Data Validation Package

June 2009
Groundwater and Surface Water Sampling at the Riverton, Wyoming, Processing Site

August 2009

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

The draft 2007 *Long-Term Management Plan* (LTMP) *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 involved sampling 19 monitor wells, 9 surface water locations, and 6 domestic wells at the Riverton, Wyoming, Processing Site. Monitor well 0735 was not sampled for safety concerns. High flows of the Little Wind River had eroded the escarpment (10 foot drop to the river) to the edge of the well. Water levels were measured at all sampled monitor wells and 15 additional monitor wells that were not sampled. Sampling and analysis was conducted as specified in LTMP 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 monitor wells were below the respective U.S. Environmental Protection Agency (EPA) (Title 40 *Code of Federal Regulations* [CFR] Part 192) groundwater standard. Although concentrations of molybdenum and uranium in the surficial aquifer currently exceed their respective EPA groundwater standard, concentrations continue to trend downward at most locations as shown in the time-concentration graphs, which are included in the Data Presentation section. Groundwater modeling predicts that natural flushing of the surficial aquifer will reduce concentrations below standards within 100 years. Progress of natural flushing will be assessed in the annual Verification Monitoring Report, which will include results from both 2009 sampling events (June and November). The EPA groundwater standards for molybdenum and uranium were exceeded in samples collected from surficial aquifer monitor wells listed in Table 1.

Table 1. Riverton Wells with Samples that Exceeded EPA Groundwater Standards in November 2008

Analyte	Standard[a]	Location	Concentration
Molybdenum	0.1	0707	0.59
		0716	0.17
		0789	0.36
Uranium	0.044	0707	0.74
		0716	0.19
		0718	0.19
		0722R	0.70
		0789	2.10

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

Results from domestic wells (locations 0405, 0430, 0436, 0460, 0828, and 0836) 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.

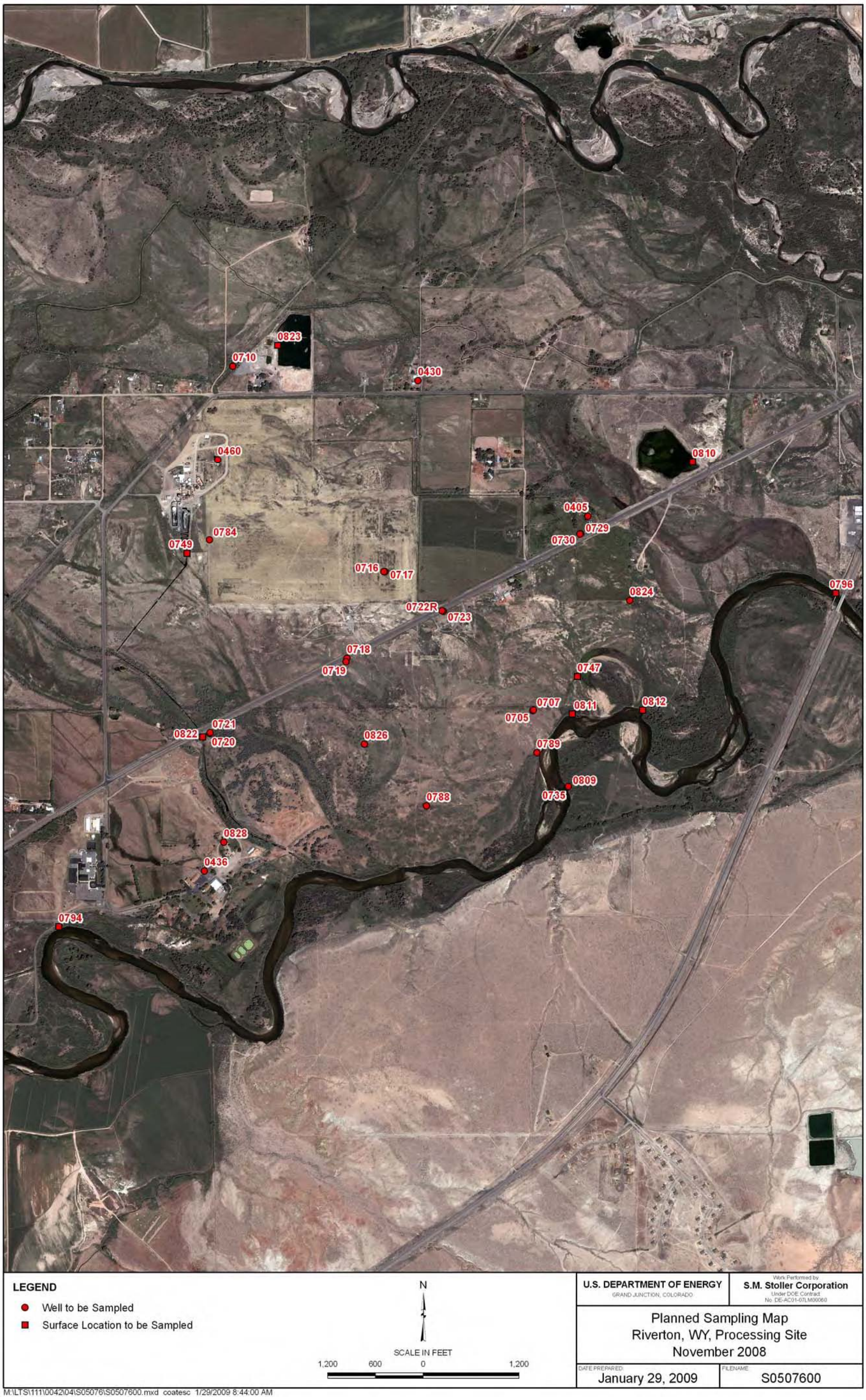
Surface water results were compared to the benchmark value for uranium (0.011 milligram per liter [mg/L]) derived from historical data at surface water location 0794, which is on the Little Wind River upstream of the site and represents background conditions (see sample location map). Uranium concentrations from Little Wind River locations 0796, 0811, and 0812 were below the benchmark value, which indicates minimal site-related impact on the water quality of the Little Wind River. In addition, the uranium concentration from surface water locations 0747 (Oxbow Lake), 0810 (constructed wetlands), 0822 (west side irrigation ditch), and 0823 (gravel pit pond) were below the benchmark value, which indicates minimal site-related impact to these surface water features.

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 (780 mg/L at location 0822).

Water samples from 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. All radium concentrations were below detection limits, which indicates no impact to water quality in the ditch.

Sam Campbell
Site Lead, S.M. Stoller

9-4-09
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**	June 1-4, 2009
Date(s) of Verification	July 20, 2009	**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 April 28, 2009.
2. Were the sampling locations specified in the planning documents sampled?	No	Monitor well 0735 was not sampled due to safety concerns. Domestic well 0836 was added to the list of wells and sampled for the first time.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on May 29, 2009.
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 at 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 2644, 2645, and 2646 were used for 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):	09052319
Sample Event:	June 1−4, 2009
Site(s):	Riverton, Wyoming
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	0906080
Analysis:	Metals, Wet Chemistry, and Radiochemistry
Validator:	Steve Donivan
Review Date:	July 17, 2009

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325) "Standard Practice for Validation of Laboratory Samples." 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 2.

Table 2. 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 3. Refer to the sections below for an explanation of the data qualifiers applied.

Table 3. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
0906080-2	0430	Uranium	U	Less than 5 times the calibration blank
0906080-3	0436	Manganese	U	Less than 5 times the method blank
0906080-3	0436	Uranium	U	Less than 5 times the calibration blank
0906080-4	0460	Manganese	U	Less than 5 times the method blank
0906080-4	0460	Uranium	U	Less than 5 times the calibration blank
0906080-11	0719	Manganese	U	Less than 5 times the method blank
0906080-12	0720	Molybdenum	U	Less than 5 times the calibration blank
0906080-13	0721	Uranium	U	Less than 5 times the calibration blank
0906080-15	0723	Molybdenum	U	Less than 5 times the method blank
0906080-15	0723	Uranium	U	Less than 5 times the method blank

Table 3 (continued). Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
0906080-18	0747	Molybdenum	U	Less than 5 times the calibration blank
0906080-23	0794	Molybdenum	U	Less than 5 times the calibration blank
0906080-24	0796	Molybdenum	U	Less than 5 times the method blank
0906080-26	0810	Molybdenum	U	Less than 5 times the calibration blank
0906080-27	0811	Molybdenum	U	Less than 5 times the method blank
0906080-28	0812	Molybdenum	U	Less than 5 times the method blank
0906080-34	0836	Uranium	U	Less than 5 times the method blank
0906080-36	Equipment Blank	Molybdenum	U	Less than 5 times the method blank
0906080-36	Equipment Blank	Uranium	U	Less than 5 times the method blank

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 37 water samples on June 9, 2009, 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.

Preservation and Holding Times

The sample shipment was received cool and intact with the temperature inside the iced cooler at 1.4 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses.

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.

Method SW-846 6010, Manganese
Calibration for manganese was performed on June 16, 2009, using one calibration standard. Calibration and laboratory spike standards were prepared from independent sources. 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 practical quantitation limit and all results were within the acceptance range.

Method SW-846 6020, Molybdenum and Uranium
Calibrations for molybdenum and uranium were performed on June 16, 2009, using seven 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 method detection limit (MDL). Calibration and laboratory spike standards were prepared from independent sources. 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 practical quantitation limit 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 May 27, 2009. 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 calibration and calibration check standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency resulting in six verification checks. The calibration checks met the acceptance criteria.

Radiochemical Analysis

All radiochemical results reported included the calculated two-sigma total propagated uncertainty (TPU) and minimum detectable concentration (MDC). Radiochemical results are qualified with a "J" flag (estimated) when the result is greater than the MDC, but less than 3 times the MDC. Radiochemical results are qualified with a "U" flag (not detected) when the result is greater than the MDC but less than the two-sigma TPU.

Radium-226
Samples were screened for radium-226 by gas flow proportional counting. Plateau voltage determinations and detector efficiency calibrations were performed in November 2008. Daily instrument checks met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples.

Radium-228
Plateau voltage determinations and detector efficiency calibrations were performed in November 2008. 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 practical quantitation limits for all analytes. In cases where a blank concentration exceeds the method detection limit (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. For manganese, all blank results were negative and the absolute values were greater than the MDL but less than the practical quantitation limit. Associated manganese results that were less than 5 times the MDL are qualified with a "J" flag as estimated values.

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

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 practical quantitation limit, 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 with the exception of the radium-228 laboratory control sample. Radium-228 was not detected in the associated sample.

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 practical quantitation limit

(PQL) for ICP-MS or greater than 50 times the PQL for ICP. All evaluated serial dilution data were acceptable.

Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of molybdenum and uranium to reduce interferences. The required detection limits were met for all metals and wet chemistry analytes.

All radiochemical MDCs were calculated using the following equation as specified in *Quality Systems for Analytical Services* revision 2.4.

$$MDC = \frac{4.65 \times \sqrt{\frac{b}{T}}}{K} + \frac{3}{K \times T}$$

Where:
b = background count rate (cpm)
K = Efficiency factor
T = Count time in minutes

The calculation of the MDCs using the equation above was verified. All reported MDCs were less than the required MDCs.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. There were no manual integrations performed and all peak integrations were satisfactory.

