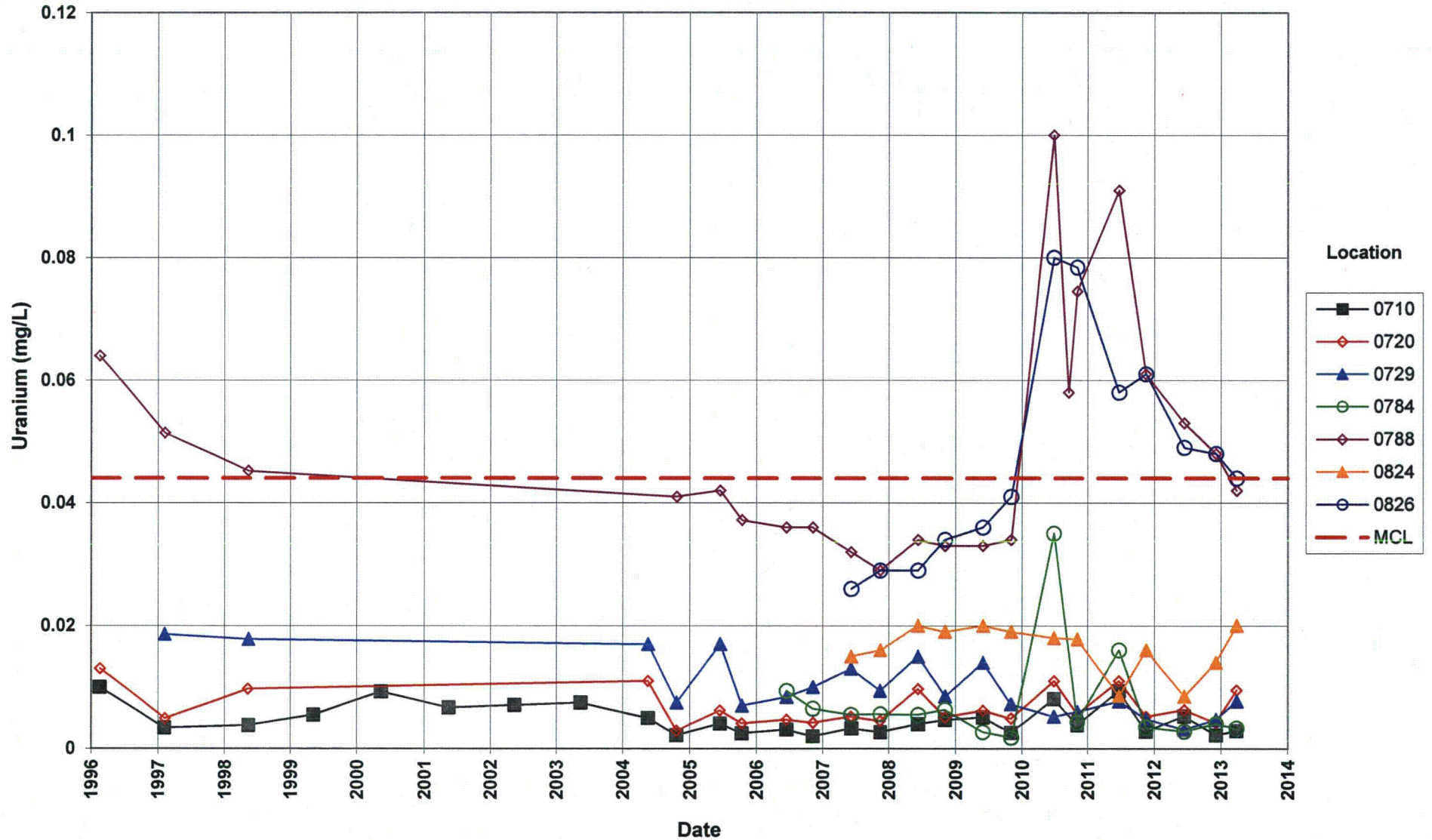
Riverton Processing Site
Sulfate Concentration
 Surficial Aquifer Locations



