Data Validation Package

November 2011
Groundwater and Surface Water Sampling at the Riverton, Wyoming, Processing Site

February 2012

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Contents

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Sampling Event Summary

Site: Riverton, Wyoming, Processing Site

Sampling Period: November 15–17, 2011

The 2009 *Long-Term Management Plan for the Riverton, Wyoming, Processing Site* requires semiannual monitoring to evaluate groundwater conditions and assess the progress of natural flushing of the uppermost aquifer. This event comprised sampling 18 monitoring wells, 9 surface water locations, and 5 domestic wells at the Riverton, Wyoming, Processing Site.

Water levels were measured at all sampled monitoring wells and 15 additional monitoring wells that were not sampled. Sampling and analysis were conducted as specified in the Long-Term Management Plan and the *Sampling and Analysis Plan for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated).

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.

Results from domestic wells (locations 0405, 0430, 0436, and 0460) did not indicate any impacts from the Riverton site. Concentrations of molybdenum and uranium in samples collected from domestic wells were below EPA groundwater and drinking water standards, respectively.

Table 1. Riverton Wells with Samples that Exceeded EPA Groundwater Standards in November 2011

Analyte	Standard [a]	Location	Concentration in mg/L
Molybdenum	0.1	0707	1.1
		0716	0.12
		0718	0.12
		0722R	0.11
		0789	0.60
Uranium	0.044	0707	1.2
		0716	0.25
		0718	0.20
		0722R	0.72
		0788	0.06
		0789	2.1
		0826	0.06

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

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 2, 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. The other 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 2. Comparison of Surface Water Concentrations (November 2011) to Benchmark

Location	Uranium Concentration (mg/L)
0794 Benchmark	**0.011**
0796 Little Wind River	0.0062
0811 Little Wind River	0.0066
0812 Little Wind River	0.0097
0747 Oxbow Lake	0.230
0810 Constructed Wetlands	0.0067
0822 West Side Irrigation Ditch	0.0097
0823 Gravel Pit Pond	0.0045

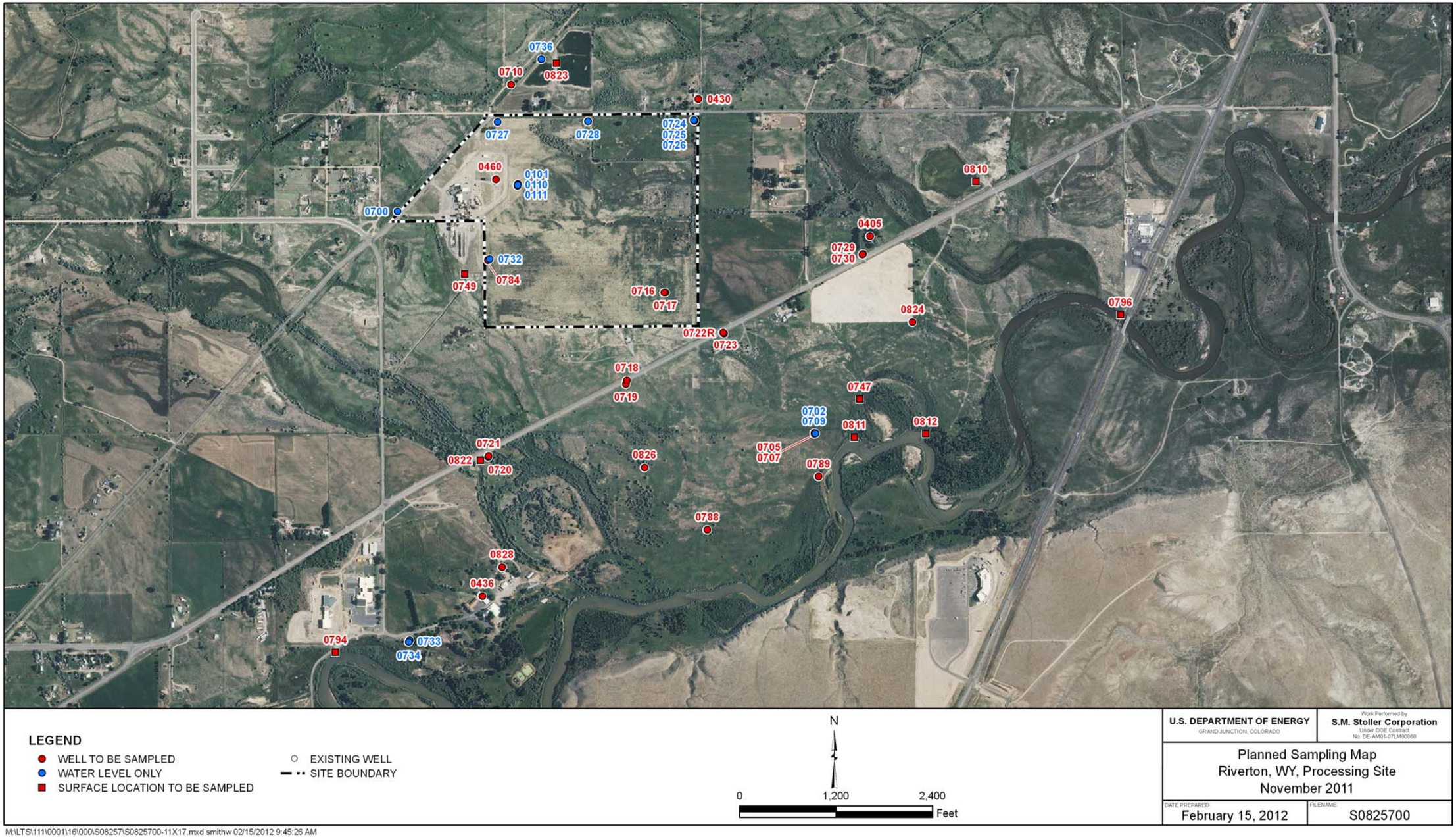
mg/L = milligrams per liter

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 (900 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 concentration was below, and radium-228 concentration slightly above the respective Decision Level Concentrations (DLC) indicating no impact to water quality in the ditch.

Sam Campbell
Site Lead, S.M. Stoller Corporation

2-15-12
Date



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**	November 15–17, 2011
Date(s) of Verification	January 24, 2012	**Name of Verifier**	Steve Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List other documents, SOPs, instructions.		Work Order letter dated October 4, 2011.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed November 11, 2011.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Was the category of the well documented?	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 stabilize prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	NA	

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 0716 and 0789.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	Yes	One equipment blank was collected.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	Location IDs 2175, 2644, and 2645 were used for the QC samples.
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	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	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the “Date Signed” fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
20. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN):	11114183
Sample Event:	November 15-17, 2011
Site(s):	Riverton, Wyoming
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	1111313
Analysis:	Metals, Wet Chemistry, and Radiochemistry
Validator:	Steve Donivan
Review Date:	January 24, 2012

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

Table 3. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
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 SOP712R14	PA SOP724R10
Radium-228	GPC-A-020	PA SOP746R8	PA SOP724R10
Sulfate	MIS-A-044	MCAWW 300.0	MCAWW 300.0

Data Qualifier Summary

Analytical results were qualified as listed in Table 4. Refer to the sections below for an explanation of the data qualifiers applied.

Table 4. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1111313-4	0460	Manganese	J	Negative method blank
1111313-28	0822	Radium-228	J	Less than the determination limit
1111313-35	Equipment Blank	Manganese	J	Negative method blank

Sample Shipping/Receiving

ALS Laboratory Group in fort Collins, Colorado, received 35 water samples on November 22, 2011, 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. Radium-226 and radium-228 were listed on the COC form as requested analytes for the equipment blank collected. However these analyses were not required for the equipment blank and aliquots were not submitted.

Preservation and Holding Times

The sample shipment was received cool and intact with the temperature inside the iced cooler at 0.4 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All analyses were performed within the required holding times.

Detection and Quantitation Limits

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

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

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

Laboratory Instrument Calibration

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

Method SW-846 6010, Manganese
Calibrations for manganese were performed on November 29, 2011, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in 12 verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range.

Method SW-846 6020, Molybdenum and Uranium
Calibrations for molybdenum and uranium were performed on November 30, 2011, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in seven verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Method SW-846 9056, Sulfate
The calibration for sulfate was performed using seven calibration standards on November 16, 2011. 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 made at the required frequency resulting in 12 verification checks. The calibration checks met the acceptance criteria.

Radium-226
Instrument calibration was performed July 13, 2011. 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 June 9, 2011. 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. The manganese method blank results were negative, with absolute values greater than the MDL, but less than the PQL. Associated sample results that are less than the PQL are qualified with a “J” flag as estimated values.

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

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

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

Matrix Spike Analysis

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

Laboratory Replicate Analysis

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

Laboratory Control Sample

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

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated when the concentration of the undiluted sample is greater than 100 times the PQL for ICP-MS or greater than 50 times the PQL for ICP. All serial dilution data evaluated 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, including manual integrations, were satisfactory.

Electronic Data Deliverable (EDD) File

The EDD file arrived on December 19, 2011. 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 EDDs 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: 11114183 **Lab Code:** PAR **Validator:** _____ **Validation Date:** 1/24/2012

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

# of Samples: 35 **Matrix:** WATER **Requested Analysis Completed:** Yes

Chain of Custody

Present: OK **Signed:** OK **Dated:** OK

Sample

Integrity: OK **Preservation:** OK **Temperature:** OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	The reported detection limits are equal to or below contract requirements.
☑ Field/Trip Blanks	There was 1 trip/equipment blank evaluated.
☑ Field Duplicates	There were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 11114183 **Lab Code:** PAR **Date Due:** 12/20/2011

Matrix: Water **Site Code:** RVT **Date Completed:** 12/19/2011

Analyte	Method Type	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	ICV	CCV	ICB	CCB								
Manganese	ICP/ES	11/29/2011	0.0000	1.0000	OK	OK	OK	OK	OK	97.0	99.0	98.0	1.0	99.0	7.0	109.0
Manganese	ICP/ES	11/29/2011							OK	101.0	89.0	91.0	1.0	99.0	5.0	110.0
Manganese	ICP/ES	11/29/2011							OK	101.0	90.0	92.0	0.0	98.0		109.0
Molybdenum	ICP/MS	11/30/2011	0.0000	1.0000	OK	OK	OK	OK	OK	95.0	92.0	95.0	2.0		3.0	95.0
Molybdenum	ICP/MS	11/30/2011							OK	94.0	99.0	96.0	2.0		5.0	89.0
Molybdenum	ICP/MS	11/30/2011							OK	95.0	98.0	97.0	1.0			97.0
Uranium	ICP/MS	11/30/2011	0.0000	1.0000	OK	OK	OK	OK	OK	98.0	97.0	100.0	3.0		4.0	
Uranium	ICP/MS	11/30/2011							OK	98.0	102.0	91.0	1.0		6.0	115.0
Uranium	ICP/MS	11/30/2011							OK	98.0	101.0	88.0	2.0			102.0

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 11114183 **Lab Code:** PAR **Date Due:** 12/20/2011

Matrix: Water **Site Code:** RVT **Date Completed:** 12/19/2011

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
SULFATE	12/02/2011	0.000	0.9998	OK	OK	OK	OK	OK	104.00	102.0	96.0	1.00	
SULFATE	12/02/2011							OK	98.00	109.0	109.0	0	
SULFATE	12/02/2011									109.0			

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 11114183 **Lab Code:** PAR **Date Due:** 12/20/2011

Matrix: Water **Site Code:** RVT **Date Completed:** 12/19/2011

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
0822	Radium-226	12/13/2011			76.8			
Blank_Spike	Radium-226	12/13/2011			90.1	110.00		
Blank_Spike_Du	Radium-226	12/13/2011			89.3	110.00		0.03
Blank	Radium-226	12/13/2011			87.1			
Blank	Radium-226	12/13/2011	0.1870	U				
0822	Radium-228	12/06/2011			73.6			
Blank_Spike	Radium-228	12/06/2011			74.4	93.80		
Blank_Spike_Du	Radium-228	12/06/2011			74.8	85.60		0.43
Blank	Radium-228	12/06/2011	0.5000	U	71.0			

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, 0430, 0436, 0460, and 0828) were classified as Category IV and 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 wells and were further qualified with a "Q" flag, indicating the data are qualitative because of the sampling technique.

Equipment Blank

Equipment blanks are prepared and analyzed to document contamination attributable to the sample collection process. One equipment blank was submitted with these samples. Uranium was detected in this blank. The uranium concentrations in the associated samples were greater than 10 times the blank concentration, not requiring qualification.

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 0716 and 0789 (field duplicate IDs 2175 and 2644). The duplicate results were acceptable, meeting the EPA recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than 5 times the PQL.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Equipment/Trip Blanks

RIN: 11114183 **Lab Code:** PAR **Project:** Riverton **Validation Date:** 1/24/2012

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	1111313-35	SW6020	Uranium	0.05	B	0.029	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
1111313-18	JMV 571	0747	230	50		
1111313-23	JMV 573	0794	6.9	10		
1111313-24	JMV 574	0796	6.2	10		
1111313-25	JMV 575	0810	6.7	10		
1111313-26	JMV 576	0811	6.6	10		
1111313-27	JMV 577	0812	9.7	10		
1111313-28	JMV 578	0822	9.7	10		
1111313-29	JMV 579	0823	4.5	10		

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 11114183 **Lab Code:** PAR **Project:** Riverton **Validation Date:** 1/24/2012

Duplicate: 2175 **Sample:** 0716

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Manganese	140			1	150			1	6.90		UG/L
Molybdenum	120			50	120			50	0		UG/L
SULFATE	440			10	440			10	0		MG/L
Uranium	250			50	250			50	0		UG/L

Duplicate: 2644 **Sample:** 0789

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Manganese	690			1	750			1	8.33		UG/L
Molybdenum	600			200	590			200	1.68		UG/L
SULFATE	6500			100	6600			100	1.53		MG/L
Uranium	2100			200	2100			200	0		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 — Date: 2-14-2012

Data Validation Lead: Steve Donivan — Date: 2-14-2012

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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 SEEPro database. The application compares the new data set 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 manganese result from location 0810 and the sulfate result from location 0823 were identified as potentially anomalous. These data are acceptable as reported. There were no errors associated with the manganese data and the sulfate concentration in surface water location 0823 has been trending upward since 2009.

Data Validation Outliers Report - No Field Parameters
Comparison: All Historical Data
Laboratory: ALS Laboratory Group
RIN: 11114183
Report Date: 1/25/2012

					Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
						Qualifiers			Qualifiers			Qualifiers				
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RVT01	0430	N001	11/15/2011	Manganese	0.068			0.014			0.0018	B		25	12	
RVT01	0705	N001	11/17/2011	Manganese	0.077		FQ	0.063		FQ	0.00023	U	FQ	40	17	No
RVT01	0716	N001	11/15/2011	Manganese	0.14		F	0.773			0.2		F	31	0	No
RVT01	0716	N002	11/15/2011	Manganese	0.15		F	0.773			0.2		F	31	0	No
RVT01	0716	N001	11/15/2011	Molybdenum	0.12		F	0.26			0.13		F	31	0	No
RVT01	0716	N002	11/15/2011	Molybdenum	0.12		F	0.26			0.13		F	31	0	No
RVT01	0719	N001	11/17/2011	Molybdenum	0.0075		FQ	0.04		F	0.012		FQ	26	0	No
RVT01	0721	N001	11/16/2011	Manganese	0.0029	B	F	0.01	U		0.003	B	F	21	2	No
RVT01	0722R	N001	11/17/2011	Sulfate	1200		F	1110		F	230		F	9	0	No
RVT01	0729	N001	11/17/2011	Uranium	0.0048		F	0.0186			0.0052		F	21	0	No
RVT01	0730	N001	11/17/2011	Sulfate	150		FQ	400			160		FQ	18	0	No
RVT01	0810	N001	11/17/2011	Manganese	0.34			0.099			0.024			14	0	Yes
RVT01	0810	N001	11/17/2011	Sulfate	450			390			240			16	0	No
RVT01	0812	N001	11/17/2011	Manganese	0.072			0.0448			0.0067			13	0	No
RVT01	0812	N001	11/17/2011	Uranium	0.0097			0.00826			0.001			15	0	No
RVT01	0823	N001	11/15/2011	Sulfate	920			650			230			14	0	Yes
RVT01	0824	N001	11/17/2011	Molybdenum	0.0027		F	0.0064		F	0.0037		F	9	0	No
RVT01	0824	N001	11/17/2011	Sulfate	240		F	190		F	65		F	9	0	No
RVT01	0826	N001	11/16/2011	Manganese	3		F	2.7		F	0.45		F	10	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.