Electronic Data Deliverable (EDD) File

The EDD file arrived on July 1, 2009. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file 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: 09052319 **Lab Code:** PAR **Validator:** Steve Donivan **Validation Date:** 7/17/2009

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

# of Samples: 37 **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: 09052319 **Lab Code:** PAR **Date Due:** 7/7/2009

Matrix: Water **Site Code:** RVT **Date Completed:** 7/2/2009

Analyte	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	06/16/2009			OK	OK	OK	OK	OK	101.0	94.0	91.0	3.0	91.0	7.0	101.0
MANGANESE	06/16/2009							OK	99.0	95.0	97.0	1.0	89.0		97.0
MOLYBDENUM	06/16/2009	0.0000	1.0000	OK	OK	OK	OK	OK	99.0	109.0	106.0	2.0	112.0	5.0	108.0
MOLYBDENUM	06/16/2009							OK	104.0	99.0	101.0	2.0			
URANIUM	06/16/2009	0.0000	1.0000	OK	OK	OK	OK	OK	101.0	103.0	98.0	2.0	103.0	5.0	102.0
URANIUM	06/16/2009							OK	106.0	102.0	102.0	0.0			

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 09052319 **Lab Code:** PAR **Date Due:** 7/7/2009

Matrix: Water **Site Code:** RVT **Date Completed:** 7/2/2009

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	06/16/2009	0.000	1.0000	OK	OK	OK	OK	OK	95.00	106.0	105.0	0	
SULFATE	06/16/2009							OK	98.00	106.0	100.0	2.00	
SULFATE	06/16/2009									105.0			
SULFATE	06/16/2009									101.0			

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 09052319 **Lab Code:** PAR **Date Due:** 7/7/2009

Matrix: Water **Site Code:** RVT **Date Completed:** 7/2/2009

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
0822	Radium-226	06/30/2009			86.5			
Blank_Spike	Radium-226	06/30/2009			91.7	105.0		
Blank_Spike_Du	Radium-226	06/30/2009			94.6	104.0		0.07
Blank	Radium-226	06/30/2009	0.1490	U	91.8			
0822	Radium-228	06/18/2009			63.7			
Blank_Spike	Radium-228	06/18/2009			65.2	132.0		
Blank_Spike_Du	Radium-228	06/18/2009			64.0	106.0		0.97
Blank	Radium-228	06/18/2009	0.1240	U	70.8			

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. Monitor wells were sampled using a peristaltic pump and dedicated tubing. Domestic wells were sampled by filling bottles at the discharge point.

Sample results for all monitor 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 and 0719 were classified as Category II. The sample results for these wells were qualified with a "Q" flag, indicating the data are qualitative because of the sampling technique.

Equipment Blank Assessment

An equipment blank (field ID 2645) was collected after decontamination of the non-dedicated tubing reel used to collect some surface water samples. Manganese was detected in this blank. All associated sample results were greater than 5 times the blank concentration. 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 0716 and 0789 (field duplicate IDs 2644 and 2646). 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: 09052319 **Lab Code:** PAR **Project:** Riverton **Validation Date:** 7/17/2009

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0906080-36	SW6010	MANGANESE	1.1	B	0.12	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0906080-18	HGZ 203	0747	77	1		
0906080-19	HGZ 204	0749	64	1		
0906080-23	HGZ 205	0794	9.7	1		
0906080-24	HGZ 206	0796	8.2	1		
0906080-26	HGZ 207	0810	36	1		
0906080-27	HGZ 208	0811	9.3	1		
0906080-28	HGZ 209	0812	10	1		
0906080-29	HGZ 210	0822	19	1		
0906080-30	HGZ 211	0823	68	1		

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 09052319 **Lab Code:** PAR **Project:** Riverton **Validation Date:** 7/17/2009

Duplicate: 2644 **Sample:** 0716

Analyte	Sample Result	Sample Flag	Sample Error	Duplicate Result	Duplicate Flag	Duplicate Error	RPD	RER	Units
MANGANESE	340			360			5.71		UG/L
MOLYBDENUM	170			160			6.06		UG/L
SULFATE	290			300			3.39		MG/L
URANIUM	190			190			0		UG/L

Duplicate: 2646 **Sample:** 0789

Analyte	Sample Result	Sample Flag	Sample Error	Duplicate Result	Duplicate Flag	Duplicate Error	RPD	RER	Units
MANGANESE	33			31			6.25		UG/L
MOLYBDENUM	360			340			5.71		UG/L
SULFATE	4500			4700			4.35		MG/L
URANIUM	2100			2100			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: 8-27-2009

Steve Donivan

Data Validation Lead: Steve Donivan — Date: 8-27-2009

Steve Donivan

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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 specific conductance and sulfate concentrations in Oxbow Lake at location 0747 were identified as anomalously low. Oxbow Lake was receiving water from the Little Wind River at the time of sampling causing dilution and reduction of contaminant concentrations.

The specific conductance, sulfate, and uranium concentrations in monitor well 0789 were identified as anomalously high. These data are considered acceptable as qualified based on the following.

- A field duplicate was collected from this location and submitted to the laboratory with a fictitious location ID. The duplicate results were in close agreement with the original sample.
- The molybdenum and uranium analyses were performed simultaneously using a diluted sample aliquot. The uranium concentration was higher than the historical values; however, the molybdenum was lower than the values previously observed, indicating that an analytical error is highly unlikely.

Data Validation Outliers Report - No Field Parameters
Laboratory: PARAGON (Fort Collins, CO)
RIN: 09052319
Comparison: All Historical Data
Report Date: 8/3/2009

Site Code	Location Code	Sample Date	Analyte	Current Result	Current Qualifiers Lab	Current Qualifiers Data	Historical Maximum Result	Historical Maximum Qualifiers Lab	Historical Maximum Qualifiers Data	Historical Minimum Result	Historical Minimum Qualifiers Lab	Historical Minimum Qualifiers Data	Number of Data Points N	Number of Data Points N Below Detect	Normally Distributed	Statistical Outlier
RVT01	0460	06/02/2009	Sulfate	150			170			155			11	0	No	No
RVT01	0716	06/02/2009	Sulfate	290		F	850			320		F	24	0	Yes (log)	No
RVT01	0716	06/02/2009	Uranium	0.19		F	0.718			0.21		F	25	0	No	Yes
RVT01	0717	06/02/2009	Manganese	0.26		F	0.24		F	0.017		F	21	0	No	No
RVT01	0718	06/04/2009	Manganese	0.37		F	3.28			0.93		F	22	0	Yes	No
RVT01	0718	06/04/2009	Molybdenum	0.073		F	0.15			0.084		F	22	0	Yes	No
RVT01	0719	06/04/2009	Manganese	0.0022	B	UFQ	0.24		F	0.0032	B	FQ	21	0	Yes	No
RVT01	0720	06/03/2009	Molybdenum	0.0012		UF	0.01	U		0.0013		F	18	5	No	No
RVT01	0747	06/03/2009	Manganese	0.077			2.5			0.17			25	0	No	Yes
RVT01	0747	06/03/2009	Molybdenum	0.001		U	0.032		J	0.008	B		25	0	No	Yes
RVT01	0747	06/03/2009	Sulfate	50			2600			160			25	0	Yes (log)	Yes
RVT01	0747	06/03/2009	Uranium	0.004			0.662			0.063			27	0	Yes (log)	No
RVT01	0784	06/02/2009	Manganese	0.26		F	0.54		F	0.3		F	6	0	Yes	No
RVT01	0784	06/02/2009	Uranium	0.0027		F	0.0094		F	0.0055		F	6	0	No	No
RVT01	0789	06/03/2009	Manganese	0.033		F	0.82		F	0.15		F	7	0	Yes	No
RVT01	0789	06/03/2009	Molybdenum	0.36		F	0.51		F	0.38		F	7	0	No	No
RVT01	0789	06/03/2009	Sulfate	4500		F	4000		F	3500		F	7	0	Yes	Yes
RVT01	0789	06/03/2009	Uranium	2.1		F	1.7		F	1.3		F	8	0	Yes	Yes

Data Validation Outliers Report - No Field Parameters
Laboratory: PARAGON (Fort Collins, CO)
RIN: 09052319
Comparison: All Historical Data
Report Date: 8/3/2009

Site Code	Location Code	Sample Date	Analyte	Current Result	Current Qualifiers *Lab*	Current Qualifiers *Data*	Historical Maximum Result	Historical Maximum Qualifiers *Lab*	Historical Maximum Qualifiers *Data*	Historical Minimum Result	Historical Minimum Qualifiers *Lab*	Historical Minimum Qualifiers *Data*	Number of Data Points N	Number of Data Points N Below Detect	Normally Distributed	Statistical Outlier
RVT01	0794	06/02/2009	Sulfate	38			468			77			26	0	No	No
RVT01	0794	06/02/2009	Uranium	0.0011			0.011			0.0017			28	1	No	No
RVT01	0796	06/02/2009	Sulfate	39			438			68			28	0	No	No
RVT01	0796	06/02/2009	Uranium	0.00084			0.0148			0.0015			30	1	No	No
RVT01	0809	06/03/2009	Molybdenum	0.0024		F	0.0023		F	0.0013		UF	10	3	Yes	No
RVT01	0809	06/03/2009	Uranium	0.001		F	0.0055		F	0.0013		F	10	0	Yes	No
RVT01	0810	06/02/2009	Molybdenum	0.001		U	0.0021	B		0.0011			9	3	Yes	No
RVT01	0810	06/02/2009	Uranium	0.004			0.01			0.0046			11	0	Yes	No
RVT01	0812	06/04/2009	Uranium	0.0013			0.0072			0.0014			10	0	Yes (log)	No
RVT01	0822	06/03/2009	Sulfate	780			1500			901			10	0	Yes (log)	No
RVT01	0823	06/02/2009	Manganese	0.068			0.063			0.0019	B		7	1	Yes (log)	No
RVT01	0823	06/02/2009	Molybdenum	0.0024			0.0063	E		0.0026			7	0	Yes	No
RVT01	0823	06/02/2009	Uranium	0.0037			0.013			0.0043			9	0	Yes	No
RVT01	0826	06/03/2009	Manganese	0.57		F	0.53		F	0.45		F	5	0	Yes	No
RVT01	0826	06/03/2009	Molybdenum	0.021		F	0.026		F	0.022		F	5	0	Yes	No
RVT01	0826	06/03/2009	Uranium	0.036		F	0.034		F	0.026		F	5	0	Yes	No
RVT01	0828	06/02/2009	Sulfate	190			240			200			10	0	Yes	No

Data Validation Outliers Report - Field Parameters Only
Laboratory: Field Measurements
RIN: 09052319
Comparison: All Historical Data
Report Date: 8/3/2009

Site Code	Location Code	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Number of Data Points		Normally Distributed	Statistical Outlier
					Qualifiers			Qualifiers			Qualifiers					
				Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect		
RVT01	0460	06/02/2009	Oxidation Reduction Potential	191.4			143			-31			9	0	Yes	No
RVT01	0716	06/02/2009	pH	7.34		F	7.25		F	6.97		F	20	0	Yes	No
RVT01	0720	06/03/2009	Turbidity	9.23		F	5.41		F	0			16	0	Yes (log)	No
RVT01	0747	06/03/2009	Specific Conductance	275			3680			614			17	0	Yes (log)	Yes
RVT01	0784	06/02/2009	Temperature	11.31		F	14.1		F	11.72		F	6	0	Yes	No
RVT01	0789	06/03/2009	pH	7.37		F	7.2		F	6.98			6	0	Yes	No
RVT01	0789	06/03/2009	Specific Conductance	7981		F	6636			6210		F	6	0	Yes	Yes
RVT01	0789	06/03/2009	Turbidity	2.08		F	9.54			2.12		F	6	0	Yes	No
RVT01	0796	06/02/2009	pH	8.89			8.78			7.27			25	0	Yes	No
RVT01	0809	06/03/2009	pH	7.77		F	7.75		F	7.29		F	10	0	Yes	No
RVT01	0810	06/02/2009	pH	9.5			9.39			8.49			10	0	Yes	No
RVT01	0811	06/03/2009	Specific Conductance	280			907			303			10	0	Yes	No
RVT01	0812	06/04/2009	pH	7.5			8.61			8.1			10	0	Yes	No
RVT01	0812	06/04/2009	Specific Conductance	250			922			262			10	0	Yes	No
RVT01	0823	06/02/2009	pH	9.38			9.2			8.19			9	0	No	No
RVT01	0828	06/02/2009	Specific Conductance	737			874			763			9	0	Yes	No

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.		

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.