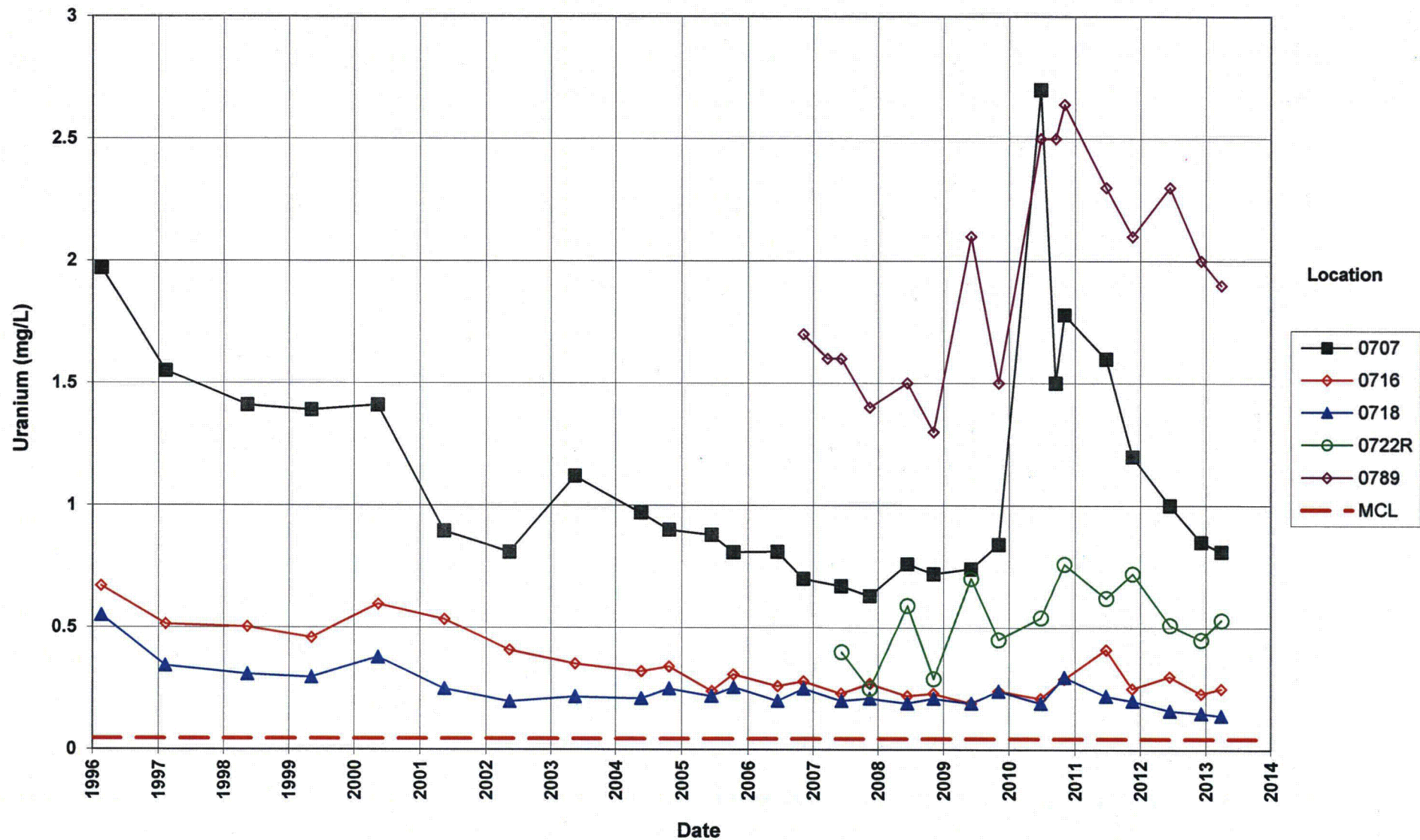
Riverton Processing Site
Uranium Concentration
Semi-Confined Aquifer Locations
Maximum Concentration Limit (MCL) = 0.044 mg/L



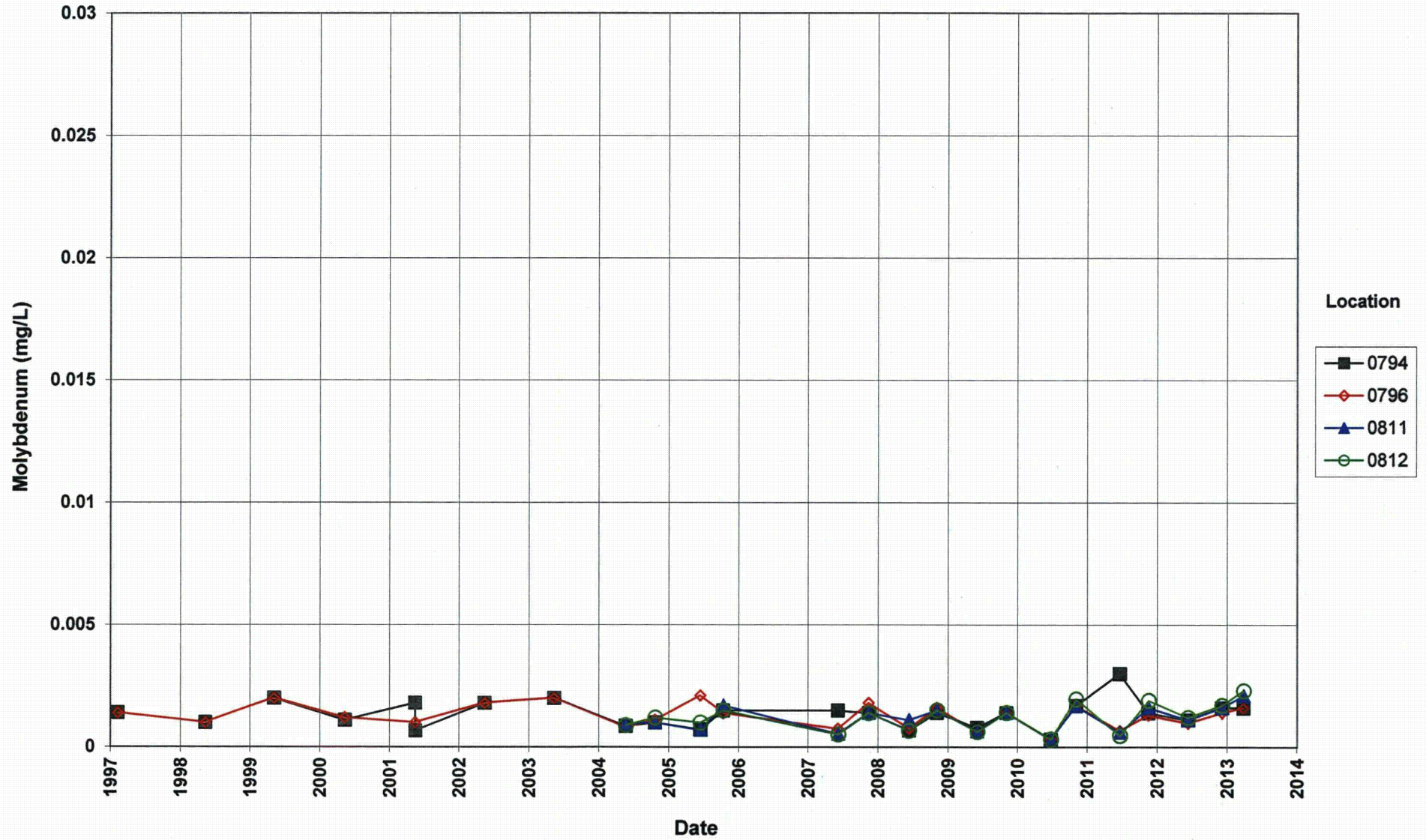
Riverton Processing Site
Uranium Concentration
 Surficial Aquifer Locations
 Maximum Concentration Limit (MCL) = 0.044 mg/L