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: 1/25/2012
Location: 0405 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	-	28			#		
Dissolved Oxygen	mg/L	11/17/2011	N001	-	5.47			#		
Manganese	mg/L	11/17/2011	N001	-	0.0022	B		#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	-	0.0047			#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	-	-18.7			#		
pH	s.u.	11/17/2011	N001	-	9.37			#		
Specific Conductance	umhos /cm	11/17/2011	N001	-	1017			#		
Sulfate	mg/L	11/17/2011	N001	-	370			#	2.5	
Temperature	C	11/17/2011	N001	-	9.31			#		
Turbidity	NTU	11/17/2011	N001	-	1.41			#		
Uranium	mg/L	11/17/2011	N001	-	0.000029	U		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0430 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	-	150			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	-	3.15			#		
Manganese	mg/L	11/15/2011	N001	-	0.068			#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	-	0.0022			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	-	158.8			#		
pH	s.u.	11/15/2011	N001	-	8.69			#		
Specific Conductance	umhos /cm	11/15/2011	N001	-	756			#		
Sulfate	mg/L	11/15/2011	N001	-	180			#	2.5	
Temperature	C	11/15/2011	N001	-	9.05			#		
Turbidity	NTU	11/15/2011	N001	-	4.43			#		
Uranium	mg/L	11/15/2011	N001	-	0.00004	B		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0436 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	-	140			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	-	4.39			#		
Manganese	mg/L	11/15/2011	N001	-	0.0018	B		#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	-	0.0029			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	-	169			#		
pH	s.u.	11/15/2011	N001	-	8.96			#		
Specific Conductance	umhos /cm	11/15/2011	N001	-	771			#		
Sulfate	mg/L	11/15/2011	N001	-	190			#	2.5	
Temperature	C	11/15/2011	N001	-	13.23			#		
Turbidity	NTU	11/15/2011	N001	-	3.48			#		
Uranium	mg/L	11/15/2011	N001	-	0.00026			#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0460 WELL Koch Sulfuric Acid Plant

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	-	159			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	-	4.53			#		
Manganese	mg/L	11/15/2011	N001	-	0.00048	B	J	#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	-	0.0025			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	-	119.1			#		
pH	s.u.	11/15/2011	N001	-	8.95			#		
Specific Conductance	umhos /cm	11/15/2011	N001	-	725			#		
Sulfate	mg/L	11/15/2011	N001	-	160			#	2.5	
Temperature	C	11/15/2011	N001	-	19.83			#		
Turbidity	NTU	11/15/2011	N001	-	1.15			#		
Uranium	mg/L	11/15/2011	N001	-	0.00005	B		#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0705 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	37.3	-	61.8	39		FQ	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	37.3	-	61.8	1.2		FQ	#		
Manganese	mg/L	11/17/2011	N001	37.3	-	61.8	0.077		FQ	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	37.3	-	61.8	0.0027		FQ	#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	37.3	-	61.8	-128.7		FQ	#		
pH	s.u.	11/17/2011	N001	37.3	-	61.8	8.53		FQ	#		
Specific Conductance	umhos /cm	11/17/2011	N001	37.3	-	61.8	1246		FQ	#		
Sulfate	mg/L	11/17/2011	N001	37.3	-	61.8	410		FQ	#	5	
Temperature	C	11/17/2011	N001	37.3	-	61.8	6.95		FQ	#		
Turbidity	NTU	11/17/2011	N001	37.3	-	61.8	4.58		FQ	#		
Uranium	mg/L	11/17/2011	N001	37.3	-	61.8	0.00017		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0707 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	9.1	-	23.3	280		F	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	9.1	-	23.3	1.26		F	#		
Manganese	mg/L	11/17/2011	N001	9.1	-	23.3	1.3		F	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	9.1	-	23.3	1.1		F	#	0.0064	
Oxidation Reduction Potential	mV	11/17/2011	N001	9.1	-	23.3	72.7		F	#		
pH	s.u.	11/17/2011	N001	9.1	-	23.3	7.19		F	#		
Specific Conductance	umhos /cm	11/17/2011	N001	9.1	-	23.3	6458		F	#		
Sulfate	mg/L	11/17/2011	N001	9.1	-	23.3	3500		F	#	25	
Temperature	C	11/17/2011	N001	9.1	-	23.3	7.44		F	#		
Turbidity	NTU	11/17/2011	N001	9.1	-	23.3	0.59		F	#		
Uranium	mg/L	11/17/2011	N001	9.1	-	23.3	1.2		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0710 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	9.8	-	26.8	147		F	#		
Dissolved Oxygen	mg/L	11/15/2011	N001	9.8	-	26.8	0.96		F	#		
Manganese	mg/L	11/15/2011	N001	9.8	-	26.8	0.019		F	#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	9.8	-	26.8	0.0015		F	#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	9.8	-	26.8	12.7		F	#		
pH	s.u.	11/15/2011	N001	9.8	-	26.8	7.56		F	#		
Specific Conductance	umhos /cm	11/15/2011	N001	9.8	-	26.8	607		F	#		
Sulfate	mg/L	11/15/2011	N001	9.8	-	26.8	130		F	#	1	
Temperature	C	11/15/2011	N001	9.8	-	26.8	11.07		F	#		
Turbidity	NTU	11/15/2011	N001	9.8	-	26.8	1.44		F	#		
Uranium	mg/L	11/15/2011	N001	9.8	-	26.8	0.0028		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0716 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	9.78 - 14.78	266		F	#		
Dissolved Oxygen	mg/L	11/15/2011	N001	9.78 - 14.78	1.26		F	#		
Manganese	mg/L	11/15/2011	N001	9.78 - 14.78	0.14		F	#	0.00011	
Manganese	mg/L	11/15/2011	N002	9.78 - 14.78	0.15		F	#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	9.78 - 14.78	0.12		F	#	0.0016	
Molybdenum	mg/L	11/15/2011	N002	9.78 - 14.78	0.12		F	#	0.0016	
Oxidation Reduction Potential	mV	11/15/2011	N001	9.78 - 14.78	171.4		F	#		
pH	s.u.	11/15/2011	N001	9.78 - 14.78	7.24		F	#		
Specific Conductance	umhos /cm	11/15/2011	N001	9.78 - 14.78	1481		F	#		
Sulfate	mg/L	11/15/2011	N001	9.78 - 14.78	440		F	#	5	
Sulfate	mg/L	11/15/2011	N002	9.78 - 14.78	440		F	#	5	
Temperature	C	11/15/2011	N001	9.78 - 14.78	11.11		F	#		
Turbidity	NTU	11/15/2011	N001	9.78 - 14.78	3.74		F	#		
Uranium	mg/L	11/15/2011	N001	9.78 - 14.78	0.25		F	#	0.00015	
Uranium	mg/L	11/15/2011	N002	9.78 - 14.78	0.25		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0717 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	45.1 - 55.1	205		F	#		
Dissolved Oxygen	mg/L	11/15/2011	N001	45.1 - 55.1	0.71		F	#		
Manganese	mg/L	11/15/2011	N001	45.1 - 55.1	0.18		F	#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	45.1 - 55.1	0.007		F	#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	45.1 - 55.1	-77.6		F	#		
pH	s.u.	11/15/2011	N001	45.1 - 55.1	8.02		F	#		
Specific Conductance	umhos /cm	11/15/2011	N001	45.1 - 55.1	1939		F	#		
Sulfate	mg/L	11/15/2011	N001	45.1 - 55.1	690		F	#	10	
Temperature	C	11/15/2011	N001	45.1 - 55.1	9.08		F	#		
Turbidity	NTU	11/15/2011	N001	45.1 - 55.1	1.3		F	#		
Uranium	mg/L	11/15/2011	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: 1/25/2012
Location: 0718 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	18.24	-	23.24	474		F	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	18.24	-	23.24	2.22		F	#		
Manganese	mg/L	11/17/2011	N001	18.24	-	23.24	0.47		F	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	18.24	-	23.24	0.12		F	#	0.0016	
Oxidation Reduction Potential	mV	11/17/2011	N001	18.24	-	23.24	-43.5		F	#		
pH	s.u.	11/17/2011	N001	18.24	-	23.24	7.14		F	#		
Specific Conductance	umhos /cm	11/17/2011	N001	18.24	-	23.24	5580		F	#		
Sulfate	mg/L	11/17/2011	N001	18.24	-	23.24	2900		F	#	25	
Temperature	C	11/17/2011	N001	18.24	-	23.24	12.97		F	#		
Turbidity	NTU	11/17/2011	N001	18.24	-	23.24	1.16		F	#		
Uranium	mg/L	11/17/2011	N001	18.24	-	23.24	0.2		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0719 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	38.47	-	48.47	90		FQ	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	38.47	-	48.47	1.08		FQ	#		
Manganese	mg/L	11/17/2011	N001	38.47	-	48.47	0.11		FQ	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	38.47	-	48.47	0.0075		FQ	#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	38.47	-	48.47	-158.2		FQ	#		
pH	s.u.	11/17/2011	N001	38.47	-	48.47	7.72		FQ	#		
Specific Conductance	umhos /cm	11/17/2011	N001	38.47	-	48.47	1224		FQ	#		
Sulfate	mg/L	11/17/2011	N001	38.47	-	48.47	440		FQ	#	5	
Temperature	C	11/17/2011	N001	38.47	-	48.47	10.94		FQ	#		
Turbidity	NTU	11/17/2011	N001	38.47	-	48.47	2.98		FQ	#		
Uranium	mg/L	11/17/2011	N001	38.47	-	48.47	0.00032		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0720 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	7.94	-	12.94	214		F	#		
Dissolved Oxygen	mg/L	11/16/2011	N001	7.94	-	12.94	1.72		F	#		
Manganese	mg/L	11/16/2011	N001	7.94	-	12.94	0.0053		F	#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	7.94	-	12.94	0.0012		F	#	0.00032	
Oxidation Reduction Potential	mV	11/16/2011	N001	7.94	-	12.94	47.4		F	#		
pH	s.u.	11/16/2011	N001	7.94	-	12.94	7.35		F	#		
Specific Conductance	umhos /cm	11/16/2011	N001	7.94	-	12.94	791		F	#		
Sulfate	mg/L	11/16/2011	N001	7.94	-	12.94	180		F	#	2.5	
Temperature	C	11/16/2011	N001	7.94	-	12.94	10.57		F	#		
Turbidity	NTU	11/16/2011	N001	7.94	-	12.94	2.32		F	#		
Uranium	mg/L	11/16/2011	N001	7.94	-	12.94	0.0052		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0721 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	44.43	-	54.43	93		F	#		
Dissolved Oxygen	mg/L	11/16/2011	N001	44.43	-	54.43	0.36		F	#		
Manganese	mg/L	11/16/2011	N001	44.43	-	54.43	0.0029	B	F	#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	44.43	-	54.43	0.0024		F	#	0.00032	
Oxidation Reduction Potential	mV	11/16/2011	N001	44.43	-	54.43	-130		F	#		
pH	s.u.	11/16/2011	N001	44.43	-	54.43	8.97		F	#		
Specific Conductance	umhos /cm	11/16/2011	N001	44.43	-	54.43	899		F	#		
Sulfate	mg/L	11/16/2011	N001	44.43	-	54.43	280		F	#	2.5	
Temperature	C	11/16/2011	N001	44.43	-	54.43	10.04		F	#		
Turbidity	NTU	11/16/2011	N001	44.43	-	54.43	0.39		F	#		
Uranium	mg/L	11/16/2011	N001	44.43	-	54.43	0.0001	B	F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0722R WELL Replacement well for destroyed well 0722.