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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: 8/3/2009
Location: 0405 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	-	0.0028	B		#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	-	0.0033			#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	-	141.6			#		
pH	s.u.	06/02/2009	N001	-	8.87			#		
Specific Conductance	umhos /cm	06/02/2009	N001	-	892			#		
Sulfate	mg/L	06/02/2009	N001	-	270			#	5	
Temperature	C	06/02/2009	N001	-	14.03			#		
Turbidity	NTU	06/02/2009	N001	-	4.26			#		
Uranium	mg/L	06/02/2009	N001	-	0.00011			#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0430 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/01/2009	N001	-	0.0056			#	0.00012	
Molybdenum	mg/L	06/01/2009	N001	-	0.0026			#	0.00007	
Oxidation Reduction Potential	mV	06/01/2009	N001	-	243			#		
pH	s.u.	06/01/2009	N001	-	8.43			#		
Specific Conductance	umhos /cm	06/01/2009	N001	-	729			#		
Sulfate	mg/L	06/01/2009	N001	-	180			#	5	
Temperature	C	06/01/2009	N001	-	10.9			#		
Turbidity	NTU	06/01/2009	N001	-	3.01			#		
Uranium	mg/L	06/01/2009	N001	-	0.000065	B	U	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0436 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	-	0.0023	B	U	#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	-	0.0032			#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	-	216.6			#		
pH	s.u.	06/02/2009	N001	-	8.92			#		
Specific Conductance	umhos /cm	06/02/2009	N001	-	738			#		
Sulfate	mg/L	06/02/2009	N001	-	190			#	5	
Temperature	C	06/02/2009	N001	-	18.02			#		
Turbidity	NTU	06/02/2009	N001	-	3.16			#		
Uranium	mg/L	06/02/2009	N001	-	0.000071	B	U	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
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
Manganese	mg/L	06/02/2009	N001	-	0.0017	B	U	#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	-	0.003			#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	-	191.4			#		
pH	s.u.	06/02/2009	N001	-	8.86			#		
Specific Conductance	umhos /cm	06/02/2009	N001	-	682			#		
Sulfate	mg/L	06/02/2009	N001	-	150			#	5	
Temperature	C	06/02/2009	N001	-	14.58			#		
Turbidity	NTU	06/02/2009	N001	-	3.03			#		
Uranium	mg/L	06/02/2009	N001	-	0.000067	B	U	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0705 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	37.3	-	61.8	0.0095		FQ	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	37.3	-	61.8	0.0029		FQ	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	37.3	-	61.8	90.5		FQ	#		
pH	s.u.	06/03/2009	N001	37.3	-	61.8	8.36		FQ	#		
Specific Conductance	umhos /cm	06/03/2009	N001	37.3	-	61.8	1175		FQ	#		
Sulfate	mg/L	06/03/2009	N001	37.3	-	61.8	420		FQ	#	5	
Temperature	C	06/03/2009	N001	37.3	-	61.8	10.16		FQ	#		
Turbidity	NTU	06/03/2009	N001	37.3	-	61.8	3.82		FQ	#		
Uranium	mg/L	06/03/2009	N001	37.3	-	61.8	0.00024		FQ	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0707 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	9.1	-	23.3	0.95		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	9.1	-	23.3	0.59		F	#	0.0014	
Oxidation Reduction Potential	mV	06/03/2009	N001	9.1	-	23.3	108.7		F	#		
pH	s.u.	06/03/2009	N001	9.1	-	23.3	7.06		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	9.1	-	23.3	3469		F	#		
Sulfate	mg/L	06/03/2009	N001	9.1	-	23.3	1800		F	#	25	
Temperature	C	06/03/2009	N001	9.1	-	23.3	9.38		F	#		
Turbidity	NTU	06/03/2009	N001	9.1	-	23.3	2.99		F	#		
Uranium	mg/L	06/03/2009	N001	9.1	-	23.3	0.74		F	#	0.00009	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0710 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	9.8	-	26.8	0.029		F	#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	9.8	-	26.8	0.0017		F	#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	9.8	-	26.8	152.9		F	#		
pH	s.u.	06/02/2009	N001	9.8	-	26.8	7.6		F	#		
Specific Conductance	umhos /cm	06/02/2009	N001	9.8	-	26.8	677		F	#		
Sulfate	mg/L	06/02/2009	N001	9.8	-	26.8	130		F	#	5	
Temperature	C	06/02/2009	N001	9.8	-	26.8	7.35		F	#		
Turbidity	NTU	06/02/2009	N001	9.8	-	26.8	6.77		F	#		
Uranium	mg/L	06/02/2009	N001	9.8	-	26.8	0.0051		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0716 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	9.78	-	14.78	0.34		F	#	0.00012	
Manganese	mg/L	06/02/2009	N002	9.78	-	14.78	0.36		F	#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	9.78	-	14.78	0.17		F	#	0.00035	
Molybdenum	mg/L	06/02/2009	N002	9.78	-	14.78	0.16		F	#	0.00035	
Oxidation Reduction Potential	mV	06/02/2009	N001	9.78	-	14.78	45		F	#		
pH	s.u.	06/02/2009	N001	9.78	-	14.78	7.34		F	#		
Specific Conductance	umhos /cm	06/02/2009	N001	9.78	-	14.78	1116		F	#		
Sulfate	mg/L	06/02/2009	N001	9.78	-	14.78	290		F	#	5	
Sulfate	mg/L	06/02/2009	N002	9.78	-	14.78	300		F	#	5	
Temperature	C	06/02/2009	N001	9.78	-	14.78	8.74		F	#		
Turbidity	NTU	06/02/2009	N001	9.78	-	14.78	8.73		F	#		
Uranium	mg/L	06/02/2009	N001	9.78	-	14.78	0.19		F	#	0.000022	
Uranium	mg/L	06/02/2009	N002	9.78	-	14.78	0.19		F	#	0.000022	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0717 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	45.1	-	55.1	0.26		F	#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	45.1	-	55.1	0.0083		F	#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	45.1	-	55.1	44.1		F	#		
pH	s.u.	06/02/2009	N001	45.1	-	55.1	7.77		F	#		
Specific Conductance	umhos /cm	06/02/2009	N001	45.1	-	55.1	1877		F	#		
Sulfate	mg/L	06/02/2009	N001	45.1	-	55.1	700		F	#	10	
Temperature	C	06/02/2009	N001	45.1	-	55.1	9.41		F	#		
Turbidity	NTU	06/02/2009	N001	45.1	-	55.1	6.22		F	#		
Uranium	mg/L	06/02/2009	N001	45.1	-	55.1	0.00018		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0718 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/04/2009	N001	18.24	-	23.24	0.37		F	#	0.00012	
Molybdenum	mg/L	06/04/2009	N001	18.24	-	23.24	0.073		F	#	0.00035	
Oxidation Reduction Potential	mV	06/04/2009	N001	18.24	-	23.24	186.5		F	#		
pH	s.u.	06/04/2009	N001	18.24	-	23.24	7.21		F	#		
Specific Conductance	umhos /cm	06/04/2009	N001	18.24	-	23.24	3443		F	#		
Sulfate	mg/L	06/04/2009	N001	18.24	-	23.24	1500		F	#	25	
Temperature	C	06/04/2009	N001	18.24	-	23.24	9.51		F	#		
Turbidity	NTU	06/04/2009	N001	18.24	-	23.24	3.72		F	#		
Uranium	mg/L	06/04/2009	N001	18.24	-	23.24	0.19		F	#	0.000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0719 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/04/2009	N001	38.47	-	48.47	0.0022	B	UFQ	#	0.00012	
Molybdenum	mg/L	06/04/2009	N001	38.47	-	48.47	0.015		FQ	#	0.00007	
Oxidation Reduction Potential	mV	06/04/2009	N001	38.47	-	48.47	158.3		FQ	#		
pH	s.u.	06/04/2009	N001	38.47	-	48.47	7.73		FQ	#		
Specific Conductance	umhos /cm	06/04/2009	N001	38.47	-	48.47	1165		FQ	#		
Sulfate	mg/L	06/04/2009	N001	38.47	-	48.47	430		FQ	#	5	
Temperature	C	06/04/2009	N001	38.47	-	48.47	11.99		FQ	#		
Turbidity	NTU	06/04/2009	N001	38.47	-	48.47	5.39		FQ	#		
Uranium	mg/L	06/04/2009	N001	38.47	-	48.47	0.0007		FQ	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0720 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	7.94	-	12.94	0.0067		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	7.94	-	12.94	0.0012		UF	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	7.94	-	12.94	36.6		F	#		
pH	s.u.	06/03/2009	N001	7.94	-	12.94	7.32		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	7.94	-	12.94	808		F	#		
Sulfate	mg/L	06/03/2009	N001	7.94	-	12.94	180		F	#	5	
Temperature	C	06/03/2009	N001	7.94	-	12.94	8.48		F	#		
Turbidity	NTU	06/03/2009	N001	7.94	-	12.94	9.23		F	#		
Uranium	mg/L	06/03/2009	N001	7.94	-	12.94	0.0062		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0721 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	44.43	-	54.43	0.0045	B	F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	44.43	-	54.43	0.0027		F	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	44.43	-	54.43	-8		F	#		
pH	s.u.	06/03/2009	N001	44.43	-	54.43	8.94		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	44.43	-	54.43	862		F	#		
Sulfate	mg/L	06/03/2009	N001	44.43	-	54.43	270		F	#	5	
Temperature	C	06/03/2009	N001	44.43	-	54.43	10.47		F	#		
Turbidity	NTU	06/03/2009	N001	44.43	-	54.43	4.27		F	#		
Uranium	mg/L	06/03/2009	N001	44.43	-	54.43	0.000097	B	UF	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
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
Manganese	mg/L	06/03/2009	N001	11.1	-	16.1	0.0031	B	F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	11.1	-	16.1	0.065		F	#	0.00014	
Oxidation Reduction Potential	mV	06/03/2009	N001	11.1	-	16.1	22.6		F	#		
pH	s.u.	06/03/2009	N001	11.1	-	16.1	6.98		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	11.1	-	16.1	1874		F	#		
Sulfate	mg/L	06/03/2009	N001	11.1	-	16.1	870		F	#	10	
Temperature	C	06/03/2009	N001	11.1	-	16.1	9.84		F	#		
Turbidity	NTU	06/03/2009	N001	11.1	-	16.1	3.16		F	#		
Uranium	mg/L	06/03/2009	N001	11.1	-	16.1	0.7		F	#	0.00009	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0723 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	45.99	-	55.99	0.57		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	45.99	-	55.99	0.00038	B	UF	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	45.99	-	55.99	-6.4		F	#		
pH	s.u.	06/03/2009	N001	45.99	-	55.99	7.11		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	45.99	-	55.99	3900		F	#		
Sulfate	mg/L	06/03/2009	N001	45.99	-	55.99	1900		F	#	25	
Temperature	C	06/03/2009	N001	45.99	-	55.99	11.08		F	#		
Turbidity	NTU	06/03/2009	N001	45.99	-	55.99	6.11		F	#		
Uranium	mg/L	06/03/2009	N001	45.99	-	55.99	0.000053	B	UF	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0729 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	14.71	-	19.71	0.0039	B	F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	14.71	-	19.71	0.0031		F	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	14.71	-	19.71	49.2		F	#		
pH	s.u.	06/03/2009	N001	14.71	-	19.71	7.29		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	14.71	-	19.71	840		F	#		
Sulfate	mg/L	06/03/2009	N001	14.71	-	19.71	120		F	#	5	
Temperature	C	06/03/2009	N001	14.71	-	19.71	8.96		F	#		
Turbidity	NTU	06/03/2009	N001	14.71	-	19.71	4.11		F	#		
Uranium	mg/L	06/03/2009	N001	14.71	-	19.71	0.014		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0730 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	38.62	-	48.62	0.1		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	38.62	-	48.62	0.0048		F	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	38.62	-	48.62	16.8		F	#		
pH	s.u.	06/03/2009	N001	38.62	-	48.62	7.55		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	38.62	-	48.62	953		F	#		
Sulfate	mg/L	06/03/2009	N001	38.62	-	48.62	170		F	#	5	
Temperature	C	06/03/2009	N001	38.62	-	48.62	10.5		F	#		
Turbidity	NTU	06/03/2009	N001	38.62	-	48.62	9.72		F	#		
Uranium	mg/L	06/03/2009	N001	38.62	-	48.62	0.0095		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0784 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	1.65	-	6.65	0.26		F	#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	1.65	-	6.65	0.015		F	#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	1.65	-	6.65	-30.6		F	#		
pH	s.u.	06/02/2009	N001	1.65	-	6.65	8.09		F	#		
Specific Conductance	umhos /cm	06/02/2009	N001	1.65	-	6.65	5034		F	#		
Sulfate	mg/L	06/02/2009	N001	1.65	-	6.65	2500		F	#	25	
Temperature	C	06/02/2009	N001	1.65	-	6.65	11.31		F	#		
Turbidity	NTU	06/02/2009	N001	1.65	-	6.65	4.58		F	#		
Uranium	mg/L	06/02/2009	N001	1.65	-	6.65	0.0027		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0788 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	1.41	-	13.41	0.029		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	1.41	-	13.41	0.023		F	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	1.41	-	13.41	102.8		F	#		
pH	s.u.	06/03/2009	N001	1.41	-	13.41	7.4		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	1.41	-	13.41	1901		F	#		
Sulfate	mg/L	06/03/2009	N001	1.41	-	13.41	660		F	#	10	
Temperature	C	06/03/2009	N001	1.41	-	13.41	9.72		F	#		
Turbidity	NTU	06/03/2009	N001	1.41	-	13.41	3.12		F	#		
Uranium	mg/L	06/03/2009	N001	1.41	-	13.41	0.033		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0789 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	6.2	-	18.2	0.033		F	#	0.00012	
Manganese	mg/L	06/03/2009	N002	6.2	-	18.2	0.031		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	6.2	-	18.2	0.36		F	#	0.0014	
Molybdenum	mg/L	06/03/2009	N002	6.2	-	18.2	0.34		F	#	0.0014	
Oxidation Reduction Potential	mV	06/03/2009	N001	6.2	-	18.2	143.8		F	#		
pH	s.u.	06/03/2009	N001	6.2	-	18.2	7.37		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	6.2	-	18.2	7981		F	#		
Sulfate	mg/L	06/03/2009	N001	6.2	-	18.2	4500		F	#	50	
Sulfate	mg/L	06/03/2009	N002	6.2	-	18.2	4700		F	#	50	
Temperature	C	06/03/2009	N001	6.2	-	18.2	10.26		F	#		
Turbidity	NTU	06/03/2009	N001	6.2	-	18.2	2.08		F	#		
Uranium	mg/L	06/03/2009	N001	6.2	-	18.2	2.1		F	#	0.00009	
Uranium	mg/L	06/03/2009	N002	6.2	-	18.2	2.1		F	#	0.00009	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0809 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	10.5	-	19.4	0.8		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	10.5	-	19.4	0.0024		F	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	10.5	-	19.4	28.4		F	#		
pH	s.u.	06/03/2009	N001	10.5	-	19.4	7.77		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	10.5	-	19.4	697		F	#		
Sulfate	mg/L	06/03/2009	N001	10.5	-	19.4	270		F	#	5	
Temperature	C	06/03/2009	N001	10.5	-	19.4	11.38		F	#		
Turbidity	NTU	06/03/2009	N001	10.5	-	19.4	0.72		F	#		
Uranium	mg/L	06/03/2009	N001	10.5	-	19.4	0.001		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0824 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/04/2009	N001	9.5	-	14.5	0.0021	B	F	#	0.00012	
Molybdenum	mg/L	06/04/2009	N001	9.5	-	14.5	0.0037		F	#	0.00007	
Oxidation Reduction Potential	mV	06/04/2009	N001	9.5	-	14.5	183		F	#		
pH	s.u.	06/04/2009	N001	9.5	-	14.5	7.35		F	#		
Specific Conductance	umhos /cm	06/04/2009	N001	9.5	-	14.5	910		F	#		
Sulfate	mg/L	06/04/2009	N001	9.5	-	14.5	160		F	#	5	
Temperature	C	06/04/2009	N001	9.5	-	14.5	8.45		F	#		
Turbidity	NTU	06/04/2009	N001	9.5	-	14.5	1.17		F	#		
Uranium	mg/L	06/04/2009	N001	9.5	-	14.5	0.02		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0826 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	N001	6.6	-	11.6	0.57		F	#	0.00012	
Molybdenum	mg/L	06/03/2009	N001	6.6	-	11.6	0.021		F	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	6.6	-	11.6	27.6		F	#		
pH	s.u.	06/03/2009	N001	6.6	-	11.6	7.39		F	#		
Specific Conductance	umhos /cm	06/03/2009	N001	6.6	-	11.6	1516		F	#		
Sulfate	mg/L	06/03/2009	N001	6.6	-	11.6	460		F	#	10	
Temperature	C	06/03/2009	N001	6.6	-	11.6	9.08		F	#		
Turbidity	NTU	06/03/2009	N001	6.6	-	11.6	1.83		F	#		
Uranium	mg/L	06/03/2009	N001	6.6	-	11.6	0.036		F	#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0828 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	-	0.0031	B		#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	-	0.0031			#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	-	229.7			#		
pH	s.u.	06/02/2009	N001	-	8.84			#		
Specific Conductance	umhos /cm	06/02/2009	N001	-	737			#		
Sulfate	mg/L	06/02/2009	N001	-	190			#	5	
Temperature	C	06/02/2009	N001	-	13.58			#		
Turbidity	NTU	06/02/2009	N001	-	3.25			#		
Uranium	mg/L	06/02/2009	N001	-	0.00016			#	0.0000045	