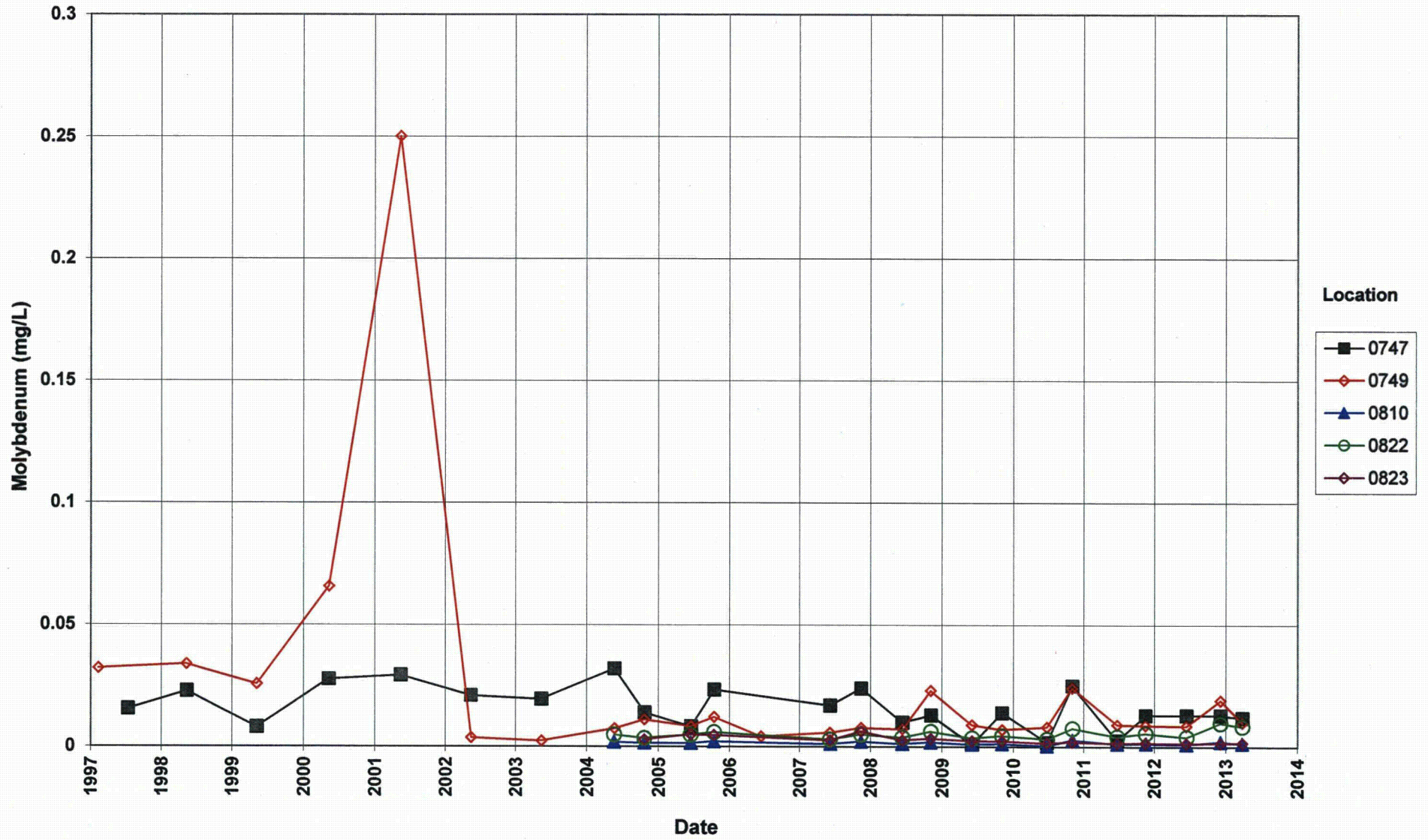
Riverton Processing Site
Uranium Concentration
 Surficial Aquifer Locations
 Maximum Concentration Limit (MCL) = 0.044 mg/L