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	11.1	-	16.1	310		F	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	11.1	-	16.1	1.69		F	#		
Manganese	mg/L	11/17/2011	N001	11.1	-	16.1	0.015		F	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	11.1	-	16.1	0.11		F	#	0.0016	
Oxidation Reduction Potential	mV	11/17/2011	N001	11.1	-	16.1	29.5		F	#		
pH	s.u.	11/17/2011	N001	11.1	-	16.1	6.95		F	#		
Specific Conductance	umhos /cm	11/17/2011	N001	11.1	-	16.1	2517		F	#		
Sulfate	mg/L	11/17/2011	N001	11.1	-	16.1	1200		F	#	10	
Temperature	C	11/17/2011	N001	11.1	-	16.1	13.43		F	#		
Turbidity	NTU	11/17/2011	N001	11.1	-	16.1	0.35		F	#		
Uranium	mg/L	11/17/2011	N001	11.1	-	16.1	0.72		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0723 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	45.99 - 55.99	355		F	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	45.99 - 55.99	1.52		F	#		
Manganese	mg/L	11/17/2011	N001	45.99 - 55.99	0.4		F	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	45.99 - 55.99	0.00032	U	F	#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	45.99 - 55.99	-99.7		F	#		
pH	s.u.	11/17/2011	N001	45.99 - 55.99	7.22		F	#		
Specific Conductance	umhos /cm	11/17/2011	N001	45.99 - 55.99	3715		F	#		
Sulfate	mg/L	11/17/2011	N001	45.99 - 55.99	1700		F	#	25	
Temperature	C	11/17/2011	N001	45.99 - 55.99	12.19		F	#		
Turbidity	NTU	11/17/2011	N001	45.99 - 55.99	2.05		F	#		
Uranium	mg/L	11/17/2011	N001	45.99 - 55.99	0.00005	B	F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0729 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	14.71	-	19.71	302		F	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	14.71	-	19.71	1.43		F	#		
Manganese	mg/L	11/17/2011	N001	14.71	-	19.71	0.0049	B	F	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	14.71	-	19.71	0.0029		F	#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	14.71	-	19.71	28.7		F	#		
pH	s.u.	11/17/2011	N001	14.71	-	19.71	7.23		F	#		
Specific Conductance	umhos /cm	11/17/2011	N001	14.71	-	19.71	820		F	#		
Sulfate	mg/L	11/17/2011	N001	14.71	-	19.71	160		F	#	2.5	
Temperature	C	11/17/2011	N001	14.71	-	19.71	12.57		F	#		
Turbidity	NTU	11/17/2011	N001	14.71	-	19.71	1.32		F	#		
Uranium	mg/L	11/17/2011	N001	14.71	-	19.71	0.0048		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0730 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	38.62	-	48.62	370		FQ	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	38.62	-	48.62	1.95		FQ	#		
Manganese	mg/L	11/17/2011	N001	38.62	-	48.62	0.047		FQ	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	38.62	-	48.62	0.0044		FQ	#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	38.62	-	48.62	-50.9		FQ	#		
pH	s.u.	11/17/2011	N001	38.62	-	48.62	7.51		FQ	#		
Specific Conductance	umhos /cm	11/17/2011	N001	38.62	-	48.62	1021		FQ	#		
Sulfate	mg/L	11/17/2011	N001	38.62	-	48.62	150		FQ	#	2.5	
Temperature	C	11/17/2011	N001	38.62	-	48.62	12.94		FQ	#		
Turbidity	NTU	11/17/2011	N001	38.62	-	48.62	0.6		FQ	#		
Uranium	mg/L	11/17/2011	N001	38.62	-	48.62	0.007		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0784 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	1.65 - 6.65	109		F	#		
Dissolved Oxygen	mg/L	11/16/2011	N001	1.65 - 6.65	1.15		F	#		
Manganese	mg/L	11/16/2011	N001	1.65 - 6.65	0.66		F	#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	1.65 - 6.65	0.017		F	#	0.00032	
Oxidation Reduction Potential	mV	11/16/2011	N001	1.65 - 6.65	-70.6		F	#		
pH	s.u.	11/16/2011	N001	1.65 - 6.65	7.49		F	#		
Specific Conductance	umhos /cm	11/16/2011	N001	1.65 - 6.65	4039		F	#		
Sulfate	mg/L	11/16/2011	N001	1.65 - 6.65	2200		F	#	25	
Temperature	C	11/16/2011	N001	1.65 - 6.65	9.6		F	#		
Turbidity	NTU	11/16/2011	N001	1.65 - 6.65	1.31		F	#		
Uranium	mg/L	11/16/2011	N001	1.65 - 6.65	0.0035		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0788 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	1.41 - 13.41	465		F	#		
Dissolved Oxygen	mg/L	11/16/2011	N001	1.41 - 13.41	1.27		F	#		
Manganese	mg/L	11/16/2011	N001	1.41 - 13.41	0.42		F	#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	1.41 - 13.41	0.024		F	#	0.00032	
Oxidation Reduction Potential	mV	11/16/2011	N001	1.41 - 13.41	-21.7		F	#		
pH	s.u.	11/16/2011	N001	1.41 - 13.41	7.26		F	#		
Specific Conductance	umhos /cm	11/16/2011	N001	1.41 - 13.41	4164		F	#		
Sulfate	mg/L	11/16/2011	N001	1.41 - 13.41	2000		F	#	25	
Temperature	C	11/16/2011	N001	1.41 - 13.41	10.43		F	#		
Turbidity	NTU	11/16/2011	N001	1.41 - 13.41	7.13		F	#		
Uranium	mg/L	11/16/2011	N001	1.41 - 13.41	0.061		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0789 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	6.2	-	18.2	521		F	#		
Dissolved Oxygen	mg/L	11/16/2011	N001	6.2	-	18.2	1.92		F	#		
Manganese	mg/L	11/16/2011	N001	6.2	-	18.2	0.69		F	#	0.00011	
Manganese	mg/L	11/16/2011	N002	6.2	-	18.2	0.75		F	#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	6.2	-	18.2	0.6		F	#	0.0064	
Molybdenum	mg/L	11/16/2011	N002	6.2	-	18.2	0.59		F	#	0.0064	
Oxidation Reduction Potential	mV	11/16/2011	N001	6.2	-	18.2	-60.5		F	#		
pH	s.u.	11/16/2011	N001	6.2	-	18.2	7.16		F	#		
Specific Conductance	umhos /cm	11/16/2011	N001	6.2	-	18.2	11113		F	#		
Sulfate	mg/L	11/16/2011	N001	6.2	-	18.2	6500		F	#	50	
Sulfate	mg/L	11/16/2011	N002	6.2	-	18.2	6600		F	#	50	
Temperature	C	11/16/2011	N001	6.2	-	18.2	9.46		F	#		
Turbidity	NTU	11/16/2011	N001	6.2	-	18.2	9.28		F	#		
Uranium	mg/L	11/16/2011	N001	6.2	-	18.2	2.1		F	#	0.00058	
Uranium	mg/L	11/16/2011	N002	6.2	-	18.2	2.1		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0824 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	9.5	-	14.5	338		F	#		
Dissolved Oxygen	mg/L	11/17/2011	N001	9.5	-	14.5	1.32		F	#		
Manganese	mg/L	11/17/2011	N001	9.5	-	14.5	0.002	B	F	#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	9.5	-	14.5	0.0027		F	#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	9.5	-	14.5	51.9		F	#		
pH	s.u.	11/17/2011	N001	9.5	-	14.5	7.23		F	#		
Specific Conductance	umhos /cm	11/17/2011	N001	9.5	-	14.5	1187		F	#		
Sulfate	mg/L	11/17/2011	N001	9.5	-	14.5	240		F	#	5	
Temperature	C	11/17/2011	N001	9.5	-	14.5	11.58		F	#		
Turbidity	NTU	11/17/2011	N001	9.5	-	14.5	4.54		F	#		
Uranium	mg/L	11/17/2011	N001	9.5	-	14.5	0.016		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0826 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	6.6	-	11.6	434		F	#		
Dissolved Oxygen	mg/L	11/16/2011	N001	6.6	-	11.6	1.21		F	#		
Manganese	mg/L	11/16/2011	N001	6.6	-	11.6	3		F	#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	6.6	-	11.6	0.023		F	#	0.00032	
Oxidation Reduction Potential	mV	11/16/2011	N001	6.6	-	11.6	5.6		F	#		
pH	s.u.	11/16/2011	N001	6.6	-	11.6	7.18		F	#		
Specific Conductance	umhos /cm	11/16/2011	N001	6.6	-	11.6	3836		F	#		
Sulfate	mg/L	11/16/2011	N001	6.6	-	11.6	1900		F	#	25	
Temperature	C	11/16/2011	N001	6.6	-	11.6	9.64		F	#		
Turbidity	NTU	11/16/2011	N001	6.6	-	11.6	1.08		F	#		
Uranium	mg/L	11/16/2011	N001	6.6	-	11.6	0.061		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0828 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	-	149			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	-	3.71			#		
Manganese	mg/L	11/15/2011	N001	-	0.0022	B		#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	-	0.003			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	-	167.5			#		
pH	s.u.	11/15/2011	N001	-	9			#		
Specific Conductance	umhos /cm	11/15/2011	N001	-	767			#		
Sulfate	mg/L	11/15/2011	N001	-	200			#	2.5	
Temperature	C	11/15/2011	N001	-	10.87			#		
Turbidity	NTU	11/15/2011	N001	-	0.5			#		
Uranium	mg/L	11/15/2011	N001	-	0.00008	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.

Surface Water Quality Data

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Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0747 SURFACE LOCATION 8/26/97 State plane east changed from 594497.14 to an estimation close to river

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	296			#		
Dissolved Oxygen	mg/L	11/16/2011	N001	10.21			#		
Manganese	mg/L	11/16/2011	N001	0.62			#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	0.013			#	0.0016	
Oxidation Reduction Potential	mV	11/16/2011	N001	96.6			#		
pH	s.u.	11/16/2011	N001	7.54			#		
Specific Conductance	umhos/cm	11/16/2011	N001	2363			#		
Sulfate	mg/L	11/16/2011	N001	1000			#	10	
Temperature	C	11/16/2011	N001	2.14			#		
Turbidity	NTU	11/16/2011	N001	6.96			#		
Uranium	mg/L	11/16/2011	N001	0.23			#	0.00015	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0749 SURFACE LOCATION 8/26/97 State plane east changed from 589532.71 to an estimation close to river

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	0001	21			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	7.68			#		
Manganese	mg/L	11/15/2011	0001	0.041			#	0.00011	
Molybdenum	mg/L	11/15/2011	0001	0.0088			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	27.8			#		
pH	s.u.	11/15/2011	N001	7.77			#		
Specific Conductance	umhos/cm	11/15/2011	N001	3267			#		
Sulfate	mg/L	11/15/2011	0001	1800			#	25	
Temperature	C	11/15/2011	N001	16.6			#		
Turbidity	NTU	11/15/2011	N001	12.3			#		
Uranium	mg/L	11/15/2011	0001	0.0013			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0794 SURFACE LOCATION 8/26/97 State plane north changed from 844178.27 to an estimation close to river

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	177			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	13.58			#		
Manganese	mg/L	11/15/2011	N001	0.033			#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	0.0014			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	223.1			#		
pH	s.u.	11/15/2011	N001	8.33			#		
Specific Conductance	umhos/cm	11/15/2011	N001	919			#		
Sulfate	mg/L	11/15/2011	N001	290			#	2.5	
Temperature	C	11/15/2011	N001	1			#		
Turbidity	NTU	11/15/2011	N001	6.44			#		
Uranium	mg/L	11/15/2011	N001	0.0069			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0796 SURFACE LOCATION Was possibly historically sampled ~900 ft E from current location

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	187			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	13.47			#		
Manganese	mg/L	11/15/2011	N001	0.046			#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	0.0013			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	271.9			#		
pH	s.u.	11/15/2011	N001	6.96			#		
Specific Conductance	umhos/cm	11/15/2011	N001	958			#		
Sulfate	mg/L	11/15/2011	N001	290			#	2.5	
Temperature	C	11/15/2011	N001	0.72			#		
Turbidity	NTU	11/15/2011	N001	9.61			#		
Uranium	mg/L	11/15/2011	N001	0.0062			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0810 SURFACE LOCATION Gravel Pit Pond

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	461			#		
Dissolved Oxygen	mg/L	11/17/2011	N001	10.93			#		
Manganese	mg/L	11/17/2011	N001	0.34			#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	0.0013			#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	-34.9			#		
pH	s.u.	11/17/2011	N001	8.55			#		
Specific Conductance	umhos/cm	11/17/2011	N001	1755			#		
Sulfate	mg/L	11/17/2011	N001	450			#	5	
Temperature	C	11/17/2011	N001	2.79			#		
Turbidity	NTU	11/17/2011	N001	5.39			#		
Uranium	mg/L	11/17/2011	N001	0.0067			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0811 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	N001	182			#		
Dissolved Oxygen	mg/L	11/16/2011	N001	13.89			#		
Manganese	mg/L	11/16/2011	N001	0.035			#	0.00011	
Molybdenum	mg/L	11/16/2011	N001	0.0016			#	0.00032	
Oxidation Reduction Potential	mV	11/16/2011	N001	32.9			#		
pH	s.u.	11/16/2011	N001	8.58			#		
Specific Conductance	umhos/cm	11/16/2011	N001	899			#		
Sulfate	mg/L	11/16/2011	N001	290			#	2.5	
Temperature	C	11/16/2011	N001	1.48			#		
Turbidity	NTU	11/16/2011	N001	7.87			#		
Uranium	mg/L	11/16/2011	N001	0.0066			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0812 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/17/2011	N001	186			#		
Dissolved Oxygen	mg/L	11/17/2011	N001	13.9			#		
Manganese	mg/L	11/17/2011	N001	0.072			#	0.00011	
Molybdenum	mg/L	11/17/2011	N001	0.0019			#	0.00032	
Oxidation Reduction Potential	mV	11/17/2011	N001	31.3			#		
pH	s.u.	11/17/2011	N001	8.5			#		
Specific Conductance	umhos/cm	11/17/2011	N001	947			#		
Sulfate	mg/L	11/17/2011	N001	300			#	2.5	
Temperature	C	11/17/2011	N001	1.9			#		
Turbidity	NTU	11/17/2011	N001	7.93			#		
Uranium	mg/L	11/17/2011	N001	0.0097			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0822 SURFACE LOCATION west-side irrigation ditch

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/16/2011	0001	204			#		
Dissolved Oxygen	mg/L	11/16/2011	N001	9.46			#		
Manganese	mg/L	11/16/2011	0001	0.099			#	0.00011	
Molybdenum	mg/L	11/16/2011	0001	0.0054			#	0.00032	
Oxidation Reduction Potential	mV	11/16/2011	N001	80.9			#		
pH	s.u.	11/16/2011	N001	7.84			#		
Radium-226	pCi/L	11/16/2011	0001	0.21	U		#	0.21	0.135
Radium-228	pCi/L	11/16/2011	0001	1.11		J	#	0.46	0.457
Specific Conductance	umhos/cm	11/16/2011	N001	1963			#		
Sulfate	mg/L	11/16/2011	0001	900			#	10	
Temperature	C	11/16/2011	N001	4.74			#		
Turbidity	NTU	11/16/2011	N001	25.9			#		
Uranium	mg/L	11/16/2011	0001	0.0097			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012
Location: 0823 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	11/15/2011	N001	109			#		
Dissolved Oxygen	mg/L	11/15/2011	N001	12.83			#		
Manganese	mg/L	11/15/2011	N001	0.042			#	0.00011	
Molybdenum	mg/L	11/15/2011	N001	0.0016			#	0.00032	
Oxidation Reduction Potential	mV	11/15/2011	N001	174.1			#		
pH	s.u.	11/15/2011	N001	8.26			#		
Specific Conductance	umhos/cm	11/15/2011	N001	2408			#		
Sulfate	mg/L	11/15/2011	N001	920			#	10	
Temperature	C	11/15/2011	N001	3.16			#		
Turbidity	NTU	11/15/2011	N001	3.59			#		
Uranium	mg/L	11/15/2011	N001	0.0045			#	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: 11114183
Report Date: 1/25/2012

Parameter	Site Code	Location ID	Sample Date	ID	Units	Result	Qualifiers Lab	Qualifiers Data	Detection Limit	Uncertainty	Sample Type
Manganese	RVT01	0999	11/16/2011	N001	mg/L	0.00011	U	J	0.00011		E
Molybdenum	RVT01	0999	11/16/2011	N001	mg/L	0.00032	U		0.00032		E
Sulfate	RVT01	0999	11/16/2011	N001	mg/L	0.5	U		0.5		E
Uranium	RVT01	0999	11/16/2011	N001	mg/L	0.00005	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.	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.		

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: 1/25/2012

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	11/16/2011	20:35:00	10.3	4936.28
0110	O	4944.35	11/16/2011	20:15:00	10.26	4934.09
0111	O	4946.87	11/16/2011	20:38:00	10.26	4936.61
0700	U	4951.38	11/16/2011	21:01:00	5.65	4945.73
0702	D	4931	11/17/2011	20:03:00	6.32	4924.68
0705	D	4930.8	11/17/2011	09:00:36	6.48	4924.32
0707	D	4931	11/17/2011	08:45:24	5.48	4925.52
0709	D	4930.7	11/17/2011	20:09:00	2.89	4927.81
0710	U	4947.9	11/15/2011	14:00:01	6.24	4941.66
0716	O	4939.12	11/15/2011	15:50:46	8.93	4930.19
0717	O	4938.8	11/15/2011	16:20:21	8.59	4930.21
0718	D	4937.6	11/17/2011	10:00:59	8.03	4929.57
0719	D	4937.55	11/17/2011	09:40:19	7.67	4929.88
0720	C	4940.46	11/16/2011	11:15:16	5.15	4935.31
0721	C	4940.47	11/16/2011	11:00:20	7.84	4932.63
0722R		4937.06	11/17/2011	14:50:00	9.24	4927.82
0723	D	4936.01	11/17/2011	14:25:07	8.01	4928
0724	U	4941.36	11/16/2011	20:13:00	7.66	4933.7
0725	U	4941.66	11/16/2011	20:00:00	8	4933.66
0726	U	4942	11/16/2011	20:10:00	7.19	4934.81
0727	U	4951.69	11/16/2011	00:01:00	10.71	4940.98
0728	U	4946.01	11/16/2011	19:56:00	9.09	4936.92
0729	D	4932.75	11/17/2011	15:35:33	6.93	4925.82
0730	D	4933.08	11/17/2011	15:10:38	7.1	4925.98
0732	U	4945.07	11/16/2011	20:42:00	7.82	4937.25
0733	U	4946.76	11/15/2011	21:46:00	7.76	4939
0734	U	4946.08	11/15/2011	21:52:00	8.72	4937.36
0736	U	4946	11/15/2011	21:55:00	7.25	4938.75

STATIC WATER LEVELS (USEE700) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 1/25/2012

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	11/16/2011	09:30:47	6.45	4939
0788	C	4935.09	11/16/2011	14:10:46	8.71	4926.38
0789	D	4933.66	11/16/2011	14:45:36	8.97	4924.69
0824		4928.27	11/17/2011	12:40:48	5.95	4922.32
0826		4936.98	11/16/2011	13:30:22	7.43	4929.55

FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWN GRADIENT F OFF SITE
N UNKNOWN O ON SITE U UPGRADIENT

Hydrographs

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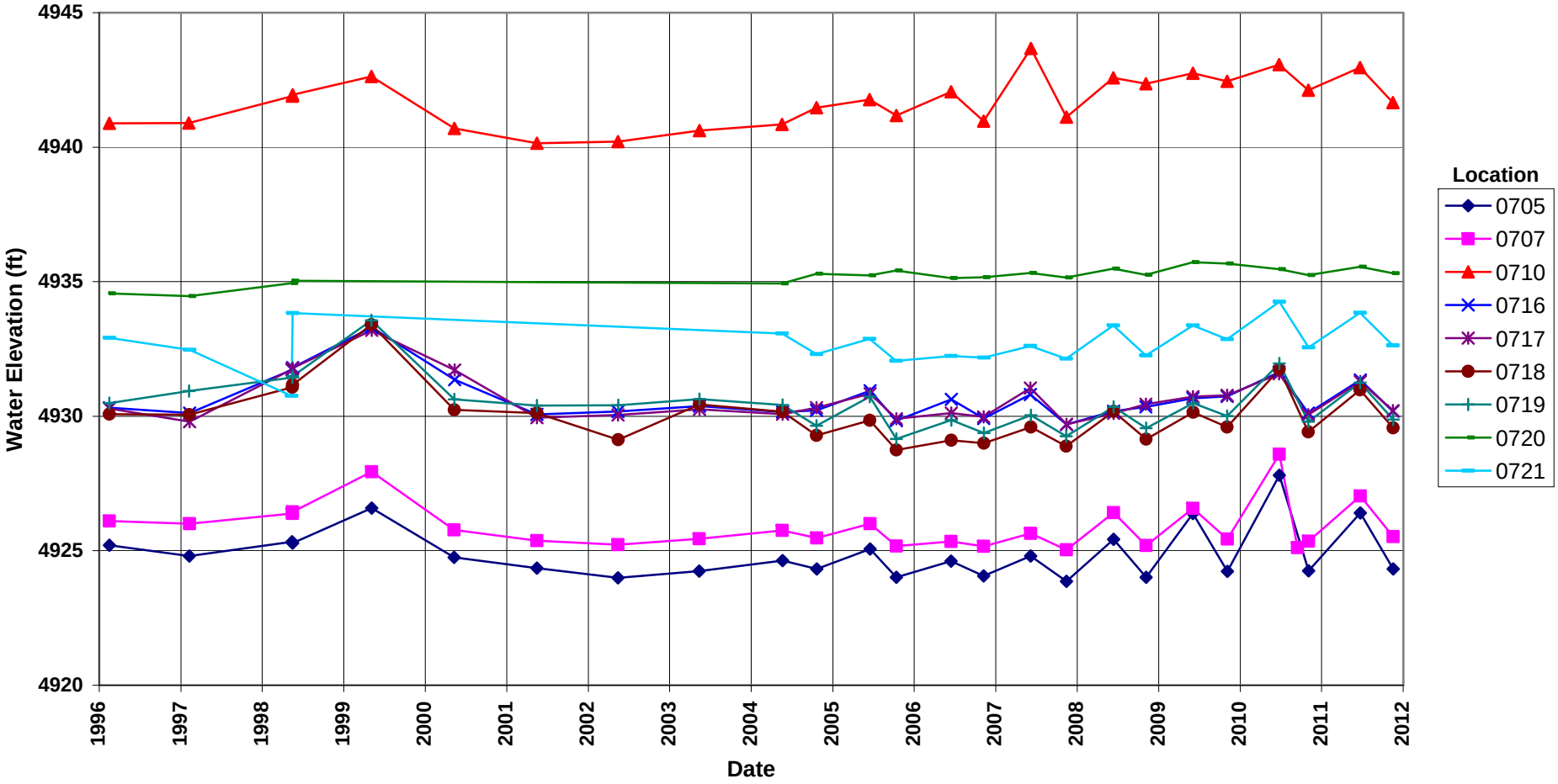
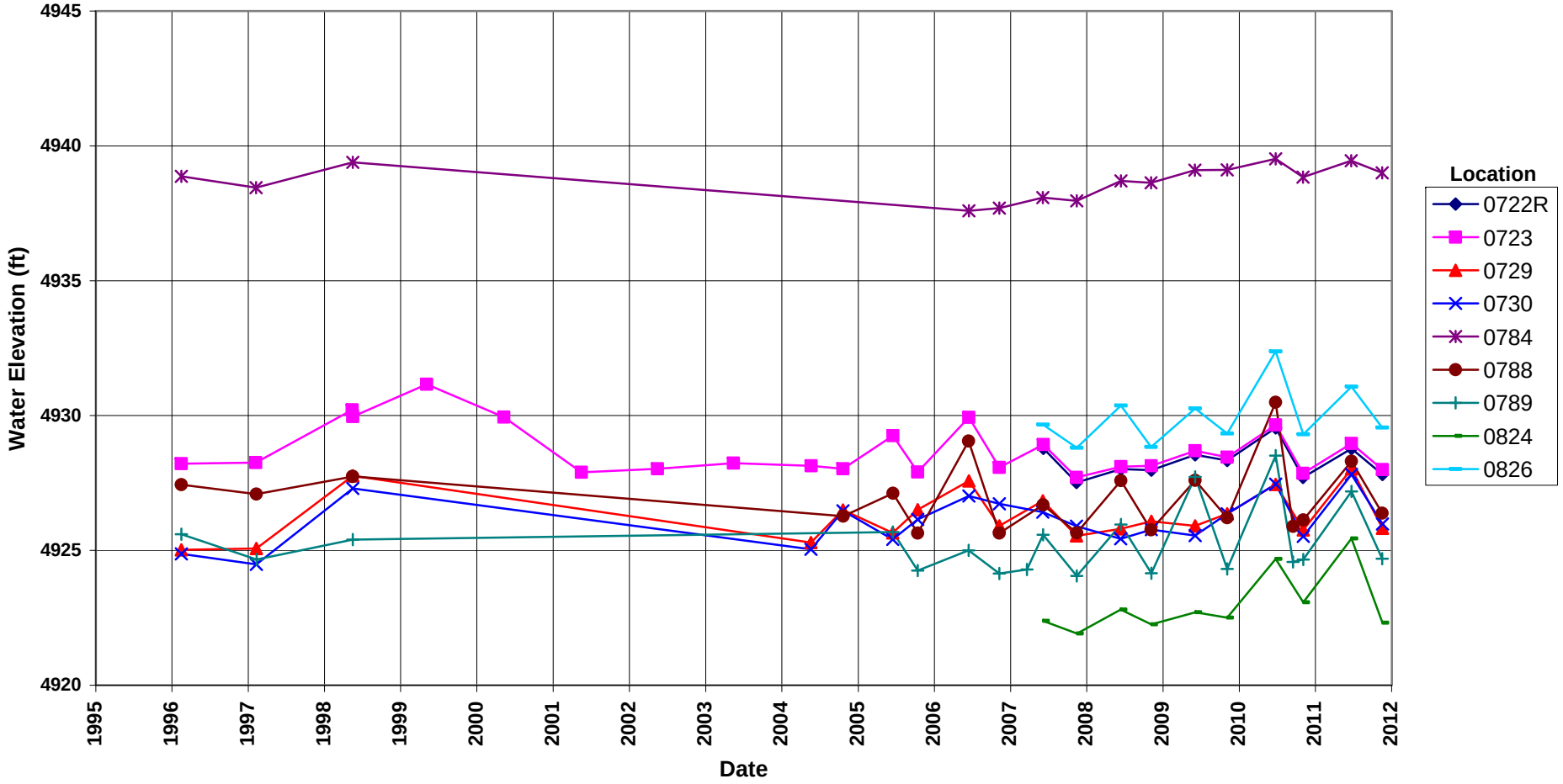
Riverton Processing Site
Hydrograph



Riverton Processing Site
Hydrograph



Time-Concentration Graphs

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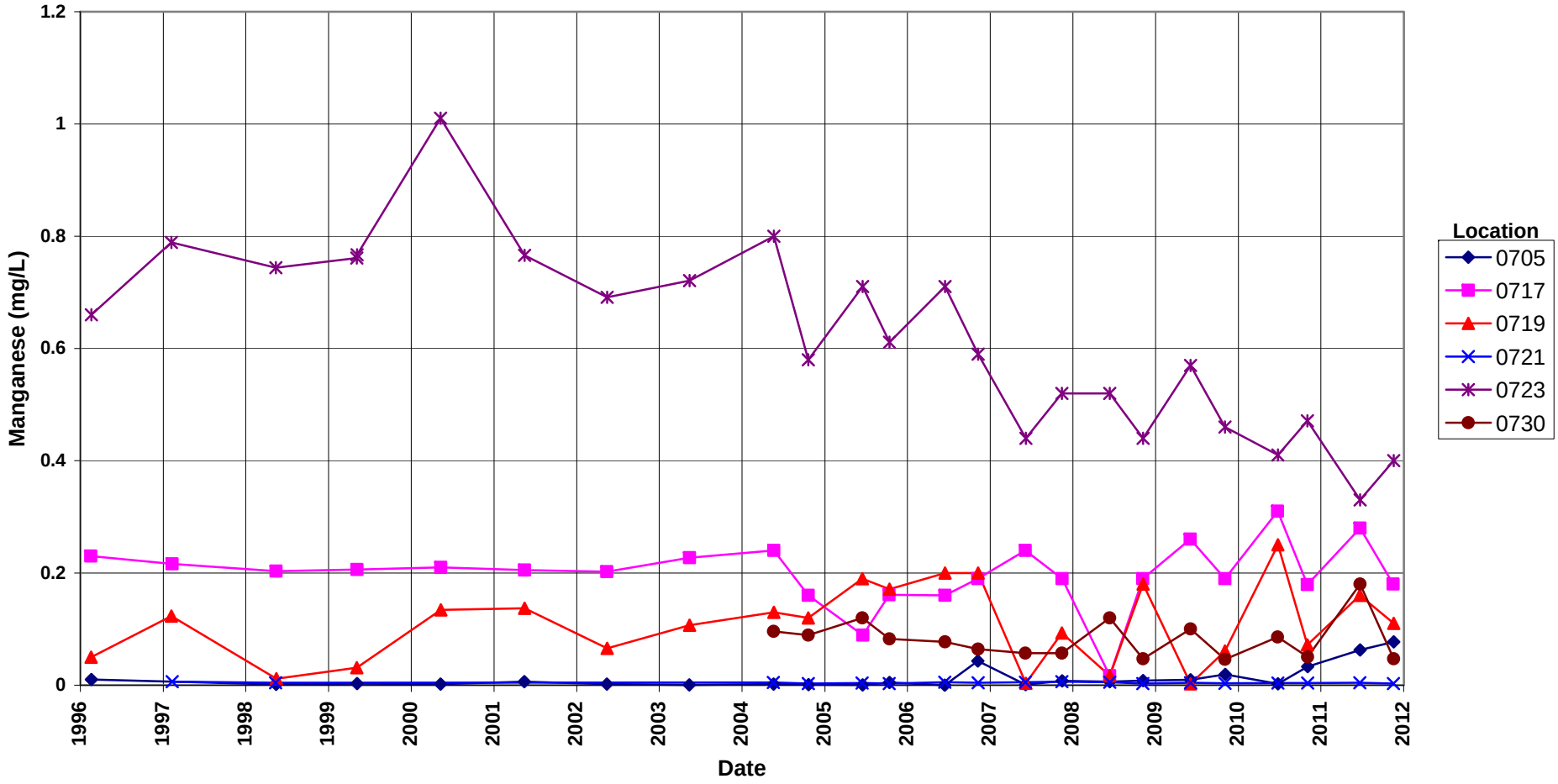
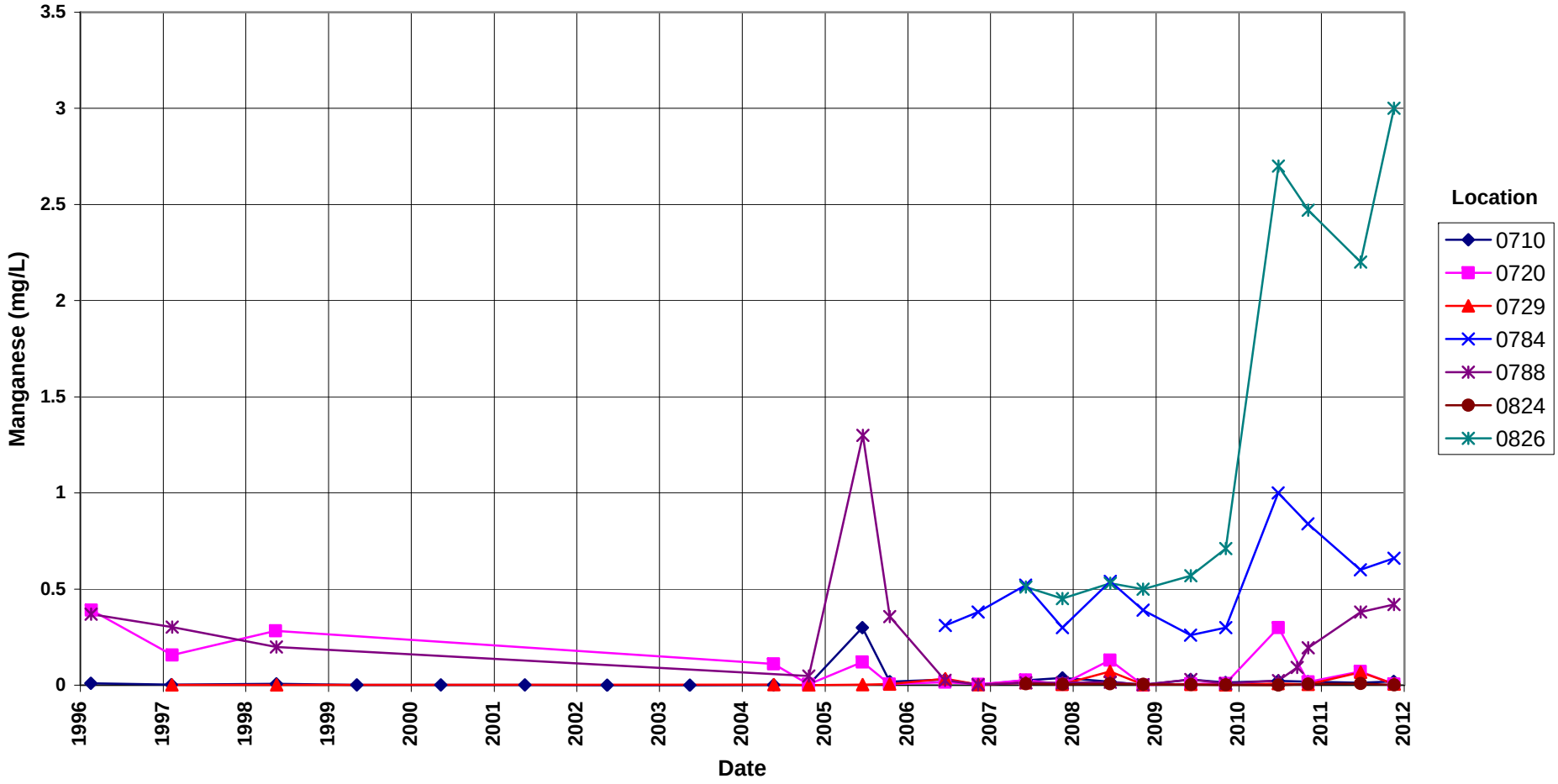
Riverton Processing Site
Manganese Concentration
Semi-Confined Aquifer Locations