Groundwater Quality Data by Location (USEE100) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0836 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	-	0.0059			#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	-	0.0024			#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	-	112			#		
pH	s.u.	06/02/2009	N001	-	9.55			#		
Specific Conductance	umhos /cm	06/02/2009	N001	-	785			#		
Sulfate	mg/L	06/02/2009	N001	-	200			#	5	
Temperature	C	06/02/2009	N001	-	9.32			#		
Turbidity	NTU	06/02/2009	N001	-	20.7			#		
Uranium	mg/L	06/02/2009	N001	-	0.00003	B	U	#	0.0000045	

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: 8/3/2009
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
Manganese	mg/L	06/03/2009	0001	0.077			#	0.00012	
Molybdenum	mg/L	06/03/2009	0001	0.001		U	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	89.2			#		
pH	s.u.	06/03/2009	N001	8.06			#		
Specific Conductance	umhos/cm	06/03/2009	N001	275			#		
Sulfate	mg/L	06/03/2009	0001	50			#	0.5	
Temperature	C	06/03/2009	N001	14.48			#		
Turbidity	NTU	06/03/2009	N001	112			#		
Uranium	mg/L	06/03/2009	0001	0.004			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
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
Manganese	mg/L	06/02/2009	0001	0.064			#	0.00012	
Molybdenum	mg/L	06/02/2009	0001	0.0089			#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	111.3			#		
pH	s.u.	06/02/2009	N001	7.42			#		
Specific Conductance	umhos/cm	06/02/2009	N001	3258			#		
Sulfate	mg/L	06/02/2009	0001	1800			#	25	
Temperature	C	06/02/2009	N001	18.91			#		
Turbidity	NTU	06/02/2009	N001	13.7			#		
Uranium	mg/L	06/02/2009	0001	0.0012			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
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
Manganese	mg/L	06/02/2009	0001	0.0097			#	0.00012	
Molybdenum	mg/L	06/02/2009	0001	0.00079	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	186			#		
pH	s.u.	06/02/2009	N001	8.18			#		
Specific Conductance	umhos/cm	06/02/2009	N001	209			#		
Sulfate	mg/L	06/02/2009	0001	38			#	0.5	
Temperature	C	06/02/2009	N001	10.13			#		
Turbidity	NTU	06/02/2009	N001	68			#		
Uranium	mg/L	06/02/2009	0001	0.0011			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
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
Manganese	mg/L	06/02/2009	0001	0.0082			#	0.00012	
Molybdenum	mg/L	06/02/2009	0001	0.00061	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	152.2			#		
pH	s.u.	06/02/2009	N001	8.89			#		
Specific Conductance	umhos/cm	06/02/2009	N001	190			#		
Sulfate	mg/L	06/02/2009	0001	39			#	0.5	
Temperature	C	06/02/2009	N001	9.94			#		
Turbidity	NTU	06/02/2009	N001	77.8			#		
Uranium	mg/L	06/02/2009	0001	0.00084			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0810 SURFACE LOCATION Gravel Pit Pond

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	0.036			#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	0.001		U	#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	145.9			#		
pH	s.u.	06/02/2009	N001	9.5			#		
Specific Conductance	umhos/cm	06/02/2009	N001	1090			#		
Sulfate	mg/L	06/02/2009	N001	250			#	5	
Temperature	C	06/02/2009	N001	15.04			#		
Turbidity	NTU	06/02/2009	N001	7.15			#		
Uranium	mg/L	06/02/2009	N001	0.004			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0811 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	0001	0.0093			#	0.00012	
Molybdenum	mg/L	06/03/2009	0001	0.00064	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	115.9			#		
pH	s.u.	06/03/2009	N001	8.45			#		
Specific Conductance	umhos/cm	06/03/2009	N001	280			#		
Sulfate	mg/L	06/03/2009	0001	75			#	0.5	
Temperature	C	06/03/2009	N001	12.96			#		
Turbidity	NTU	06/03/2009	N001	103			#		
Uranium	mg/L	06/03/2009	0001	0.0014			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0812 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/04/2009	0001	0.01			#	0.00012	
Molybdenum	mg/L	06/04/2009	0001	0.00062	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/04/2009	N001	116.1			#		
pH	s.u.	06/04/2009	N001	7.5			#		
Specific Conductance	umhos/cm	06/04/2009	N001	250			#		
Sulfate	mg/L	06/04/2009	0001	63			#	0.5	
Temperature	C	06/04/2009	N001	11.57			#		
Turbidity	NTU	06/04/2009	N001	66.1			#		
Uranium	mg/L	06/04/2009	0001	0.0013			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0822 SURFACE LOCATION west-side irrigation ditch

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	06/03/2009	0001	0.019			#	0.00012	
Molybdenum	mg/L	06/03/2009	0001	0.0035			#	0.00007	
Oxidation Reduction Potential	mV	06/03/2009	N001	12.7			#		
pH	s.u.	06/03/2009	N001	8.37			#		
Radium-226	pCi/L	06/03/2009	0001	0.18	U		#	0.18	0.134
Radium-228	pCi/L	06/03/2009	0001	0.63	U		#	0.63	0.394
Specific Conductance	umhos/cm	06/03/2009	N001	1780			#		
Sulfate	mg/L	06/03/2009	0001	780			#	10	
Temperature	C	06/03/2009	N001	14.32			#		
Turbidity	NTU	06/03/2009	N001	15.1			#		
Uranium	mg/L	06/03/2009	0001	0.005			#	0.0000045	

Surface Water Quality Data by Location (USEE102) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009
Location: 0823 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Manganese	mg/L	06/02/2009	N001	0.068			#	0.00012	
Molybdenum	mg/L	06/02/2009	N001	0.0024			#	0.00007	
Oxidation Reduction Potential	mV	06/02/2009	N001	139.8			#		
pH	s.u.	06/02/2009	N001	9.38			#		
Specific Conductance	umhos/cm	06/02/2009	N001	1113			#		
Sulfate	mg/L	06/02/2009	N001	360			#	5	
Temperature	C	06/02/2009	N001	15.43			#		
Turbidity	NTU	06/02/2009	N001	5.43			#		
Uranium	mg/L	06/02/2009	N001	0.0037			#	0.0000045	

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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Equipment Blank Data

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BLANKS REPORT
LAB: PARAGON (Fort Collins, CO)
RIN: 09052319
Report Date: 8/3/2009

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab	Qualifiers Data	Detection Limit	Uncertainty	Sample Type
Manganese	RVT01	0999	06/03/2009	0001	mg/L	0.0011	B		0.00012		E
Molybdenum	RVT01	0999	06/03/2009	0001	mg/L	0.00033	B	U	0.00007		E
Sulfate	RVT01	0999	06/03/2009	0001	mg/L	0.5	U		0.5		E
Uranium	RVT01	0999	06/03/2009	0001	mg/L	0.000029	B	U	0.0000045		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: 8/3/2009