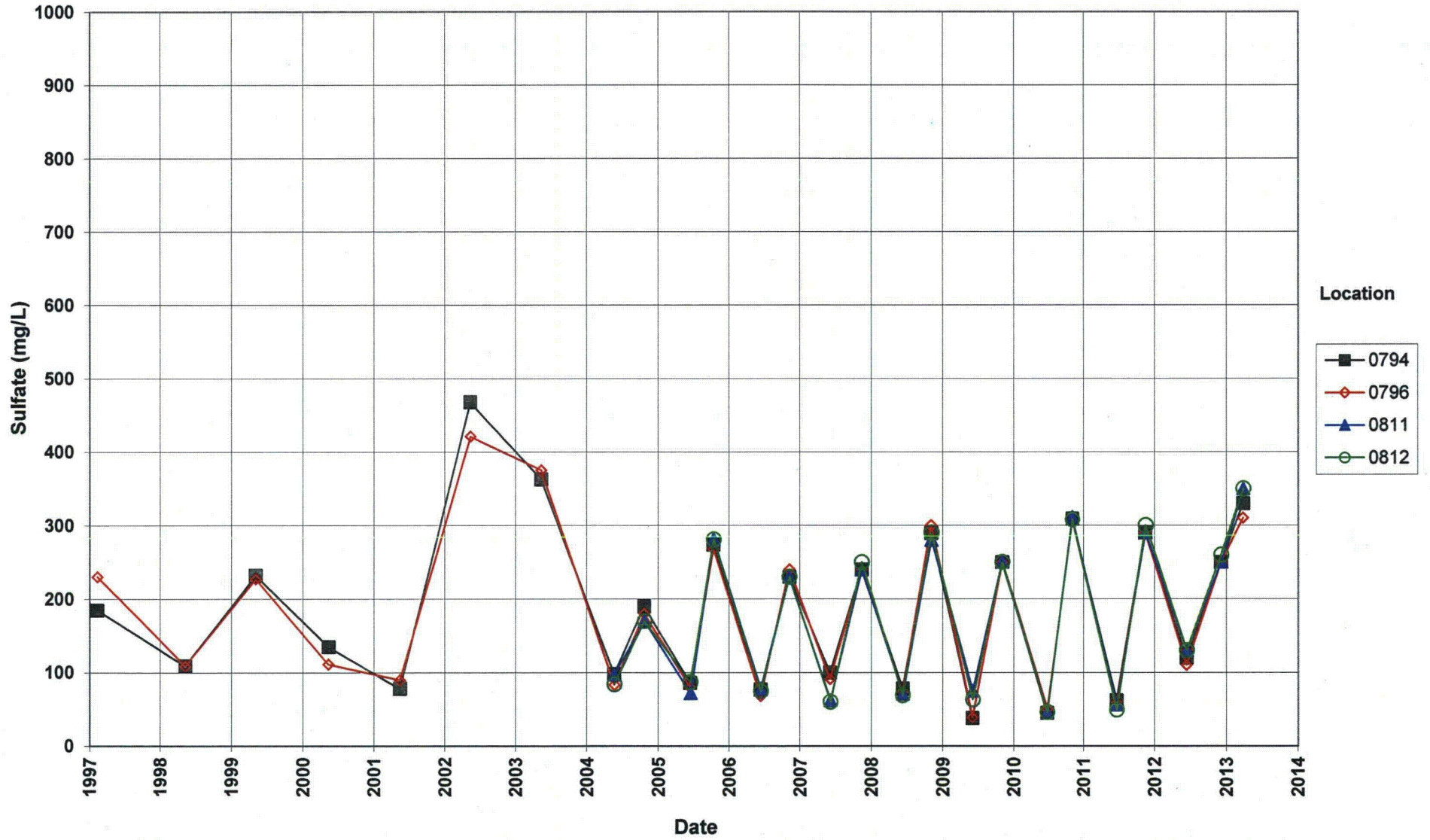
Riverton Processing Site
Molybdenum Concentration
Little Wind River Surface Water Locations