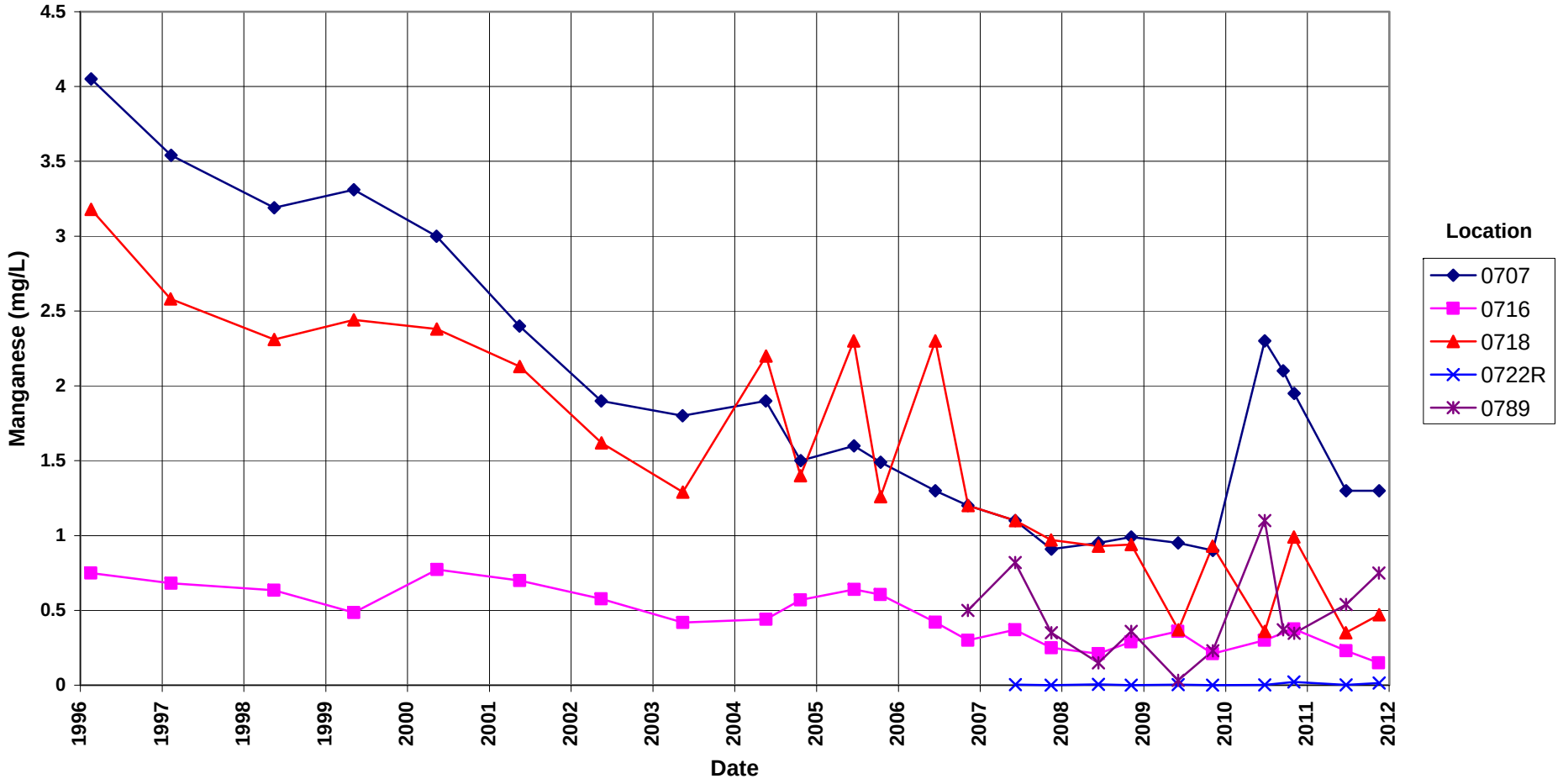


Riverton Processing Site
Manganese Concentration

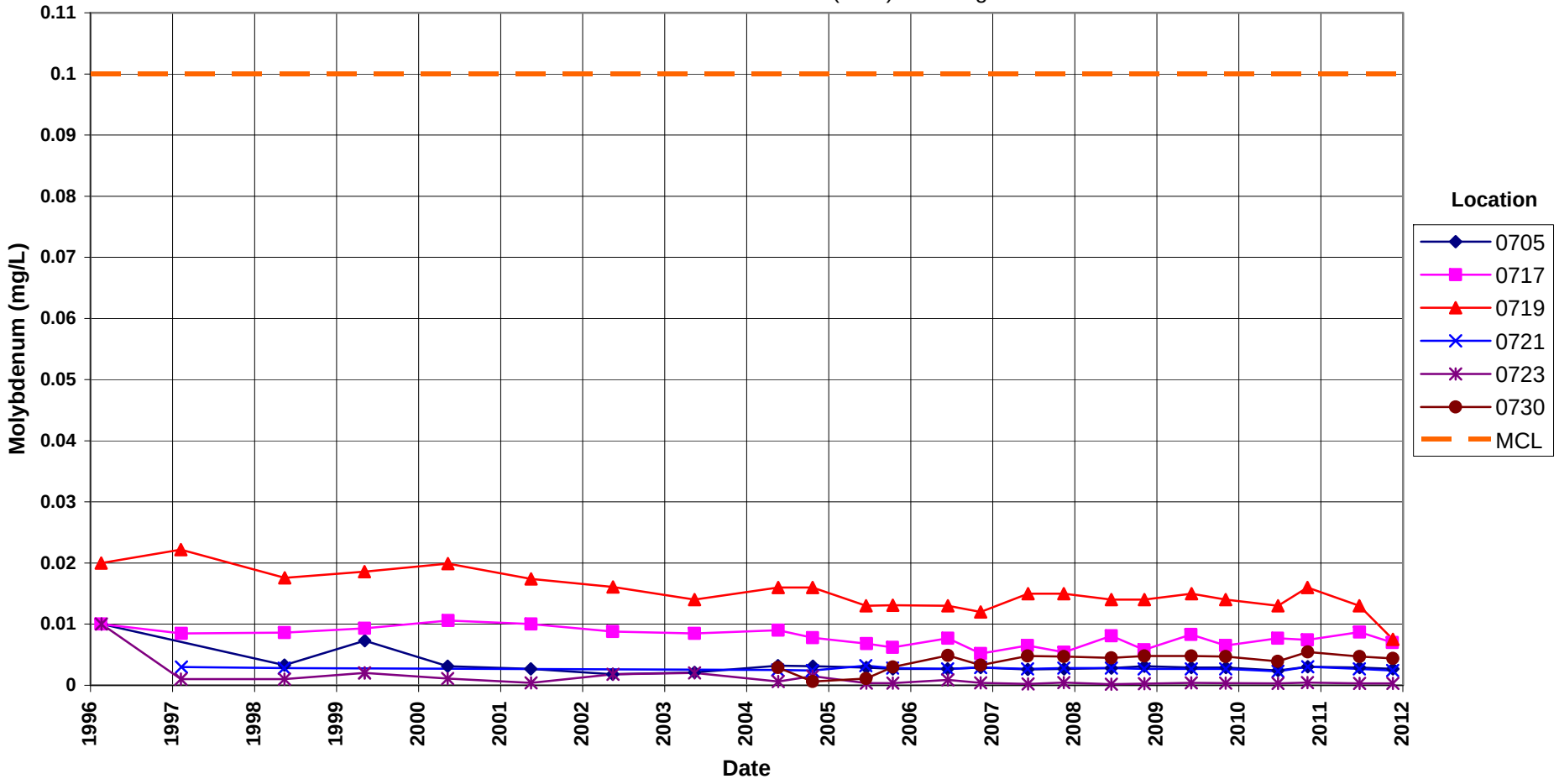
Surficial Aquifer Locations



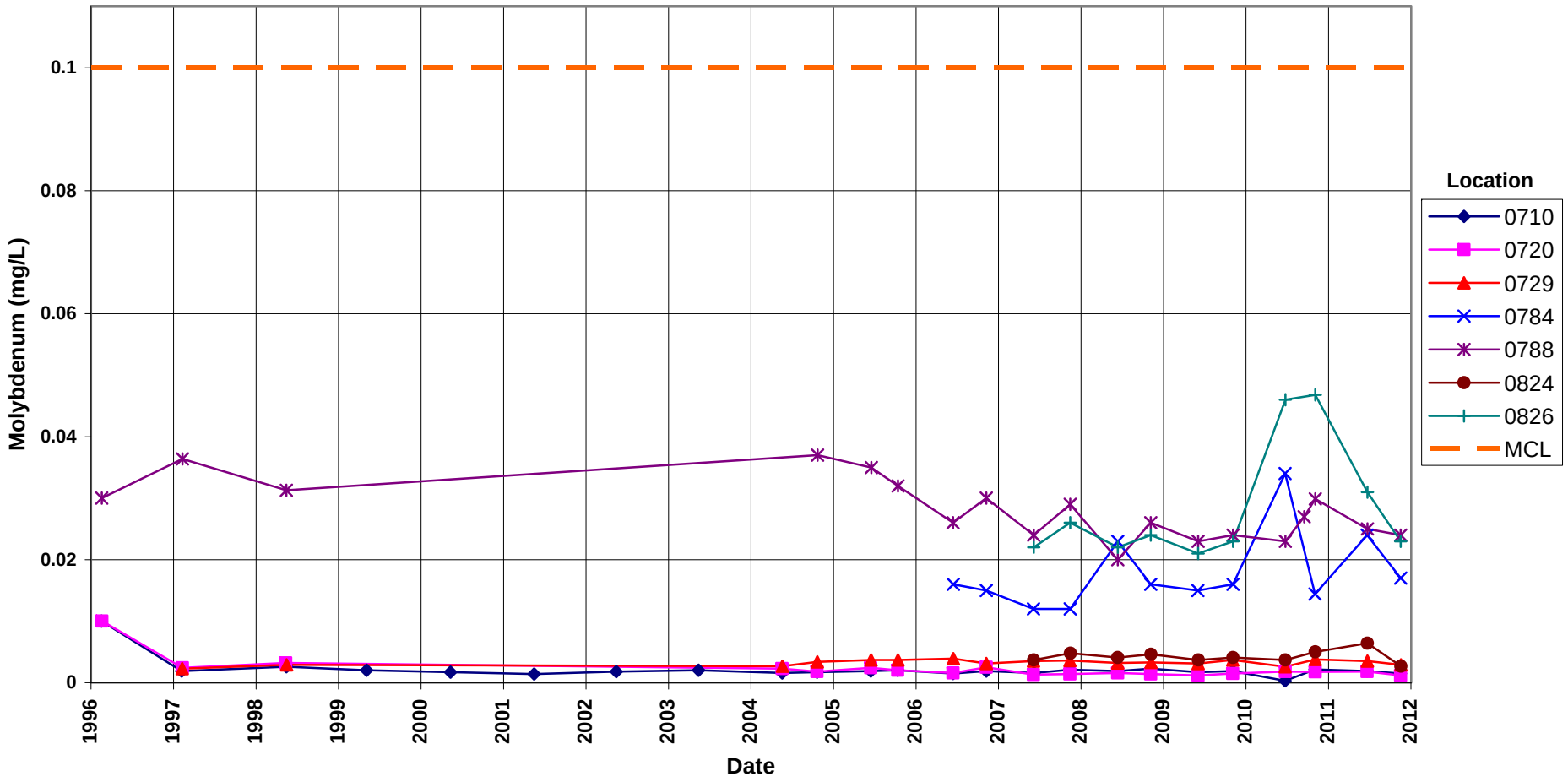
Riverton Processing Site
Manganese Concentration
Surficial Aquifer Locations



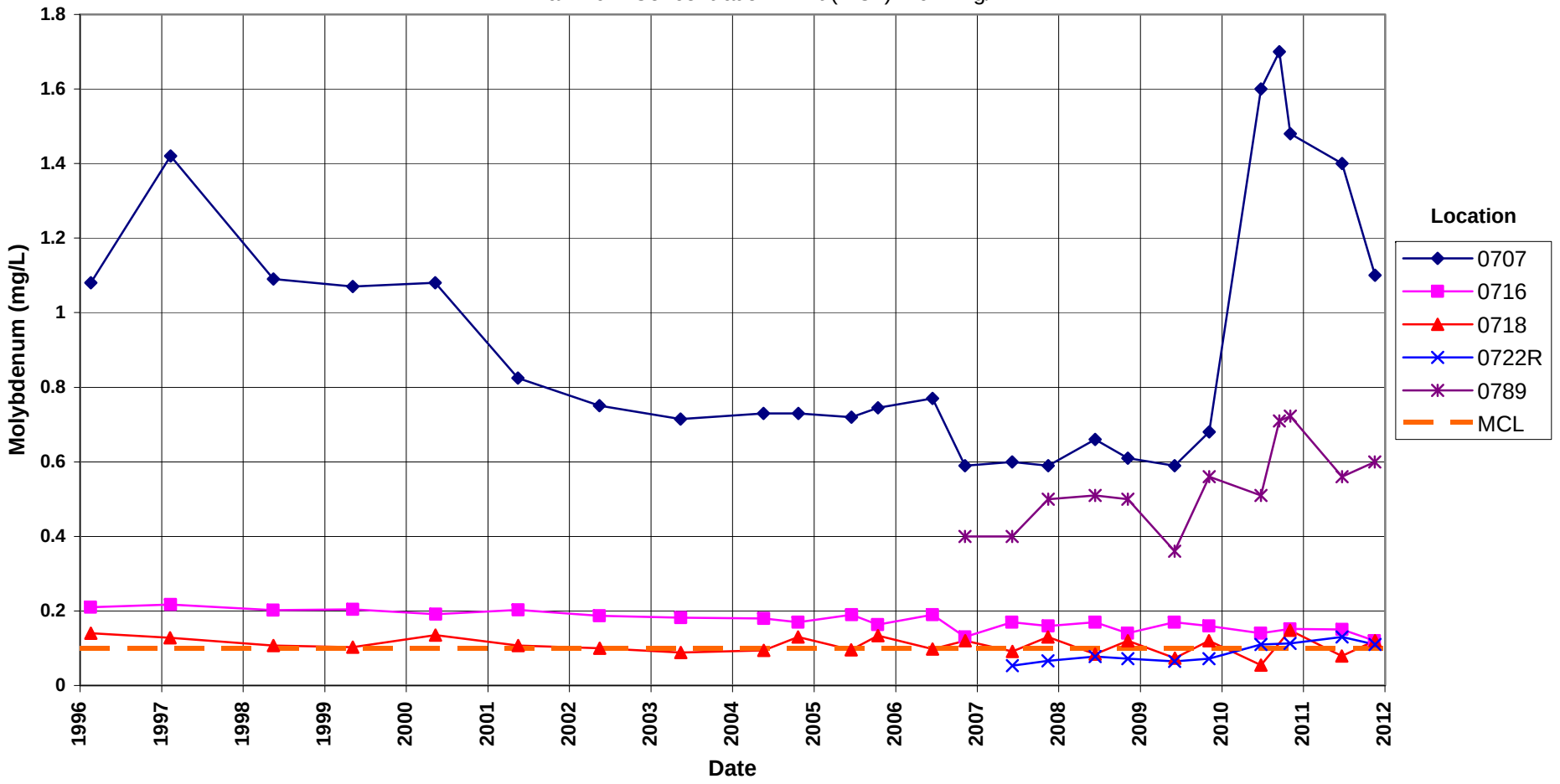
Riverton Processing Site
Molybdenum Concentration
Semi-confined Aquifer Locations
Maximum Concentration Limit (MCL) = 0.1 mg/L



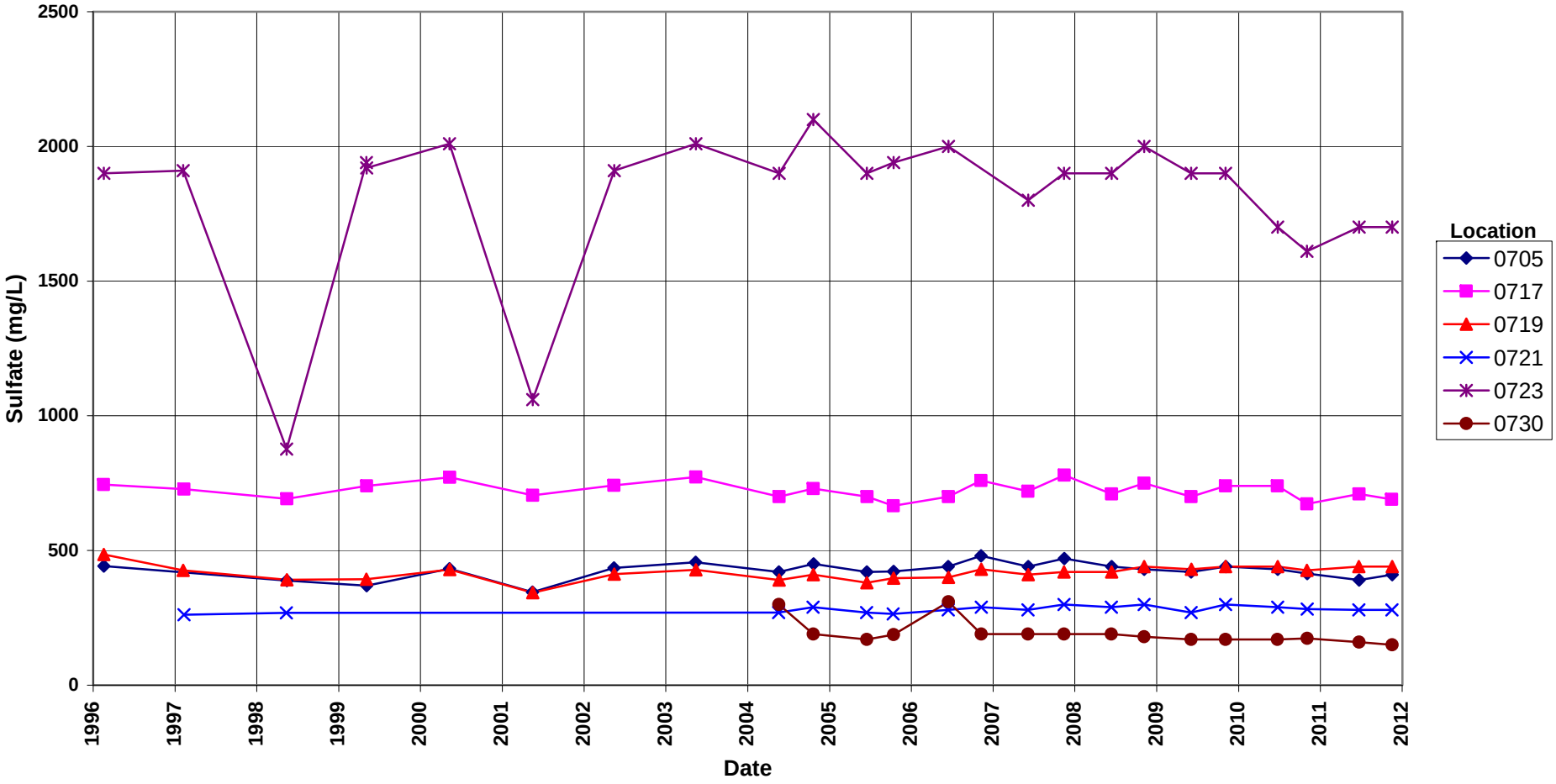
Riverton Processing Site
Molybdenum Concentration
Surficial Aquifer Locations
Maximum Concentration Limit (MCL) = 0.1 mg/L