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0101	O	4946.58	06/02/2009	05:01:00	10.1	4936.48	
0110	O	4944.35	06/02/2009	05:33:00	8.93	4935.42	
0111	O	4946.87	06/02/2009	05:32:00	9	4937.87	
0700	U	4951.38	06/01/2009	19:56:00	5.82	4945.56	
0702	D	4931	06/03/2009	02:50:00	4.6	4926.4	
0705	D	4930.8	06/03/2009	15:25:09	4.41	4926.39	
0707	D	4931	06/03/2009	15:10:45	4.42	4926.58	
0709	D	4930.7	06/02/2009	05:39:00	4.75	4925.95	
0710	U	4947.9	06/02/2009	15:10:26	5.15	4942.75	
0716	O	4939.12	06/02/2009	16:10:35	8.45	4930.67	
0717	O	4938.8	06/02/2009	15:50:29	8.07	4930.73	
0718	D	4937.6	06/04/2009	10:00:05	7.45	4930.15	
0719	D	4937.55	06/04/2009	10:45:52	7.06	4930.49	
0720	C	4940.46	06/03/2009	10:20:30	4.74	4935.72	
0721	C	4940.47	06/03/2009	10:40:34	7.1	4933.37	
0722R		4937.06	06/03/2009	09:50:29	8.51	4928.55	
0723	D	4936.01	06/03/2009	09:30:53	7.31	4928.7	
0724	U	4941.36	06/01/2009	22:24:00	6.87	4934.49	
0725	U	4941.66	06/01/2009	22:21:00	7.1	4934.56	
0726	U	4942	06/01/2009	22:08:00	5.82	4936.18	
0727	U	4951.69	06/02/2009	05:35:00	9.35	4942.34	
0728	U	4946.01	06/02/2009	02:33:00	6.71	4939.3	
0729	D	4932.75	06/03/2009	08:55:57	6.84	4925.91	
0730	D	4933.08	06/03/2009	08:20:50	7.53	4925.55	
0732	U	4945.07	06/02/2009	03:25:00	7.73	4937.34	
0733	U	4946.76	06/01/2009	19:50:00	3.58	4943.18	
0734	U	4946.08	06/01/2009	19:53:00	5.14	4940.94	
0736	U	4946	06/01/2009	22:26:00	6.81	4939.19	

STATIC WATER LEVELS (USEE700) FOR SITE RVT01, Riverton Processing Site
REPORT DATE: 8/3/2009

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0784	U	4945.45	06/02/2009	17:20:38	6.35	4939.1	
0788	C	4935.09	06/03/2009	15:55:32	7.49	4927.6	
0789	D	4933.66	06/03/2009	14:35:44	5.93	4927.73	
0809		4932.09	06/03/2009	17:15:18	4.34	4927.75	
0824		4928.27	06/04/2009	08:35:17	5.56	4922.71	
0826		4936.98	06/03/2009	12:00:44	6.72	4930.26	

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

WATER LEVEL FLAGS: D Dry F FLOWING

Time-Concentration Graphs

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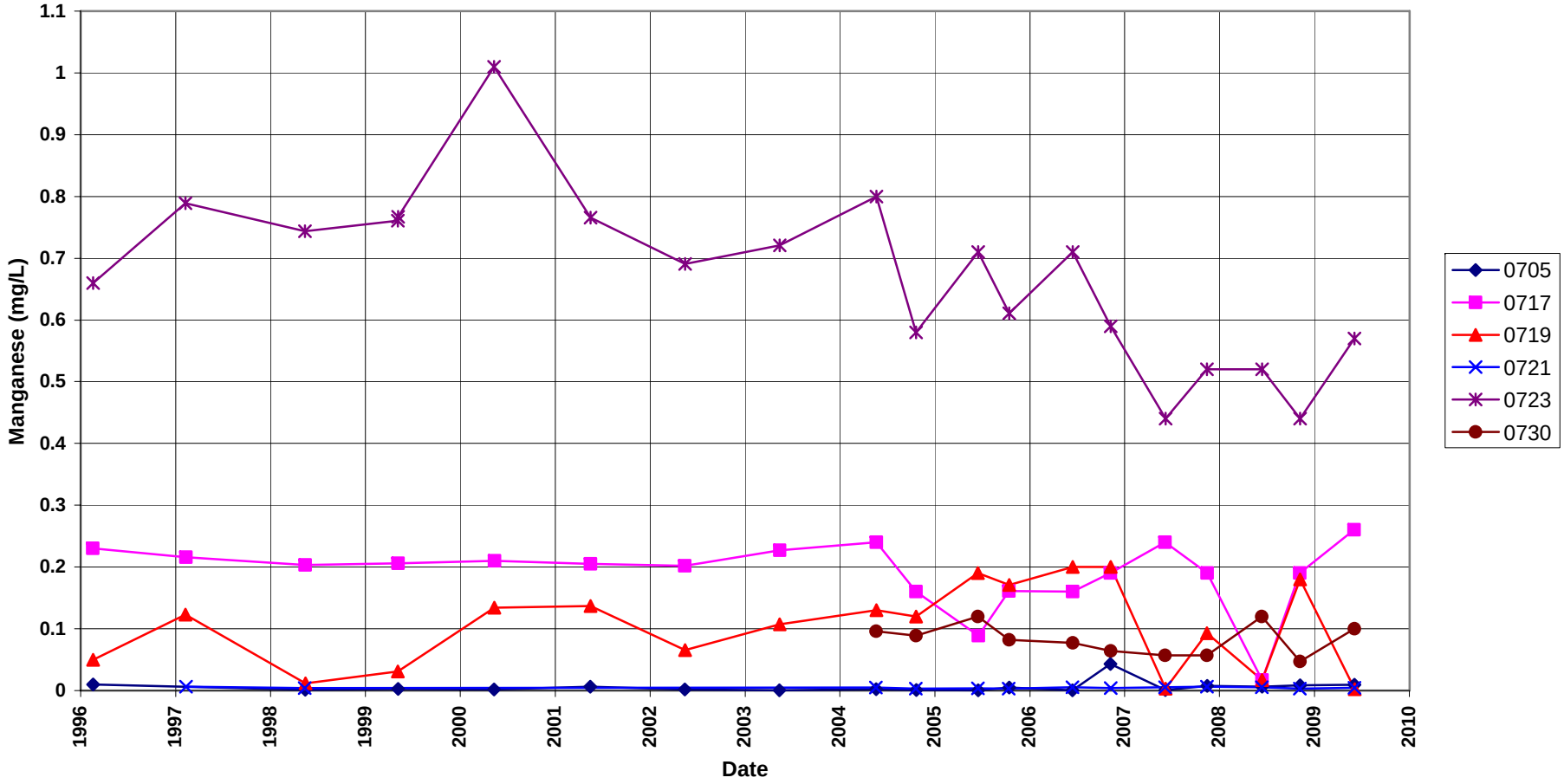
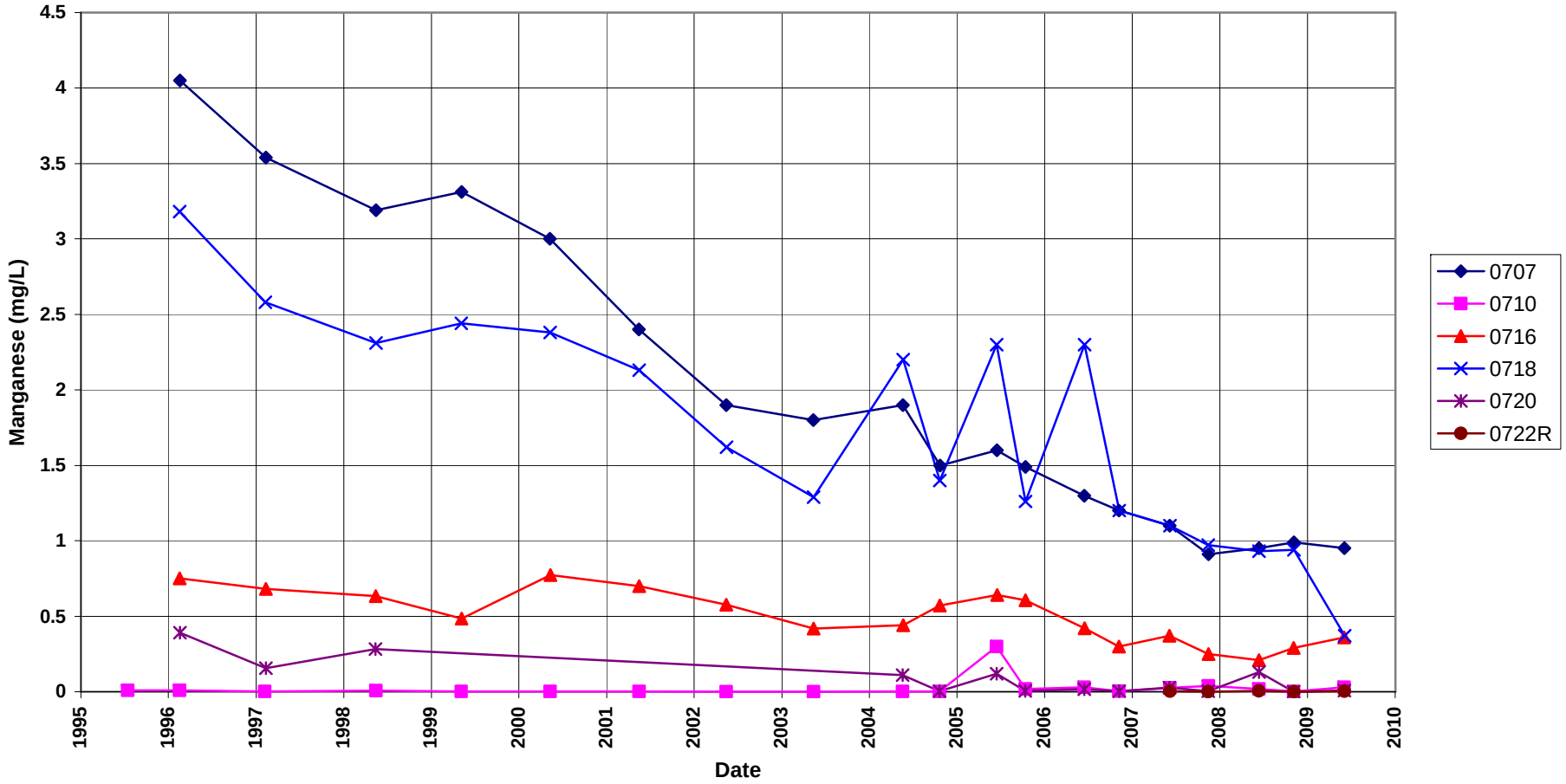
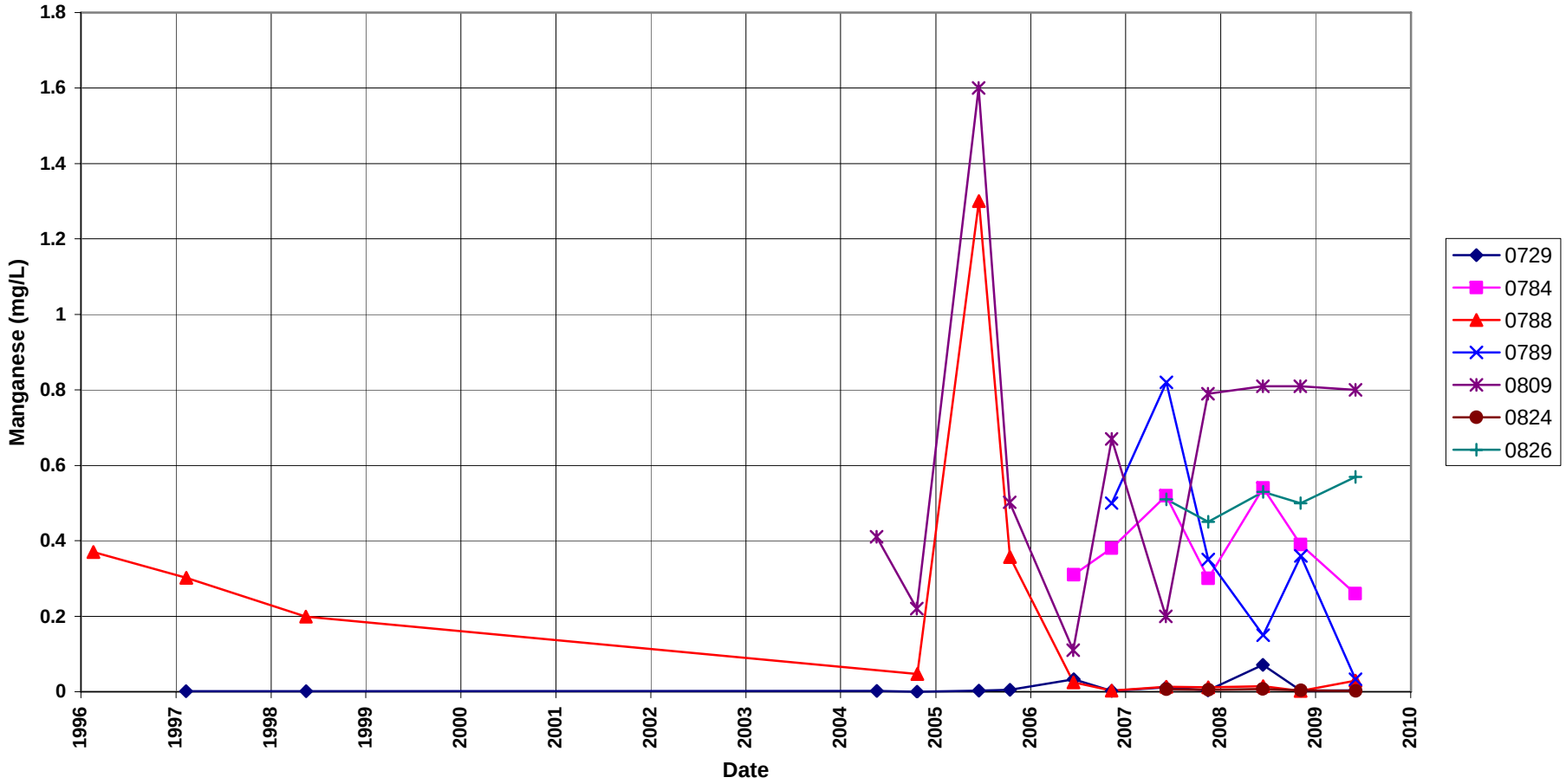
Riverton Processing Site
Semi-Confined Aquifer Locations
Manganese Concentration