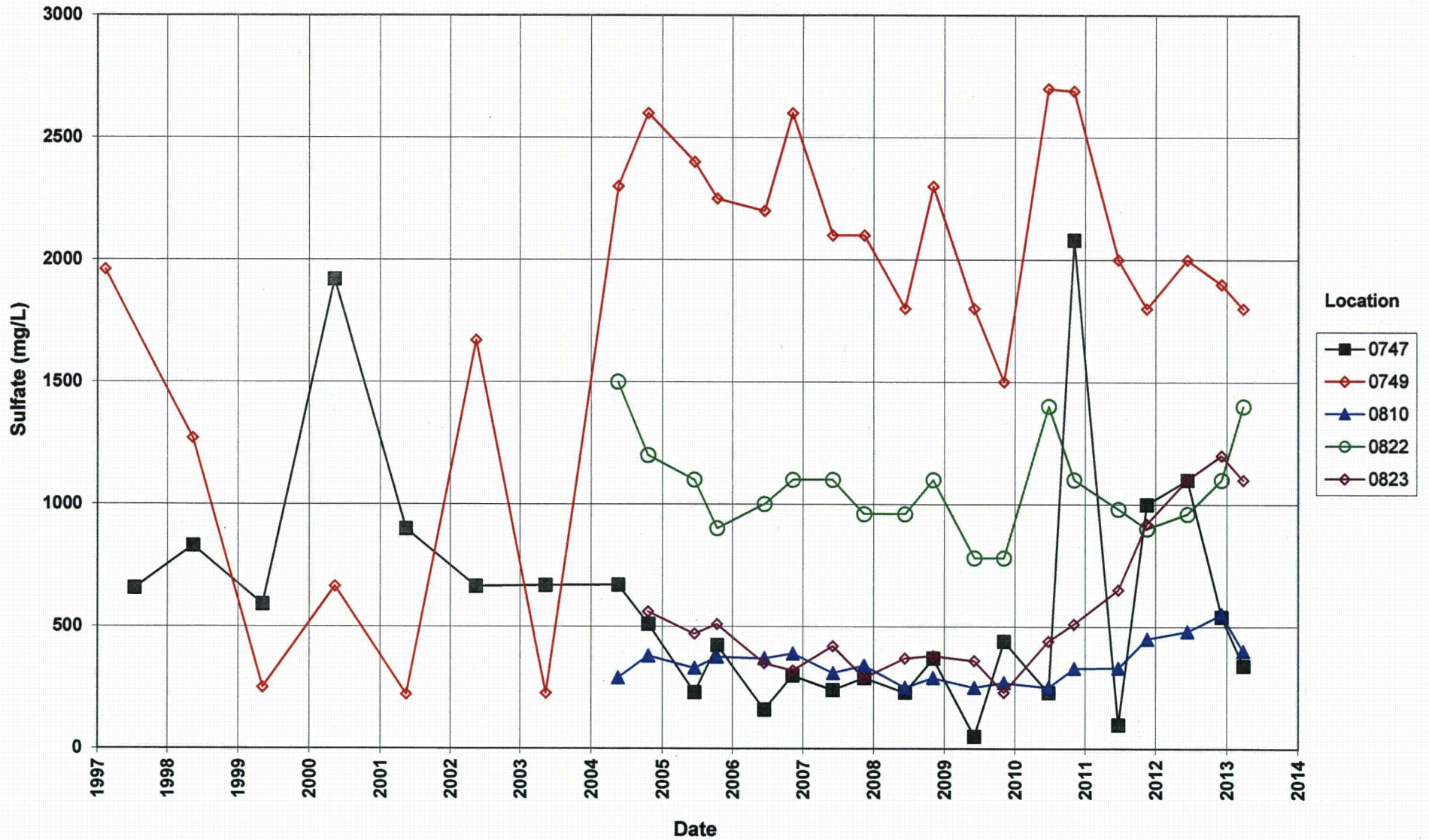
Riverton Processing Site
Molybdenum Concentration
Oxbow Lake, Wetlands, Ditch & Pond Surface Water Locations



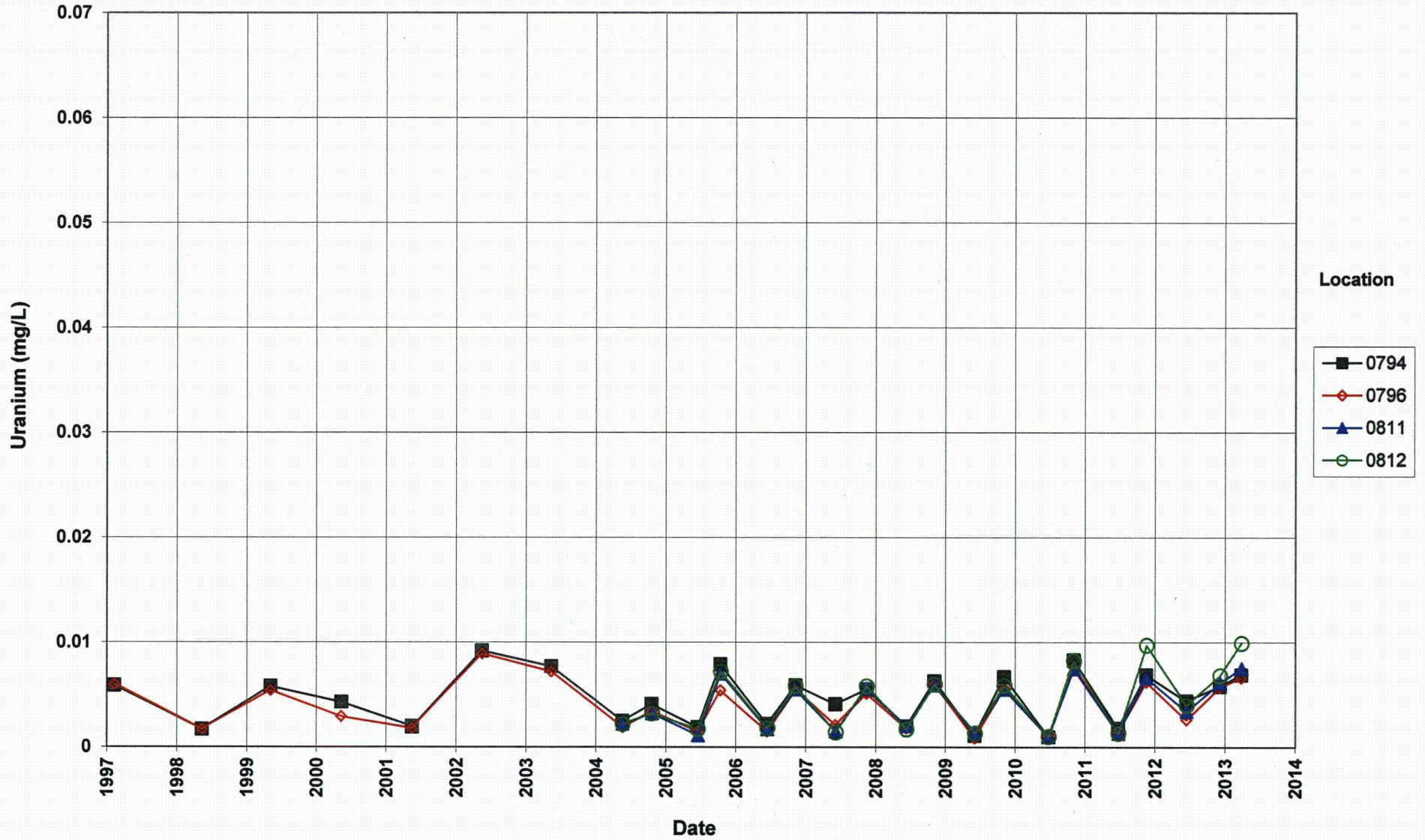
**Riverton Processing Site
Sulfate Concentration**
Little Wind River Surface Water Locations