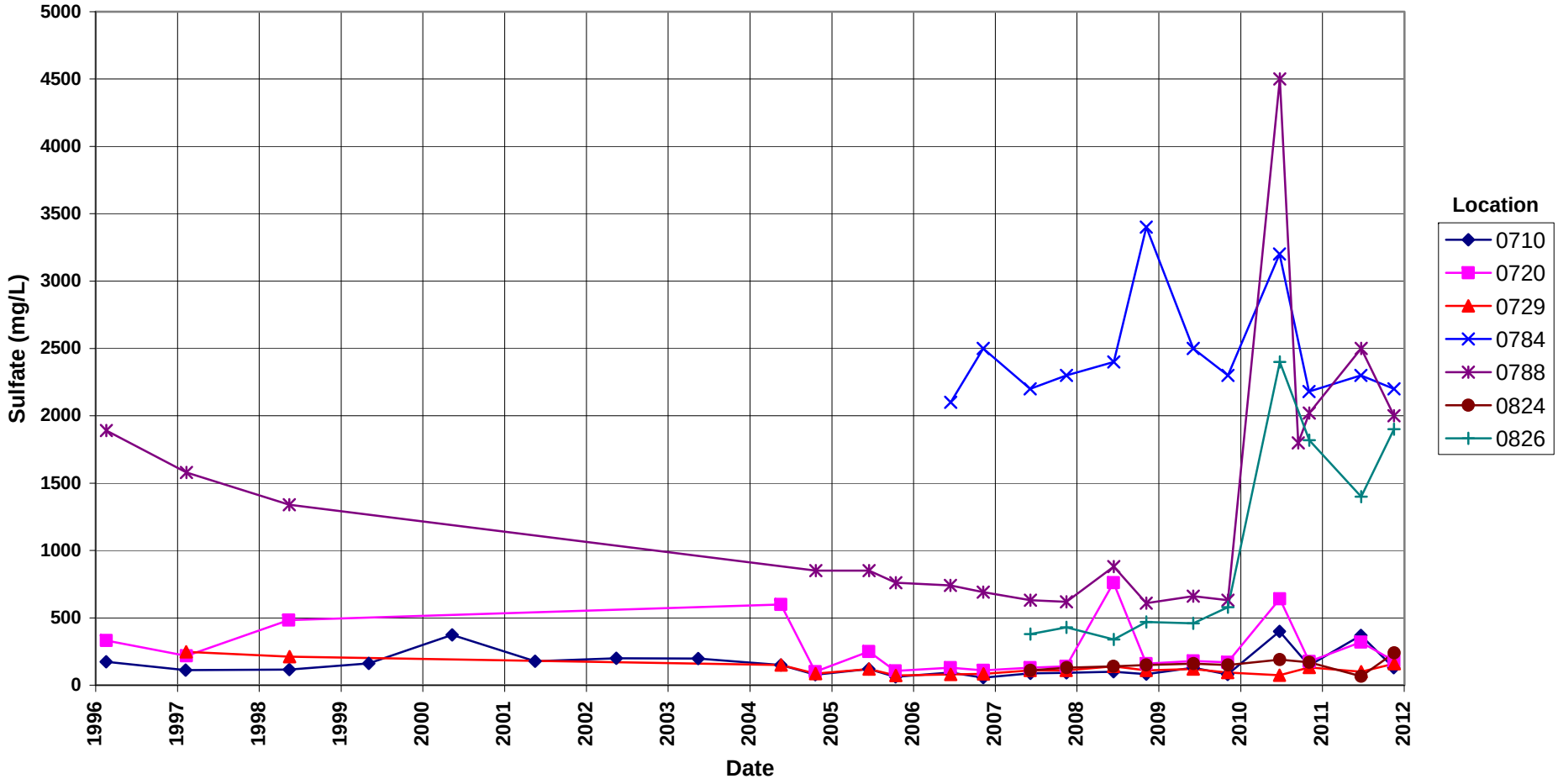
Riverton Processing Site
Molybdenum Concentration
Surficial Aquifer Locations
Maximum Concentration Limit (MCL) = 0.1 mg/L



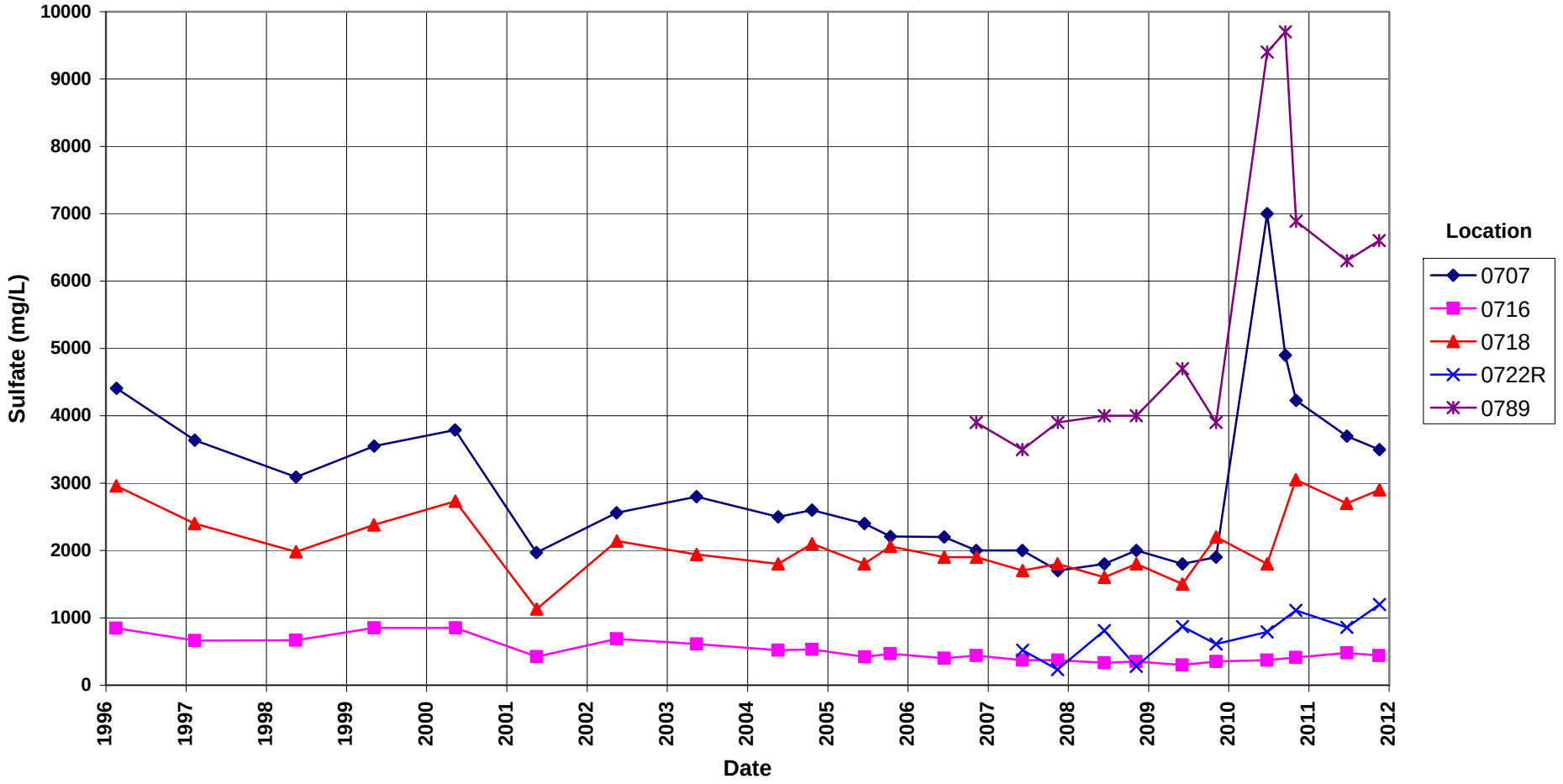
Riverton Processing Site
Sulfate Concentration
Semi-Confined Aquifer Locations



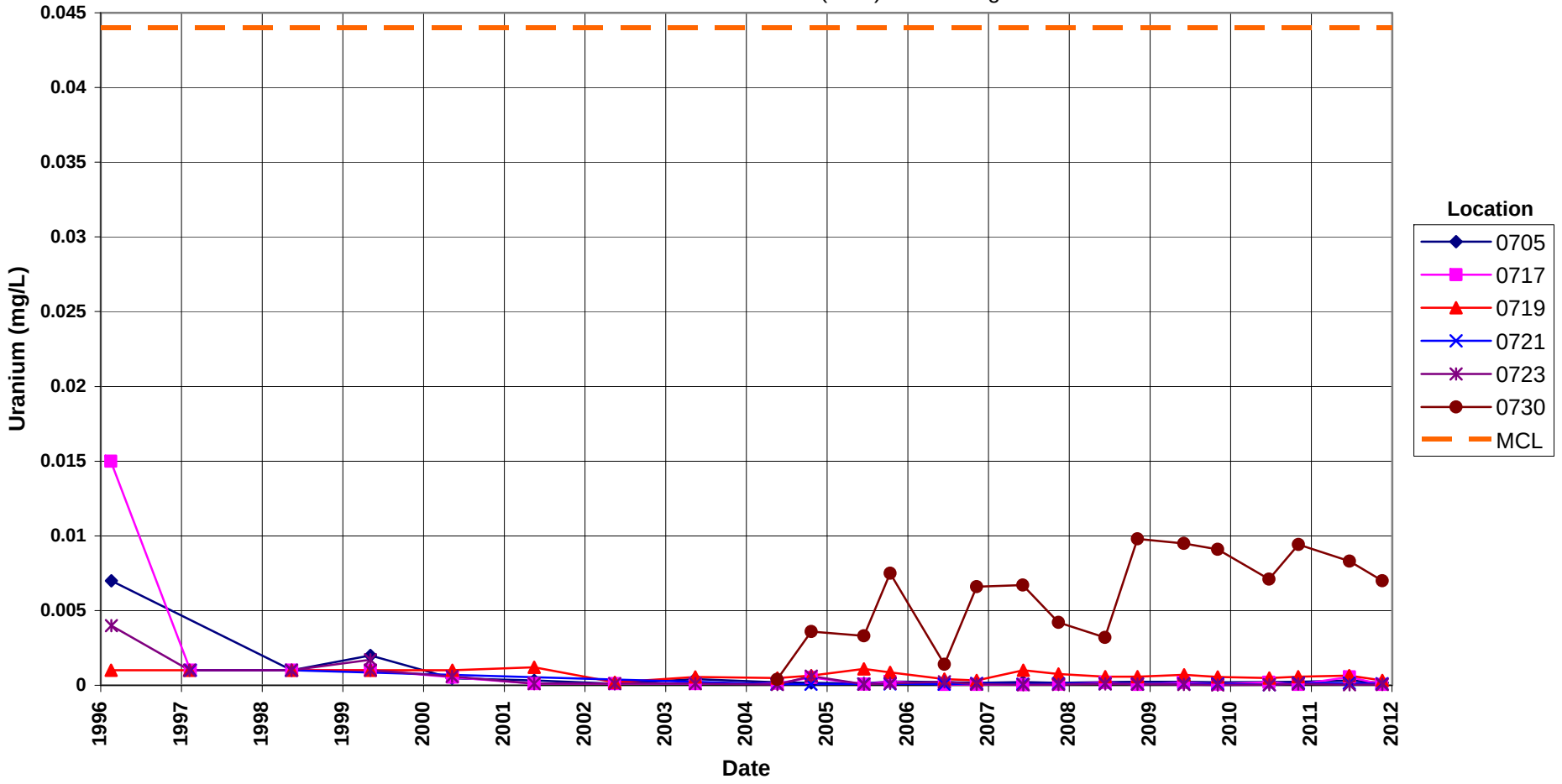
Riverton Processing Site
Sulfate Concentration
Surficial Aquifer Locations



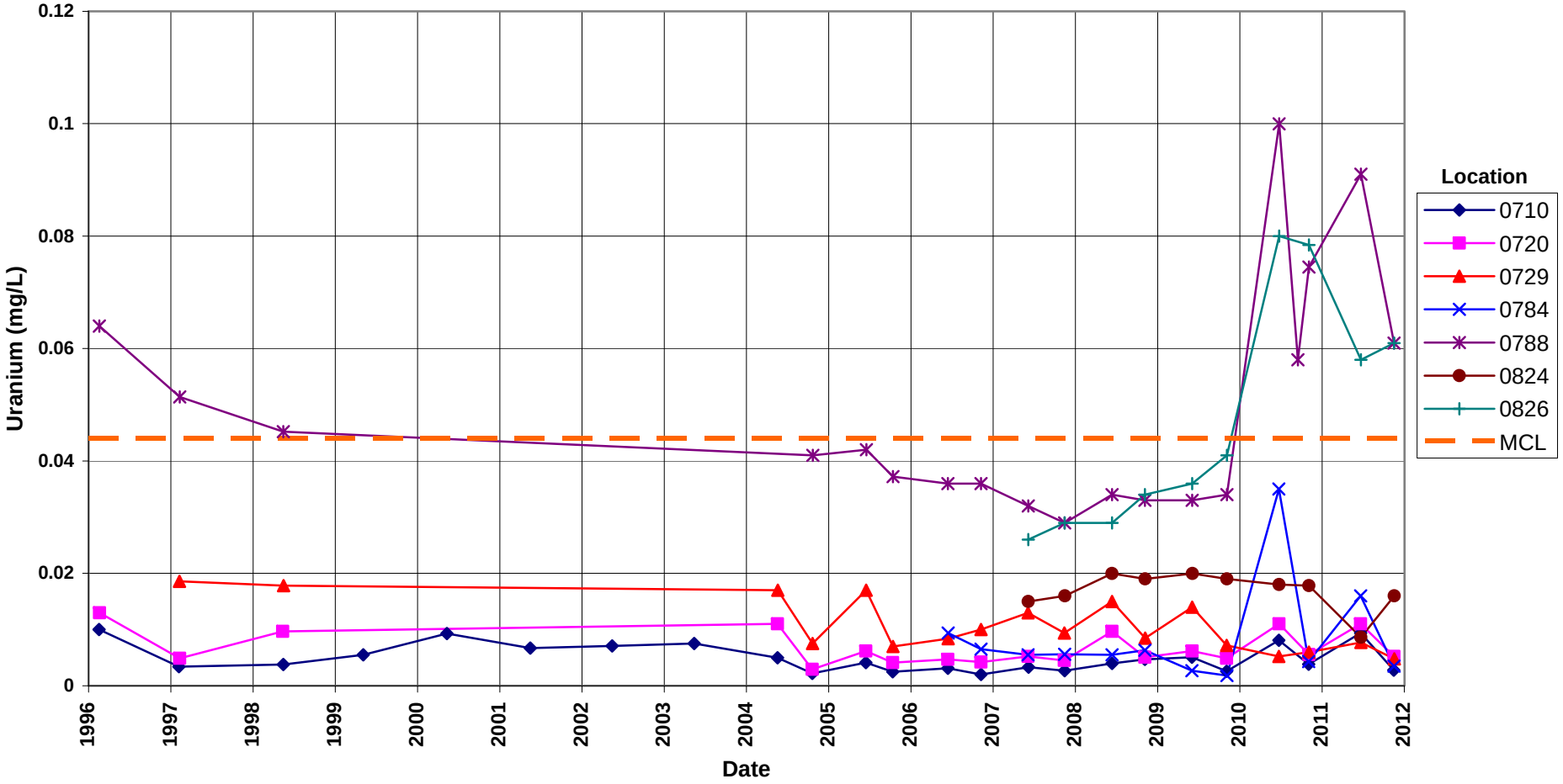
Riverton Processing Site
Sulfate Concentration
Surficial Aquifer Locations