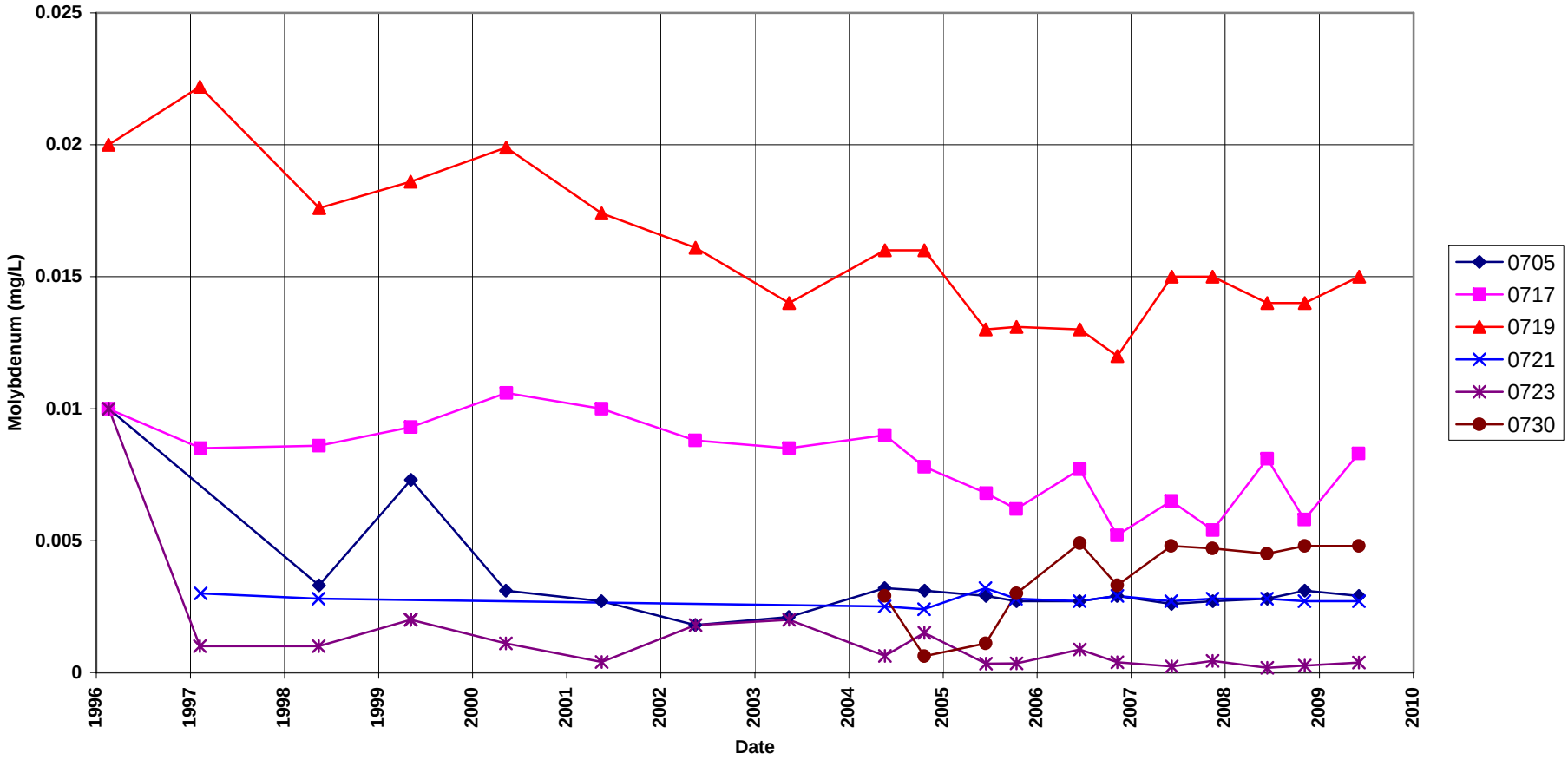
Riverton Processing Site
Surficial Aquifer Locations
Manganese Concentration



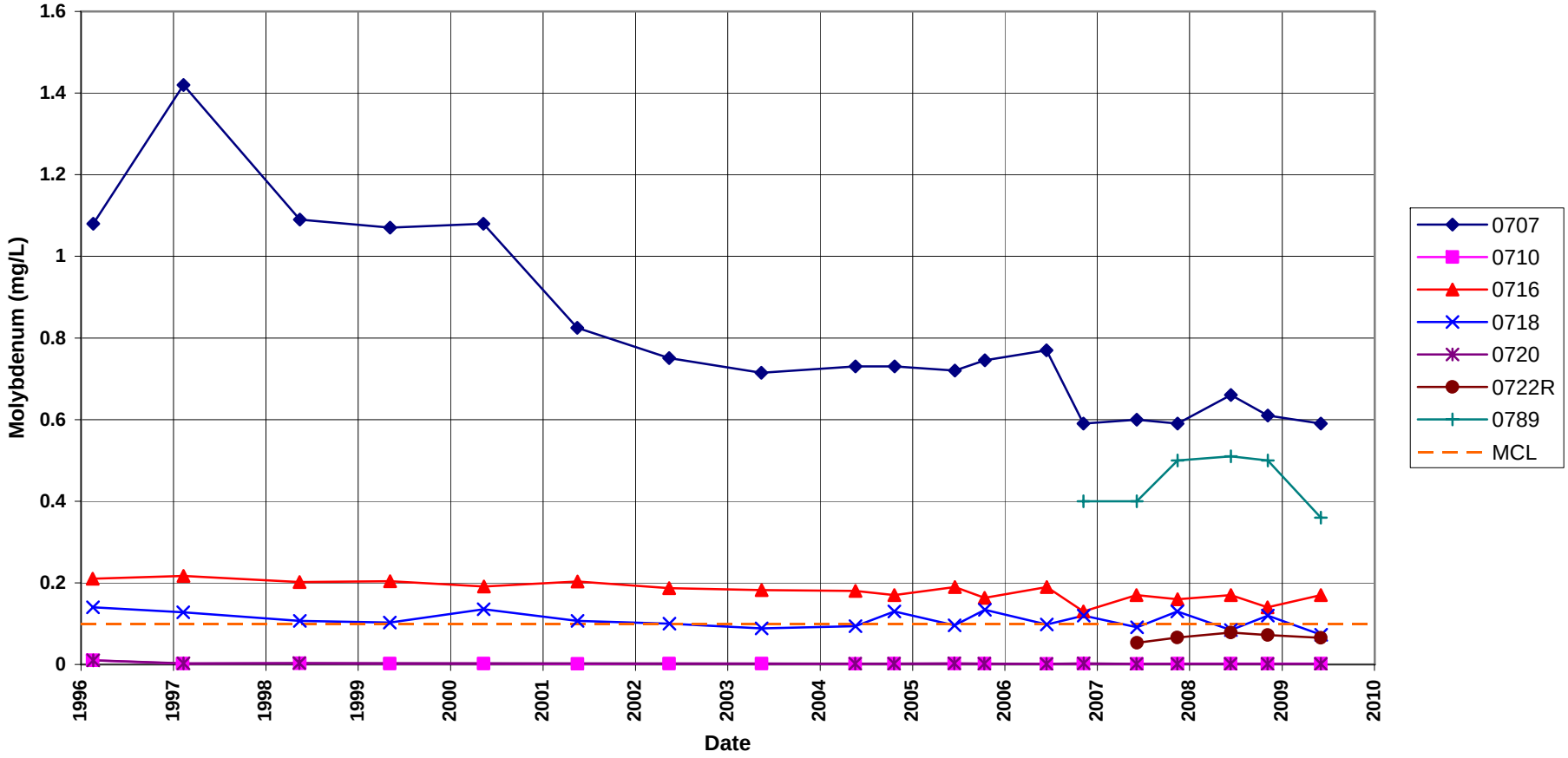
Riverton Processing Site
Surficial Aquifer Locations
Manganese Concentration



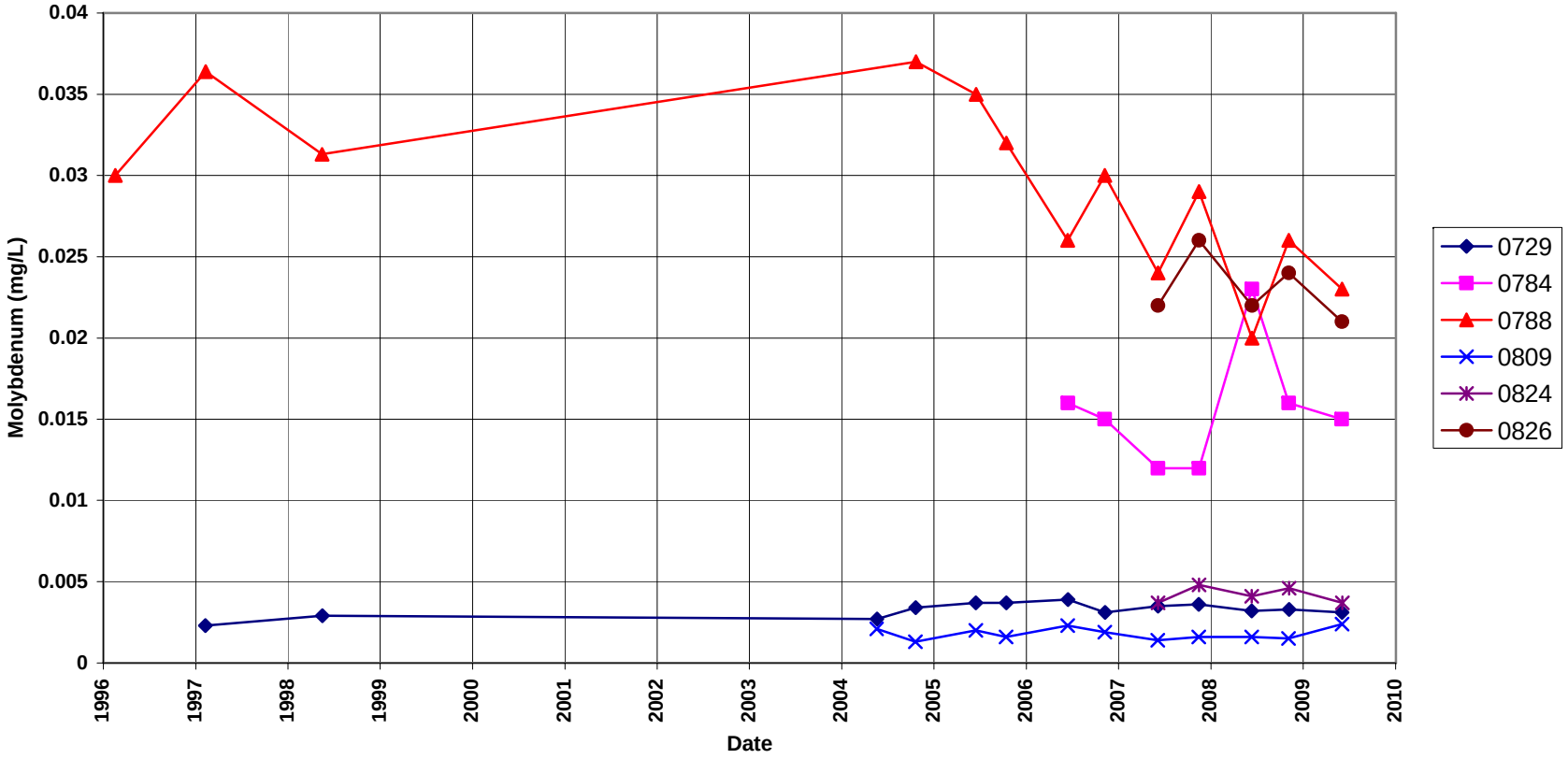
Riverton Processing Site
Semi-Confined Aquifer Locations
Molybdenum Concentration
Maximum Concentration Limit = 0.1 mg/L