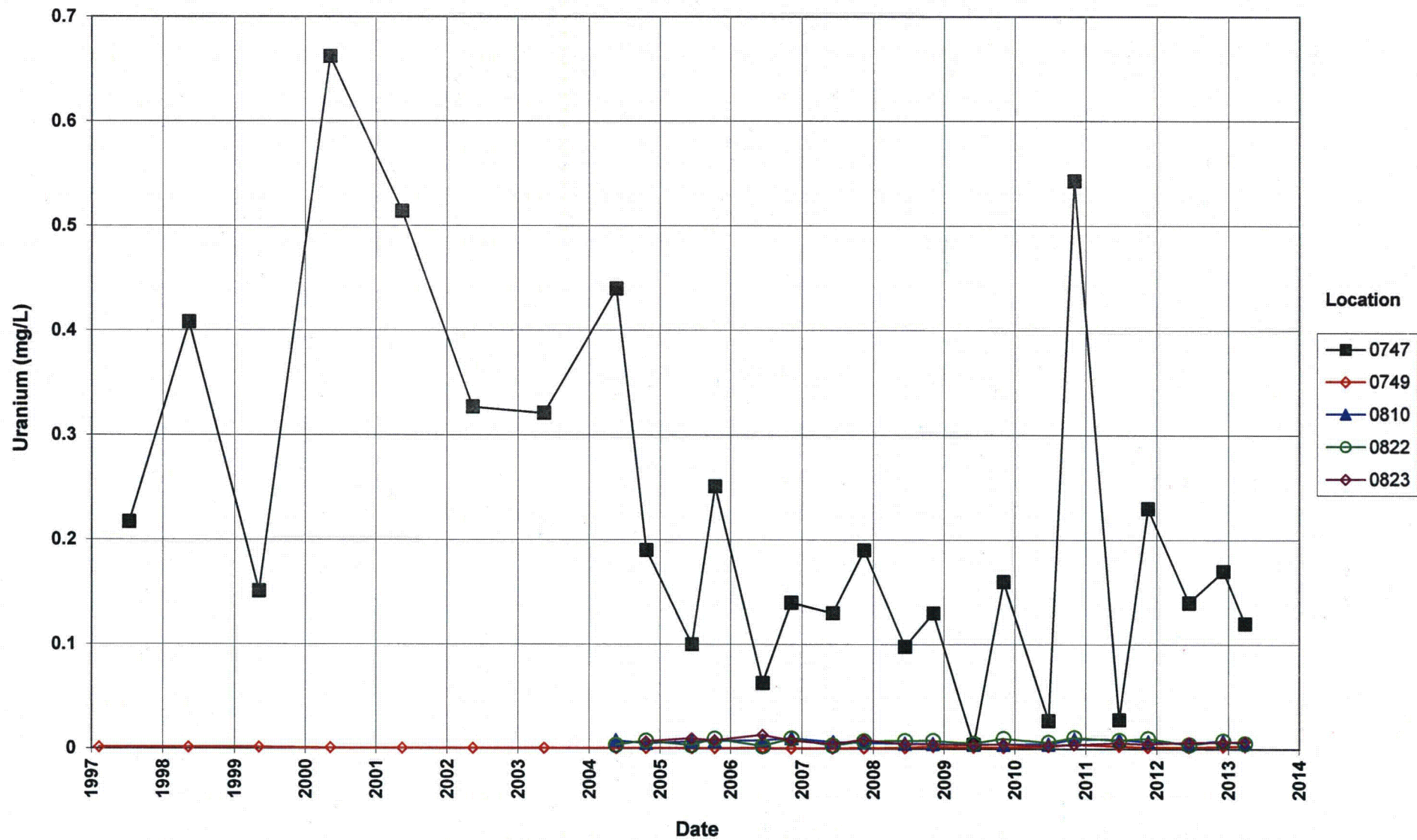
Riverton Processing Site
Sulfate Concentration
 Oxbow Lake, Wetlands, Ditch & Pond Surface Water Locations