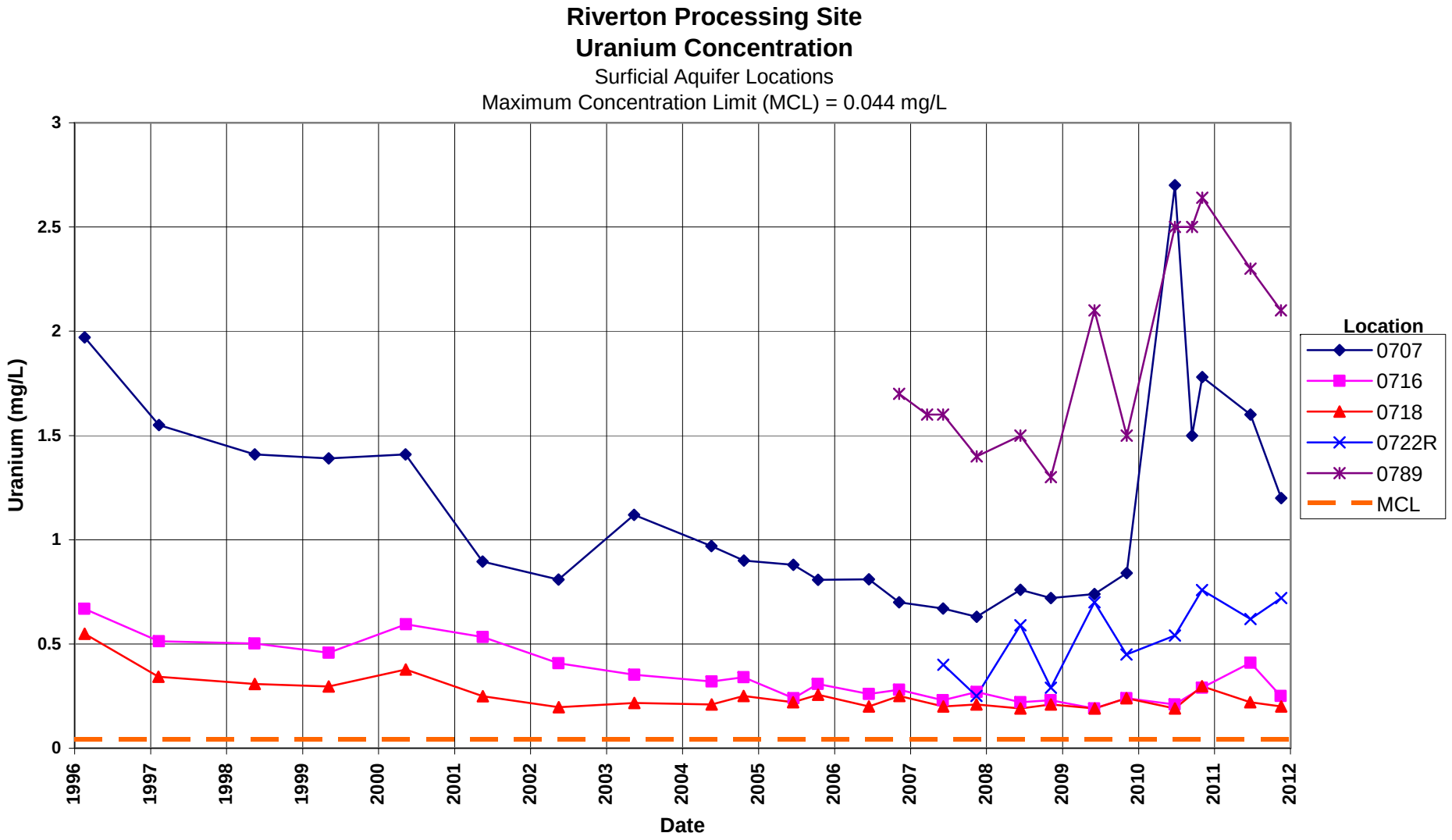


Riverton Processing Site
Uranium Concentration
Semi-Confined Aquifer Locations
Maximum Concentration Limit (MCL) = 0.044 mg/L

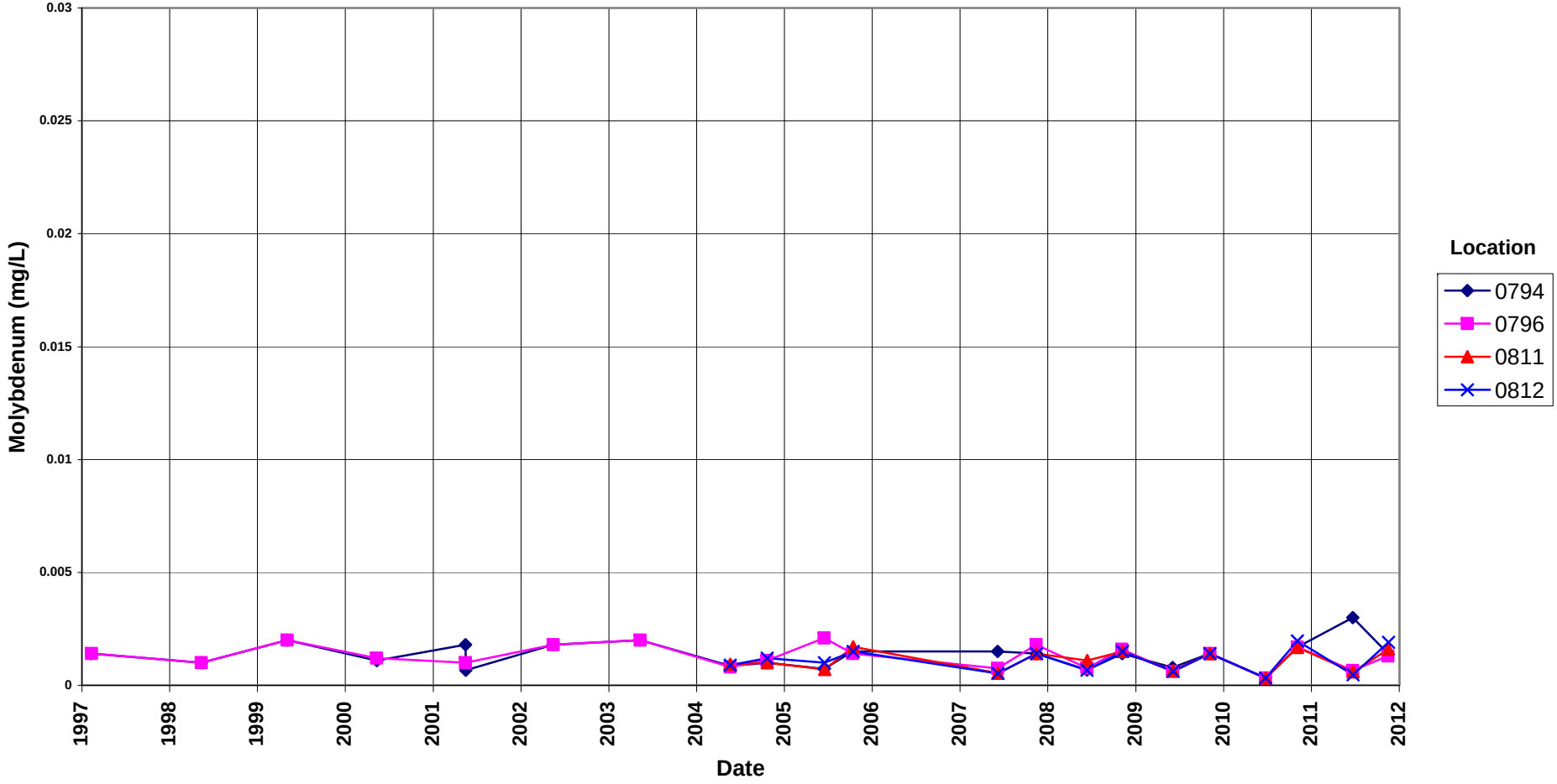


Riverton Processing Site
Uranium Concentration
Surficial Aquifer Locations
Maximum Concentration Limit (MCL) = 0.044 mg/L

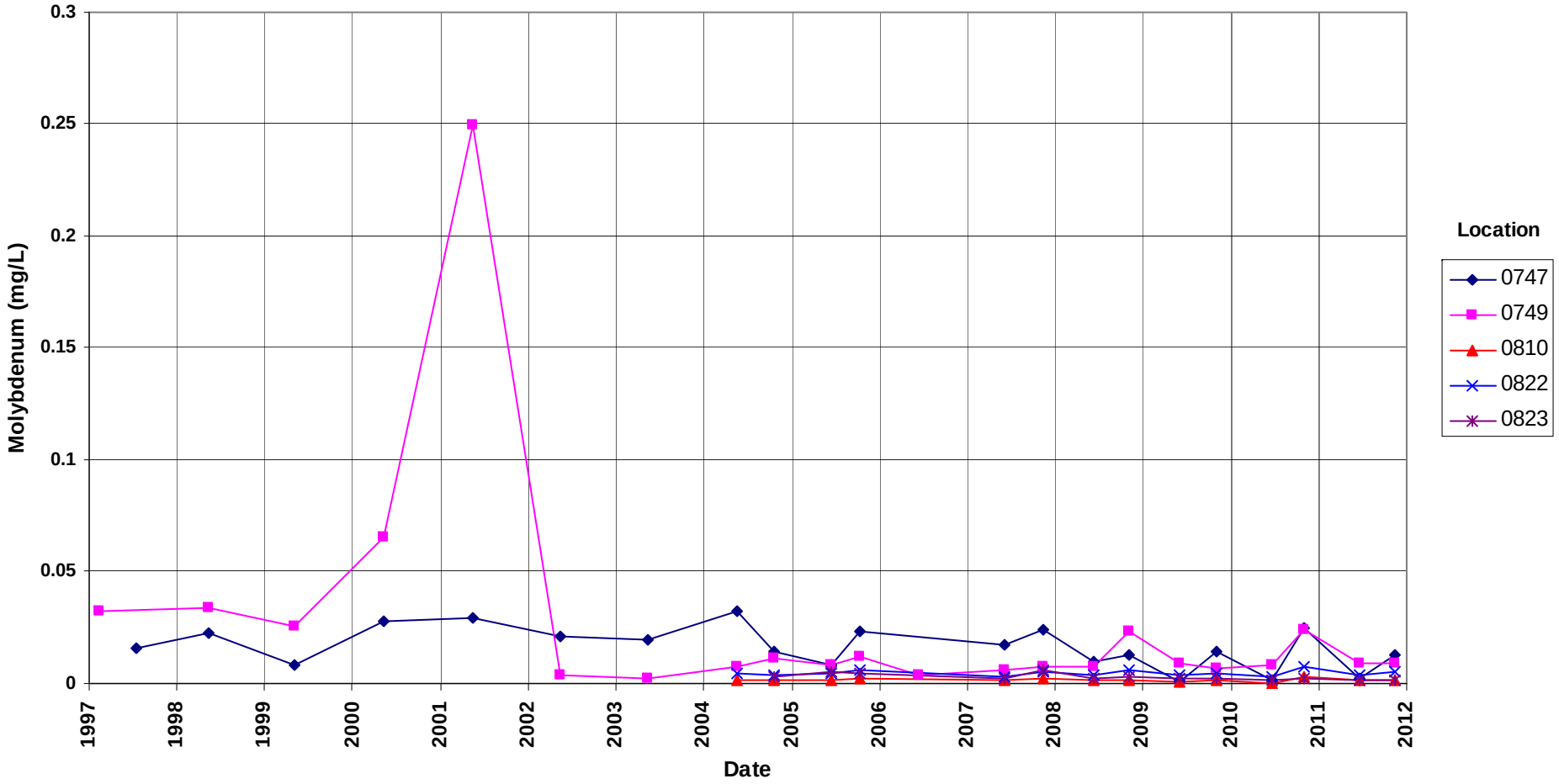



Riverton Processing Site
Uranium Concentration
Surficial Aquifer Locations
Maximum Concentration Limit (MCL) = 0.044 mg/L
Uranium (mg/L)
3
2.5
2
1.5
1
0.5
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Date
Location
0707
0716
0718
0722R
0789
MCL

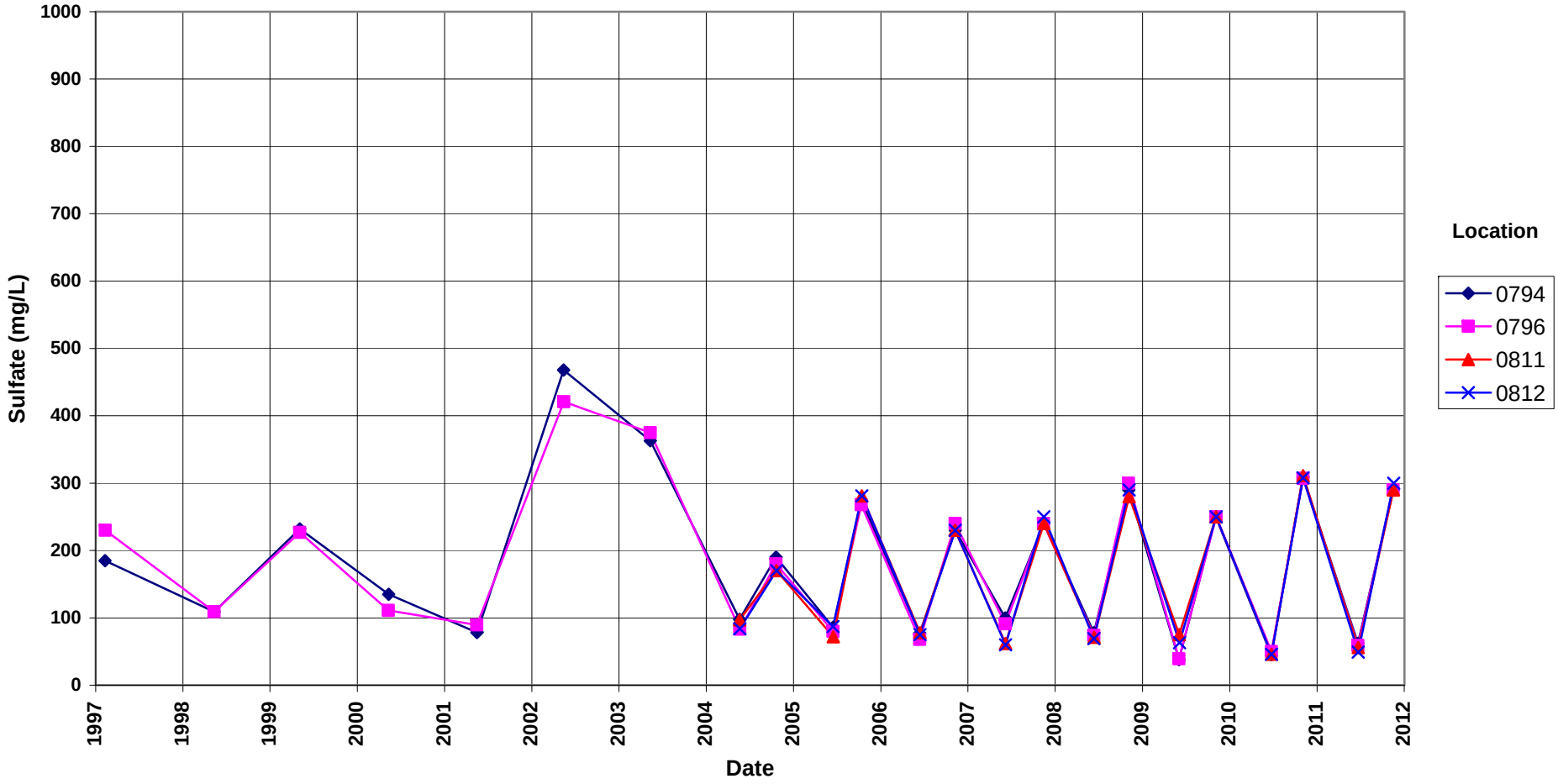
Riverton Processing Site
Molybdenum Concentration
Little Wind River Surface Water Locations