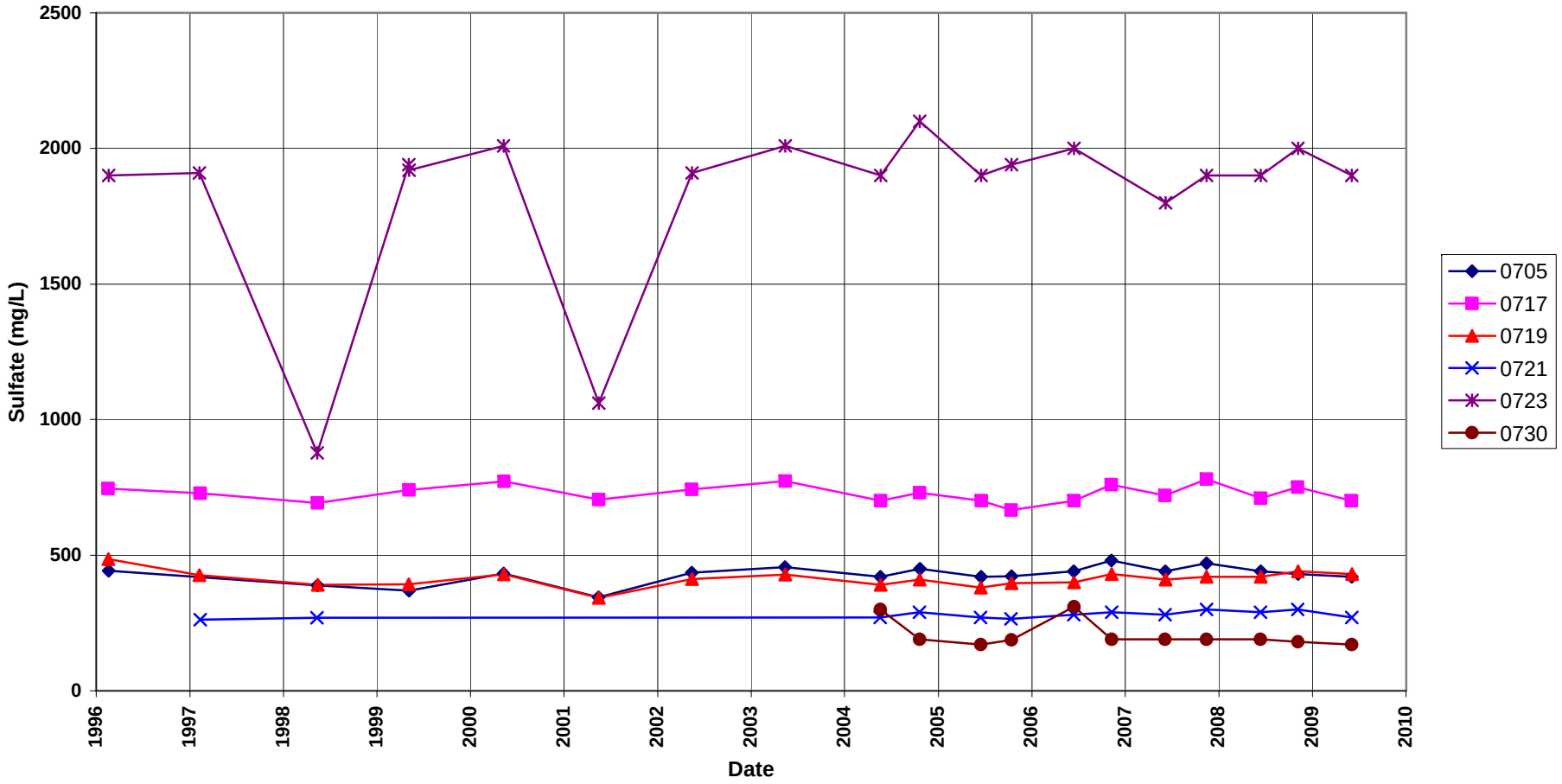
Riverton Processing Site
Surficial Aquifer Locations
Molybdenum Concentration
Maximum Concentration Limit = 0.1 mg/L



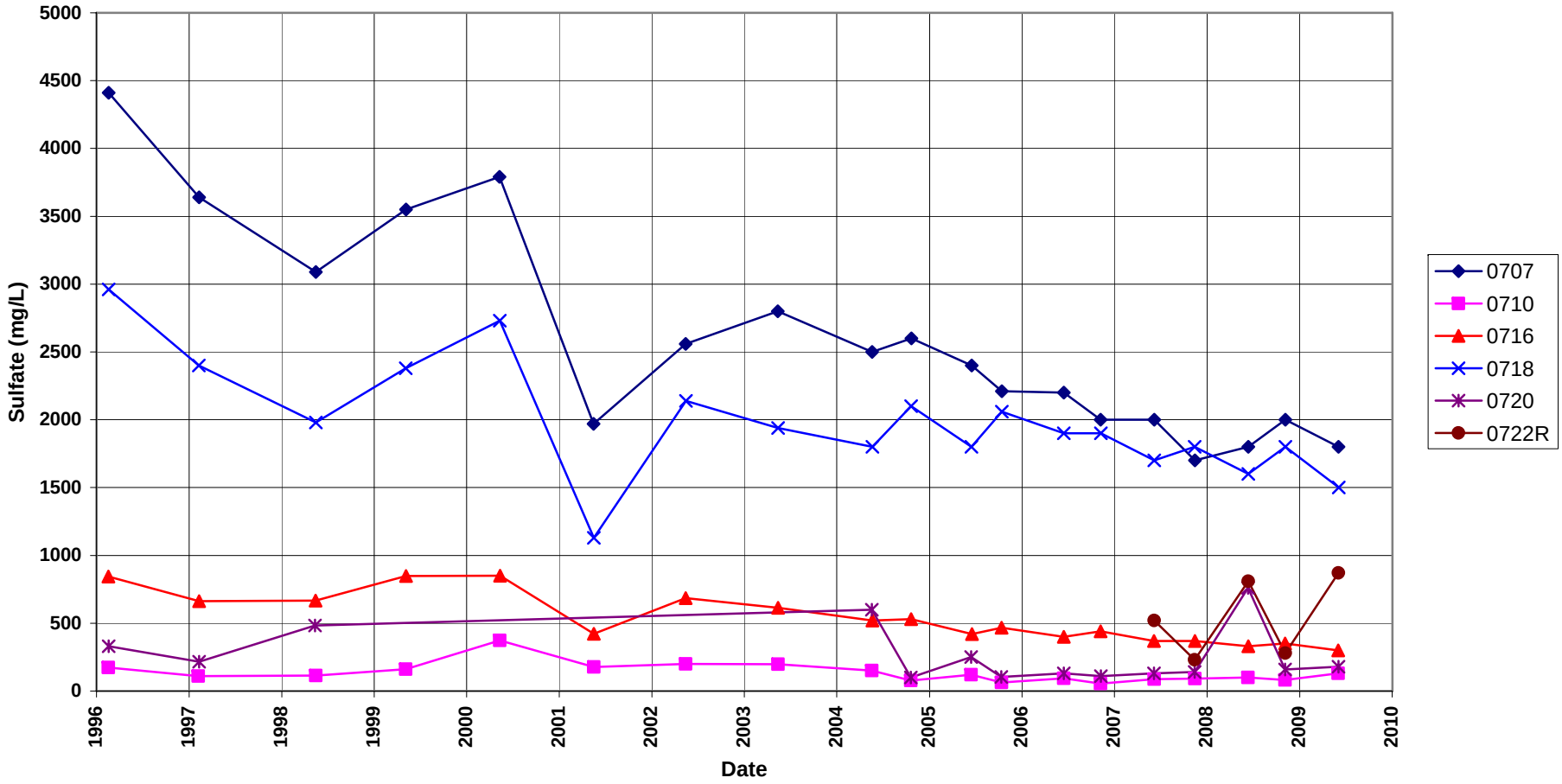
Riverton Processing Site
Surficial Aquifer Locations
Molybdenum Concentration
Maximum Concentration Limit = 0.1 mg/L



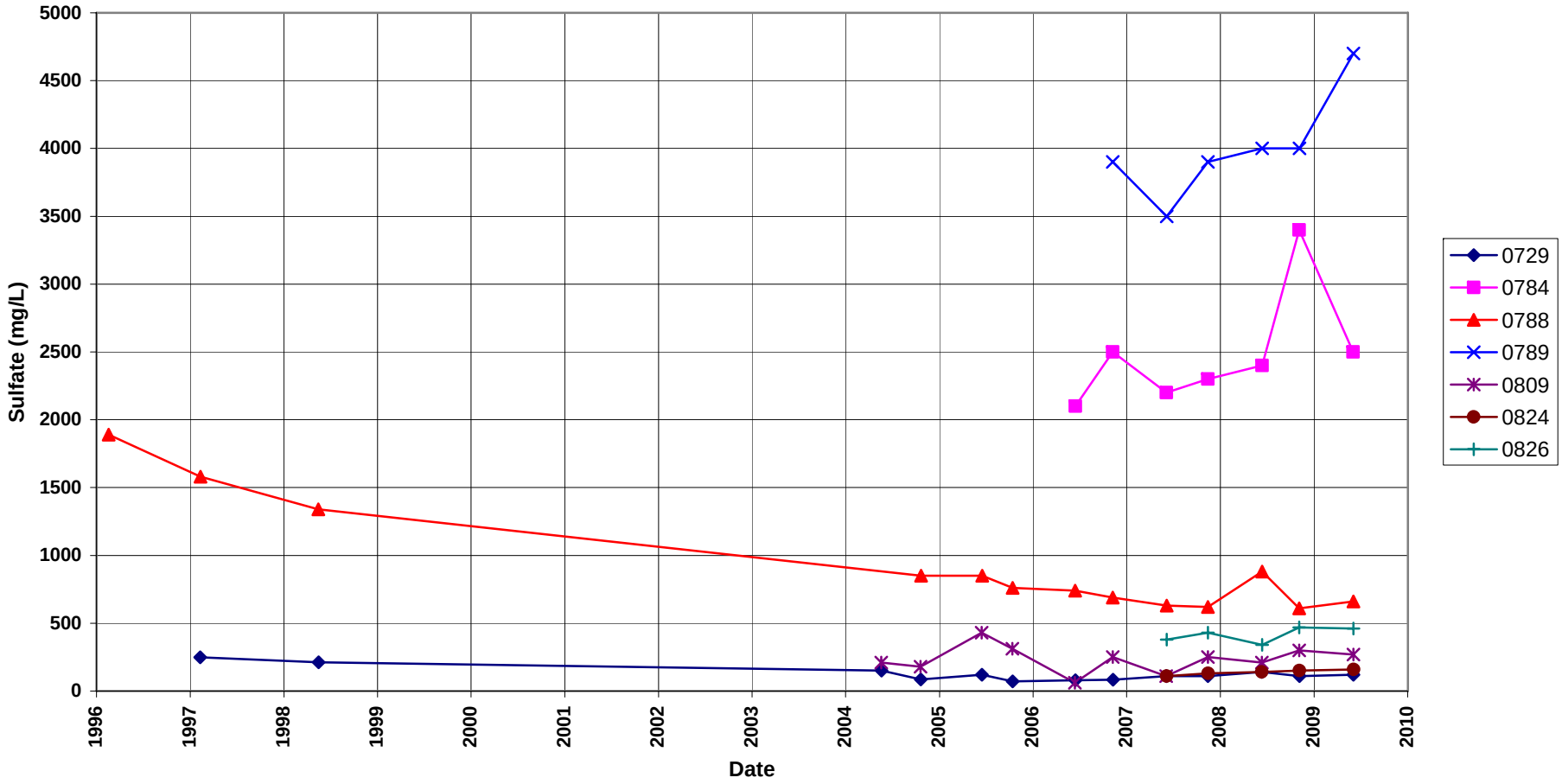
Riverton Processing Site
Semi-Confined Aquifer Locations
Sulfate Concentration