Riverton Processing Site
Uranium Concentration
Little Wind River Surface Water Locations



Riverton Processing Site
Uranium Concentration
Oxbow Lake, Wetlands, Ditch & Pond Surface Water Locations



Attachment 3
Sampling and Analysis Work Order

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established 1959

Task Order LM00-501
Control Number 13-0388

March 6, 2013

U.S. Department of Energy
Office of Legacy Management
ATTN: William Dam
Site Manager
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
March 2013 Environmental Sampling at the Riverton, Wyoming, Processing Site

REFERENCE: Task Order LM-501-02-117-402, Riverton, Wyoming, Processing Site

Dear Mr. Dam:

The purpose of this letter is to inform you of the upcoming sampling event at Riverton, Wyoming. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Riverton processing Site. Water quality data will be collected from monitoring wells, domestic wells, and surface locations; flushing of the Alternate Water Supply System also will occur as part of the routine environmental sampling currently scheduled to begin the week of March 25, 2013.

The following lists show the monitoring wells (with zone of completion), surface locations, domestic wells, and water supply system locations scheduled to be sampled during this event.

Monitoring Wells*

705 Se	716 Sf	719 Se	722R Sf	730 Se	788 Sf	824 Sf
707 Sf	717 Se	720 Sf	723 Se	784 Sf	789 Sf	826 Sf
710 Sf	718 Sf	721 Se	729 Sf			

*NOTE: Se = Semi-confined sandstone; Sf = surficial

Surface Locations

747	794	810	811	812	822	823
749	796					

Domestic Wells

405	430	436	460	828	841	842
422						

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248-6000 Fax (970) 248-6040

William Dam
Control Number 13-0388
Page 2

Alternate Water Supply System

813	815	818	820	829	834	843
814	816	819	821	830	837	

All routine monitoring samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites. Alternate Water Supply System* samples will be collected as directed in the *Alternate Water Supply System Flushing Plan Riverton, Wyoming*. Access agreements are being reviewed and are expected to be complete by the beginning of fieldwork.

Please contact me at (970) 248-6654 if you have any questions.

Sincerely,



Sam Campbell
Site Lead

SC/lcg/lb

Enclosures (3)

cc: (electronic)
Karl Stoeckle, DOE
Sam Campbell, Stoller
Steve Donovan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
EDD Delivery
rc-grand.junction
File: RVT 410.02 (A)

Constituent Sampling Breakdown

Site	Riverton		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
	Groundwater	Surface Water			
Approx. No. Samples/yr	138	36			
Field Measurements					
Alkalinity	X	X			
Dissolved Oxygen	X	X			
Redox Potential	X	X			
Residual Chlorine					
pH	X	X			
Specific Conductance	X	X			
Turbidity	X	X			
Temperature	X	X			
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)					
Calcium					
Chloride					
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese	X	X	0.005	SW-846 6010	LMM-01
Molybdenum	X	X	0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N					
Potassium					
Radium-226		0822 only	1 pCi/L	Gas Proportional Counter	GPC-A-018
Radium-228		0822 only	1 pCi/L	Gas Proportional Counter	GPC-A-020
Selenium					
Silica					
Sodium					
Strontium					
Sulfate	X	X	0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	4	6			

Note: All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

**Sampling Frequencies for Locations at
Riverton, Wyoming**

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
101					X	WL only
110					X	WL only
111					X	WL only
700					X	WL only
702					X	Data logger
705	X					
707	X					Data logger
709					X	WL only; Data logger
710	X					
716	X					
717	X					
718	X					
719	X					
720	X					
721	X					
722R	X					
723	X					
724					X	WL only
725					X	WL only
726					X	WL only
727					X	WL only
728					X	WL only
729	X					
730	X					
732					X	WL only
733					X	WL only
734					X	WL only
736					X	WL only
784	X					
788	X					
789	X					Data logger
824	X					
826	X					
Surface Locations						
747	X					
749	X					
794	X					
796	X					
810	X					Gravel pit
811	X					Little Wind River
812	X					Little Wind River
822	X					
823	X					

**Sampling Frequencies for Locations at
Riverton, Wyoming**

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Domestic Wells						
405	X					921 Rendezvous Road
422	X					10 Whitetail Drive
430	X					204 Goes in Lodge Road
436	X					33 St Stephens Road
460	X					140 Goes in Lodge Road
828	X					33 St Stephens Road
841	X					22 Whitetail Dr
842	X					14 Whitetail Dr
Alternate Water Supply System						
813		X				
814		X				
815		X				
816		X				
818		X				
819		X				
820		X				
821		X				
829		X				
830		X				
834		X				
837		X				
843		X				

Quarterly sampling conducted in March, June, August, and December
 Semiannual sampling conducted in March and October

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Attachment 4
Trip Report

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Memorandum

Control Number N/A

DATE: April 9, 2013

TO: Distribution

FROM: Sam Campbell

SUBJECT: Trip Report

Site: Riverton, Wyoming, Processing Site.