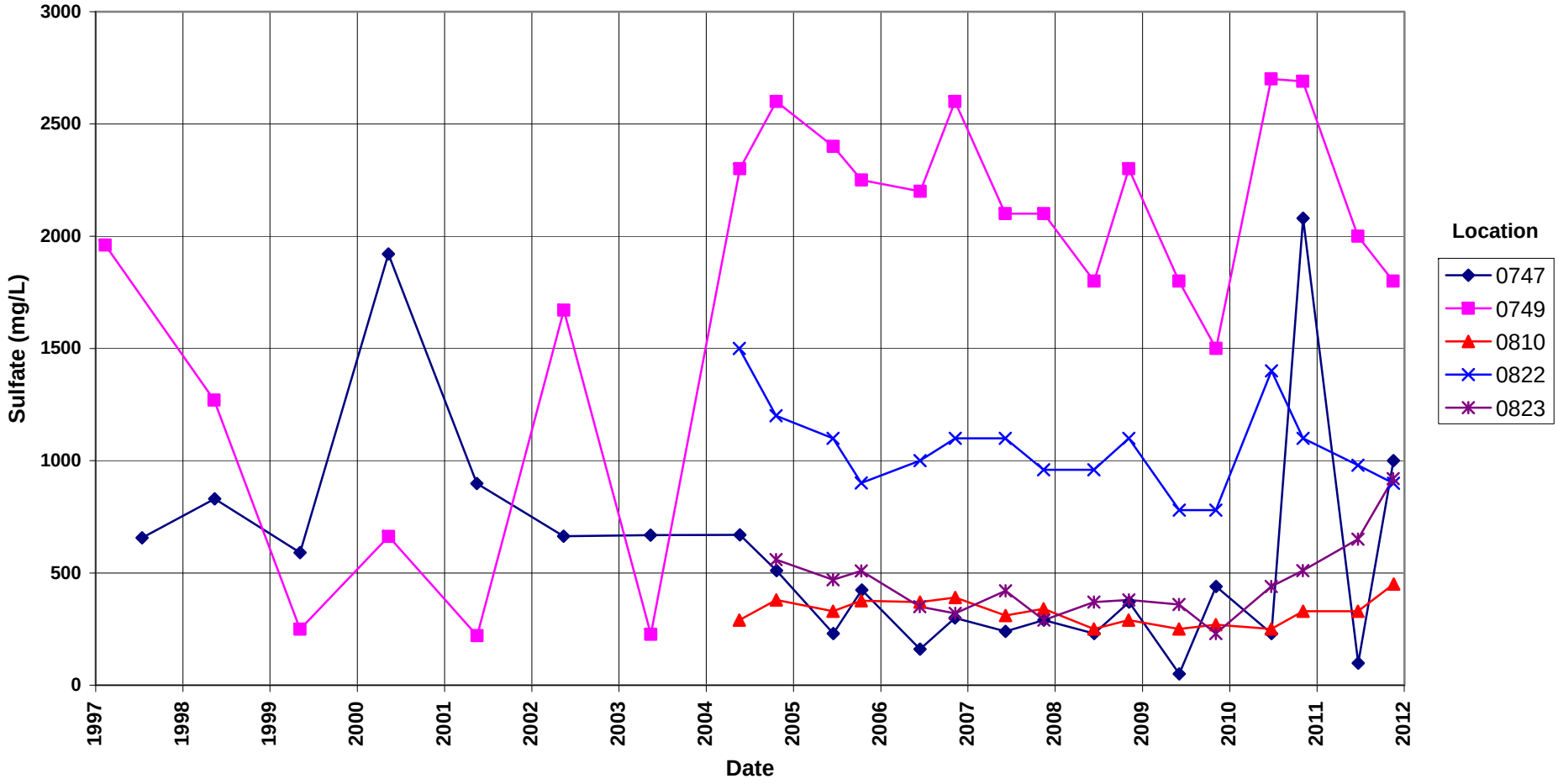
Riverton Processing Site
Molybdenum Concentration
Oxbow Lake, Wetlands, Ditch & Pond Surface Water Locations



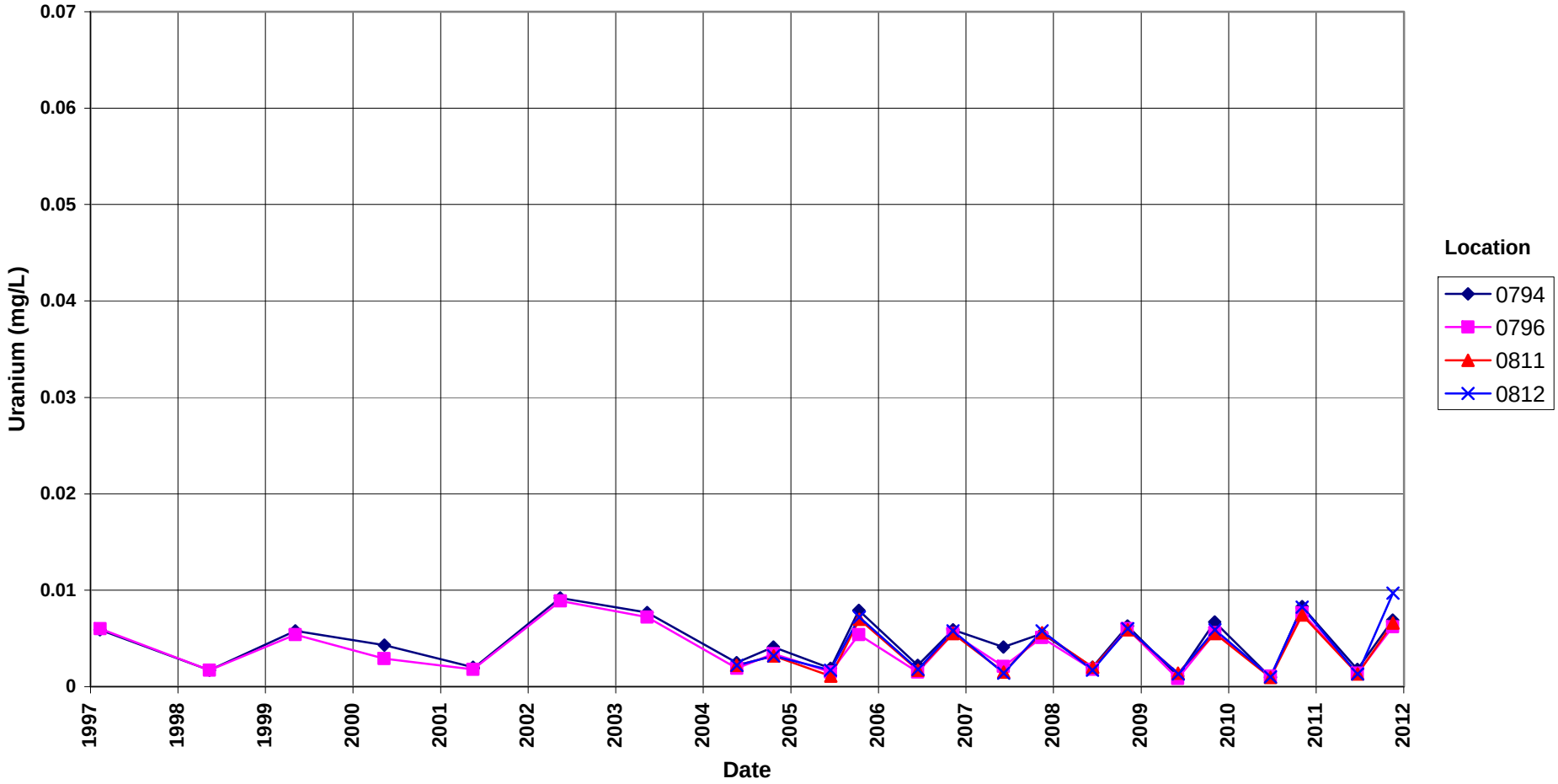
Riverton Processing Site
Sulfate Concentration
Little Wind River Surface Water Locations



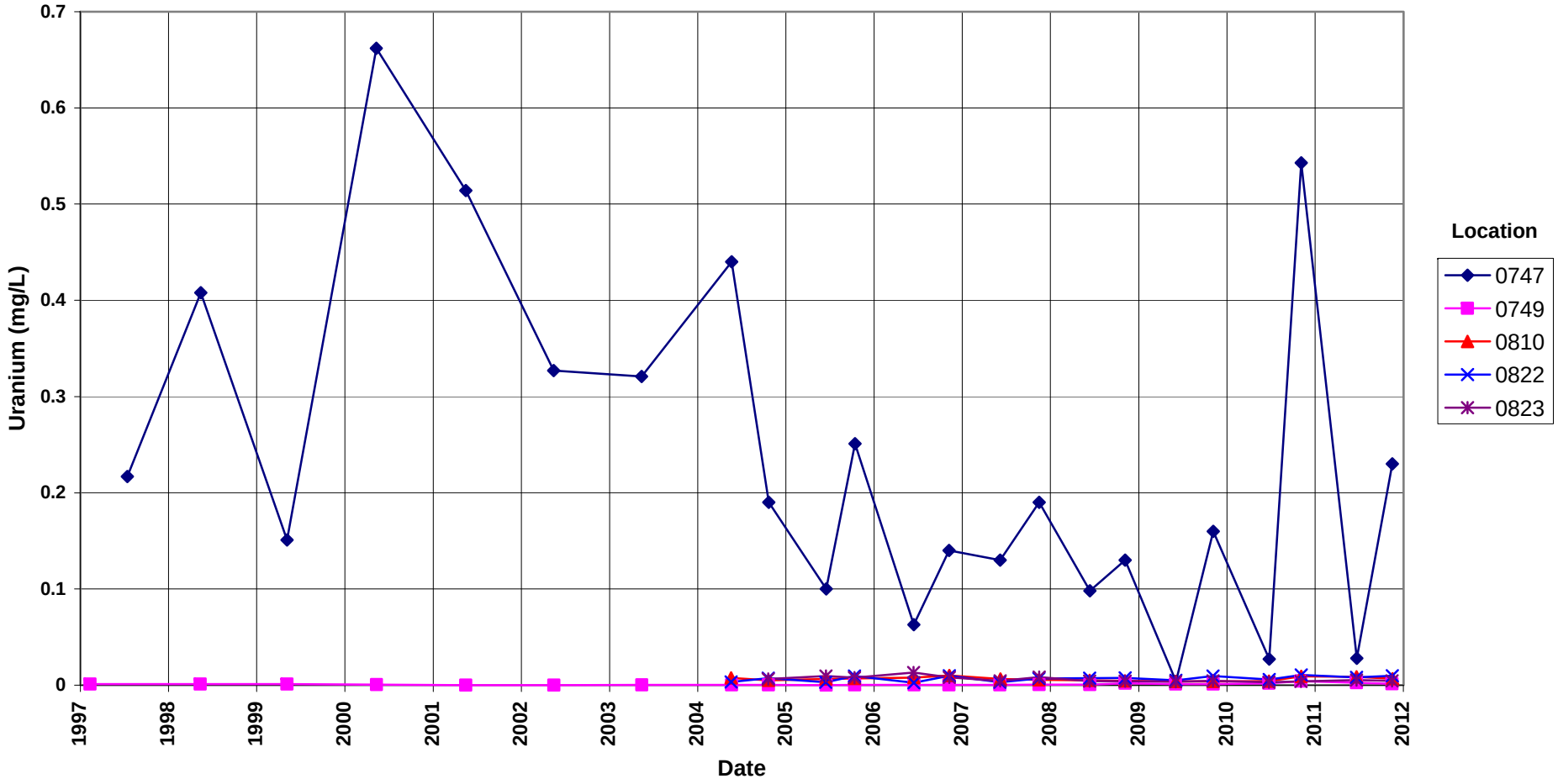
Riverton Processing Site
Sulfate Concentration
Oxbow Lake, Wetlands, Ditch & Pond Surface Water Locations



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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Stoller

established 1959

Task Order LM00-501
Control Number 12-0006

October 4, 2011

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
November 2011 Environmental Sampling at the Riverton, Wyoming,
Processing Site

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

Dear Dr. Gil:

The purpose of this letter is to inform you of the upcoming sampling event at Riverton, WY. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Riverton, WY, Processing Site. Water quality data will be collected from monitoring wells, domestic wells, and surface locations at this site as part of the routine environmental sampling currently scheduled to begin the week of November 7, 2011.

The following lists show the monitoring wells (with zone of completion), surface locations, and domestic wells 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

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

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. 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

Sam Campbell
Site Lead

SC/lcg/lb

Enclosures (3)

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

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

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
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

Sampling conducted in November and June

Constituent Sampling Breakdown

Site	Riverton				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	48	18			
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					
Magnesium					
Manganese	X	X	0.005	SW-846 6010	LMM-01
Molybdenum	X	X	0.003	SW-846 6020	LMM-02
Nitrate + Nitrite as N ((NO_3+NO_2)-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.

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Attachment 4
Trip Report

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Stoller established 1959
Grand Junction Office

Memorandum

Control Number N/A

DATE: November 22, 2011

TO: Sam Campbell

FROM: David Atkinson

SUBJECT: Trip Report

Site: Riverton, Wyoming, Processing Site

Dates of Sampling Event: November 14 – November 18, 2011.

Team Members: Sam Campbell, David Atkinson. Dr. April Gil, DOE Site Manager, also was onsite to observe sampling and conduct a safety assessment.

Number of Locations Sampled: 18 monitoring wells, 9 surface water locations, and 5 domestic wells.

Locations Not Sampled/Reason: None.

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.

Flow in the Little Wind River was seasonally low. The river was not flowing through the Oxbow Lake at the time of sampling.

The sampling point at surface water location 0810 was moved approximately 50 yards to the southwest to access open water; most of the pond was frozen.

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
2644	0789	Duplicate	JMV-584
2645	Equipment Blank	Equipment Blank	JMV-585
2175	0716	Duplicate	JMV-587

Requisition Numbers Assigned: All samples were assigned to requisition index number (RIN) 11114183 and were shipped to the ALS Laboratory Group on November 21, 2011.

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

Well Inspection Summary: Monitoring well 0110 is cut-off at ground level and difficult to access. It appeared to have been recently run-over, wedging the cap into the casing. Otherwise, all monitoring wells were in good condition.

Equipment: All equipment functioned properly.

Stakeholder/Regulatory: Met with the manager of the Chemtrade sulfuric acid plant, David Luzmoor, who provided access to the site and related information about the state of the local political situation regarding Tribal stakeholders.

Institutional Controls

Fences, Gates, Locks: No issues identified.
Signs: Two of the three warning signs installed around the oxbow lake were intact; the third sign, which was torn down by wind last spring, was replaced.
Trespassing/Site Disturbances: Several (approximately 5) stray dogs appeared to be living in the area near the oxbow lake, and several (approximately 20) horses and mules approached the sampling truck while at some wells in the grazing area, near the oxbow lake.

Access Issues: New contact information - Mr. Loren Raymond, resident at domestic well location 0430. His cell phone number is [redacted] for contact prior to sampling.

Corrective Action Required/Taken: Replaced the damaged oxbow lake warning sign.

Need to upgrade monitoring well 0110 by extending the PVC casing approximately 3 ft. to allow better access and improve visibility. New protective casing needs to be installed around the extended PVC casing.

(SEC/LB)

cc: (electronic)
April Gil, DOE
Sam Campbell, Stoller
Steve Donivan, Stoller
Bev Gallagher, Stoller
EDD Delivery