Dates of Sampling Event: March 25 to March 29, 2013

Team Members: Sam Campbell (Stoller), Jeff Price (Stoller), and Bill Dam (DOE)

Number of Locations Sampled: 18 monitoring wells, 9 surface water locations, 8 domestic wells, 8 alternate water supply system (AWSS) hydrants, and 4 AWSS taps.

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

Location Specific Information: Monitoring wells 0705, 0719, and 0730 were purged and sampled using Category II criteria; all other monitoring wells were purged and sampled using Category I criteria.

The Little Wind River was not flowing into the Oxbow Lake at the time of sampling.

New contact information was obtained at domestic wells 0430 and 0841.

Coordinate data was collected at hydrant location 0843 located at the 789 Truck Stop using a GPS unit.

Additional filtered samples were collected for iron analysis at monitoring wells 0707, 0710, 0716, and 0789 per DOE request.

Field data collected for the 5-minute sample at hydrants 0818, 0819, 0820, 0821, 0829, and 0830 was recorded on the first line of the field data sheet, and additional field measurements (alkalinity and chlorine) were captured in the comments. The 5-minute sample was recorded as an additional sample in FDCS. Field data for the end-of-sample flush was recorded on the second line of the field data sheet, and additional field measurements were captured in the designated location so that all field data for the end-of-sample flush is uploaded when FDCS is synced. The end-of-flush sample was recorded as the primary sample in FDCS.

Dissolved oxygen measurements were made down-hole in monitoring wells 0707 and 0789 at the same level of the tubing intake to compare in-situ measurements versus measurements made during pumping with a peristaltic pump. Results: well 0707 – in-situ 0.65 mg/L, pumping 0.66 mg/L; well 0789 – in-situ 0.91 mg/L, pumping 0.85 mg/L.

Hydrant Flushing: Following is a summary of the hydrant flushing.

Hydrant Location	Flushing Time (min)	Average Flow Rate (gpm)	Total Volume (gal)	Average Velocity (ft/sec)
0818	45	451.9	20,300	5.13
0819	85	503.7	42,700	3.22
0820	11	443.9	4,830	5.04
0821	31	552.3	16,900	6.27
0829	45	451.5	20,500	2.88
0830	65	520.6	33,800	3.32
0834	3	471.2	1,310	5.35
0843	7	373.6	2,645	4.24

Field Variance: None

Quality Control Sample Cross Reference: Following are the false identifications assigned to the quality control samples:

False ID	True ID	Sample Type	Ticket Number
2469	0837	Duplicate	LEX 055
2175	0460	Duplicate	LEX 036
2353	0707	Duplicate	LEX 040
2433	N/A	Equipment Blank	LEX 041

Requisition Numbers Assigned: All samples were assigned to requisition index number (RIN) 13035189 and were shipped to the ALS Laboratory Group on April 2, 2013.

Water Level Measurements: Water levels were measured at all sampled monitoring wells and 15 additional monitoring wells.

Well Inspection Summary: All monitoring wells were in good condition. A photograph of each monitoring well was taken as part of a FIMS assessment. Photographs are located at \\gull\Sites_Prod\Sites\WY\RIVERTONPROCESSING\Images\2013\20130327_Campbell_Fims Insp.

Equipment: The PDA used to collect water-level-data malfunctioned. Water level data was recorded on a paper form. All other equipment functioned properly.

Stakeholder/Regulatory: Meetings were attended during the week regarding various aspects of the Riverton Project. These meetings included DOE (Bill Dam) and personnel from George Washington University (Capstone Project students Anthony Cefali, Emily Halter, Forrest Miller,

Sam Campbell
April 9, 2013
Page 3

and Susanna Murley), Great Plains Utility Organization (Pat Moss, Floyd Addison, and Travis Blackburn), Wind River Environmental Quality Commission (Dean Goggles, Travis Shakespear, and Steve Babits), Tribal Engineer's Office (John Arneach), and University of Wyoming anthropologist (Kit Freedman).

Institutional Controls

Fences, Gates, Locks: No issues identified.

Signs: The three warning signs installed around the oxbow lake were in place and in acceptable condition (see link above for photograph).

Trespassing/Site Disturbances: None

Access Issues: None

Corrective Action Required/Taken: An email was sent to the Real Property group with new homeowner contact information for domestic wells 0430 and 0841.

Water level data will need to be entered into the environmental database.

Field measurements from the 5-minute samples collected during the hydrant flush need to be entered into the environmental database because FDCS only uploads one set of data to the database.

(SEC/lcg)

cc: (electronic)
Bill Dam, DOE
Sam Campbell, Stoller
Steve Donovan, Stoller
Bev Gallagher, Stoller
Judy Miller, Stoller
EDD Delivery

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Data Validation Packages for the Riverton, Wyoming, Processing Site, March and June 2013

The U.S. Department of Energy (DOE) has prepared Data Validation Packages containing the ground-water and surface water monitoring data generated from the March and June 2013 sampling events 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 the reports.**

The reports are also available for your review on the Internet at the DOE Office of Legacy Management (LM) website – <http://energy.gov/lm>. From the LM website home page, select the LM SITES MAP. Then select Riverton Site from the LM SITES list in the right column. The reports will be available on the Riverton Site page of the LM website under Site Documents and Links.



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ENERGY

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Management