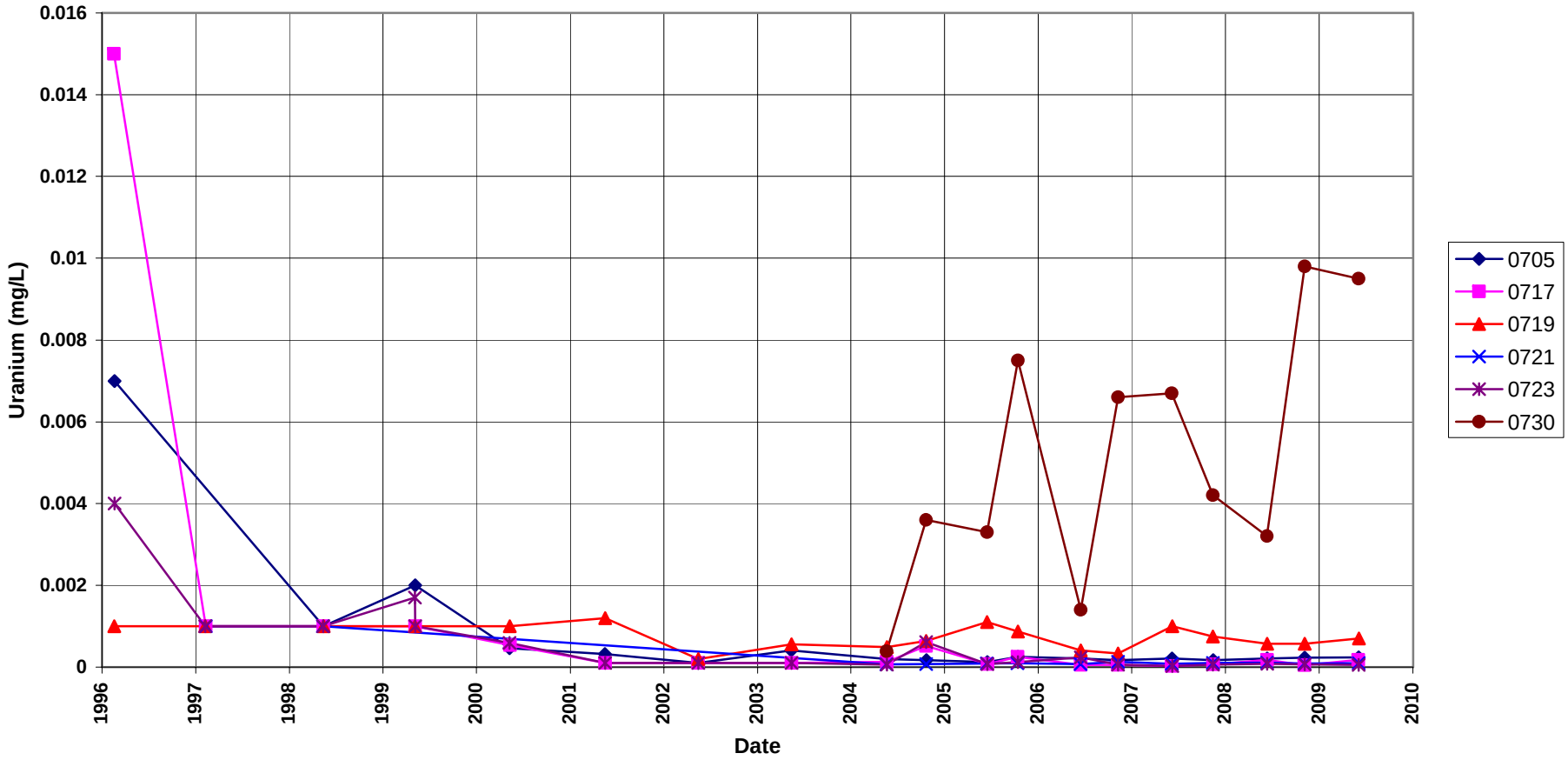
Riverton Processing Site
Surficial Aquifer Locations
Sulfate Concentration



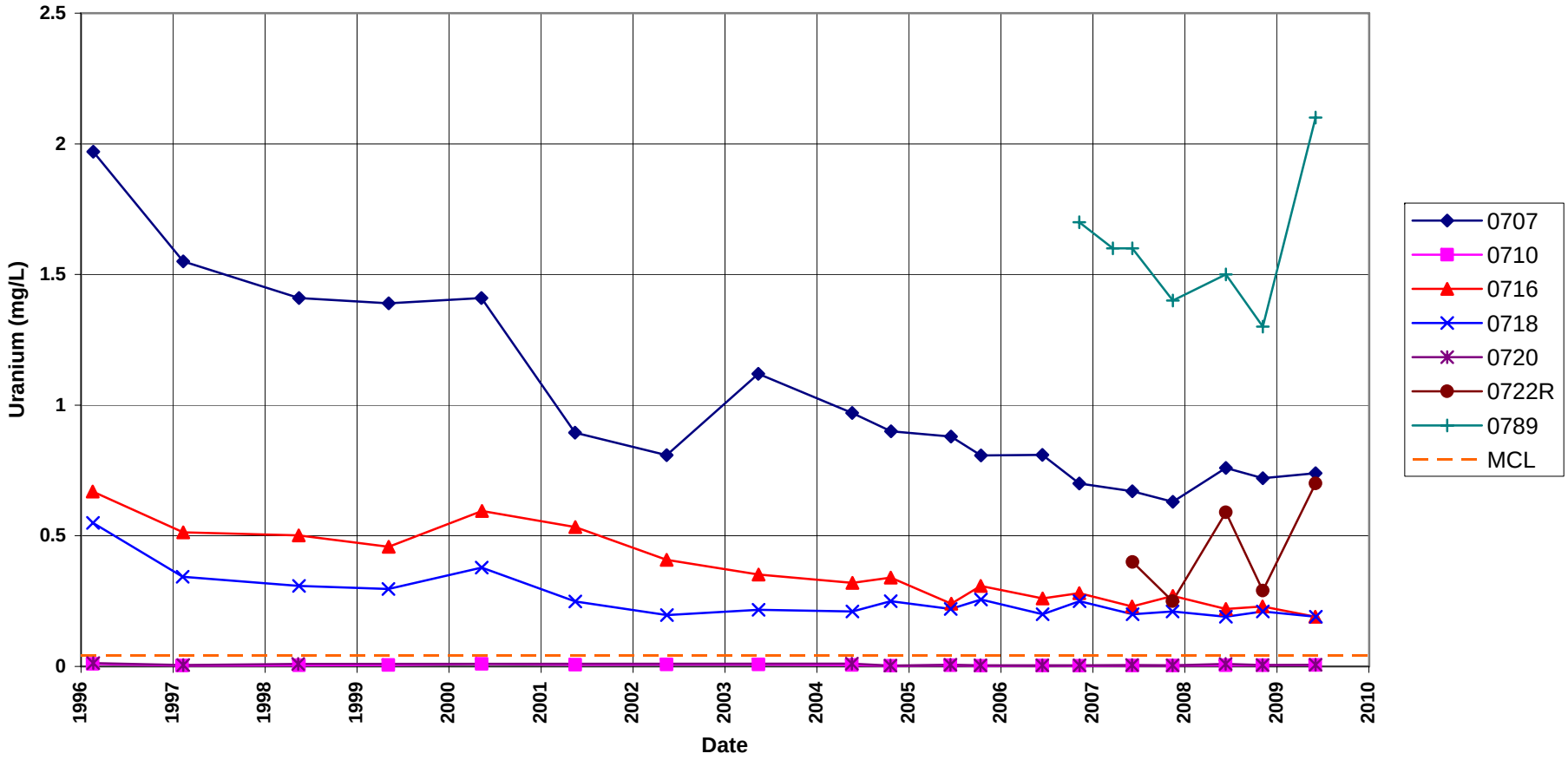
Riverton Processing Site
Surficial Aquifer Locations
Sulfate Concentration



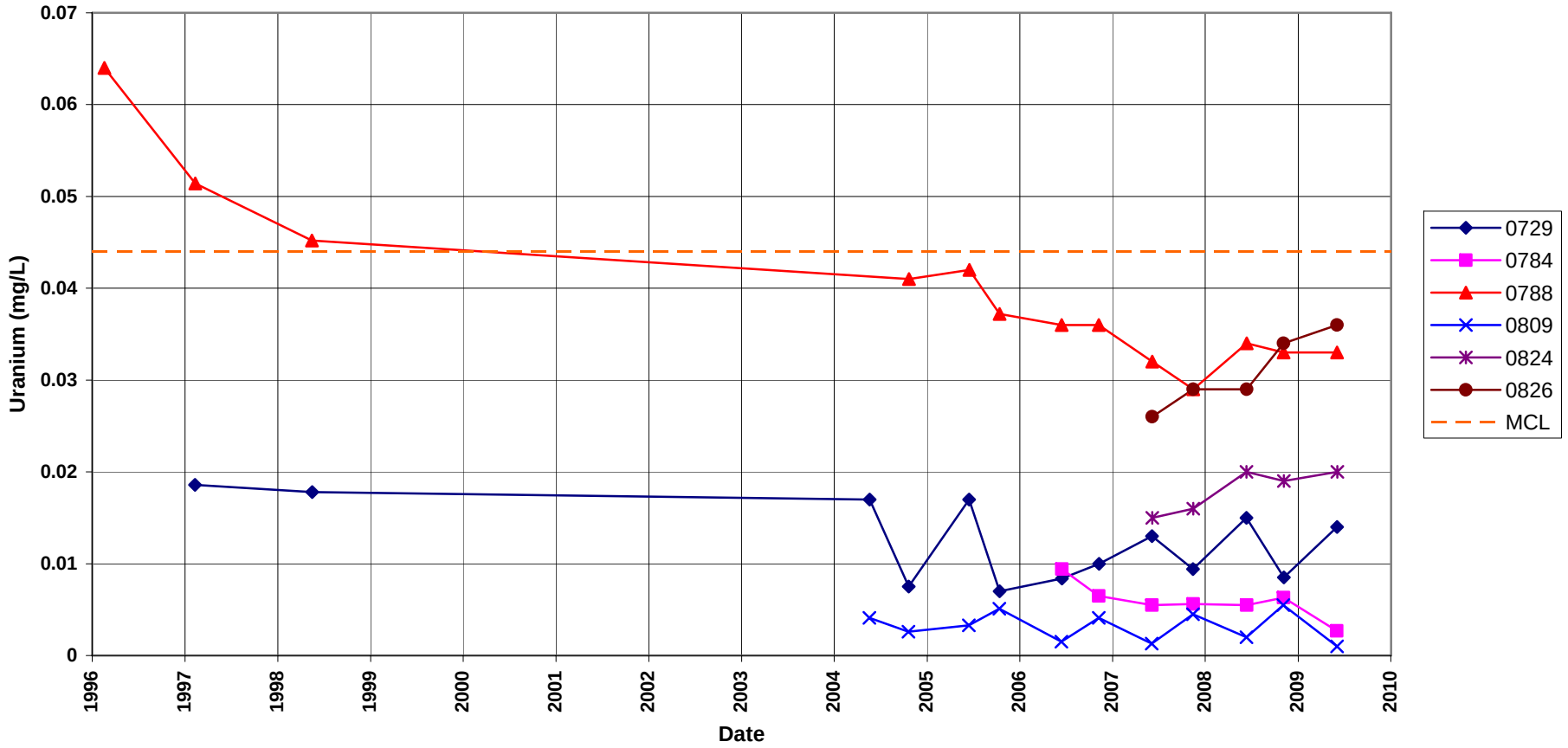
Riverton Processing Site
Semi-Confined Aquifer Locations
Uranium Concentration
Maximum Concentration Limit = 0.044 mg/L



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



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



Attachment 3
Sampling and Analysis Work Order

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Task Order LM00-501
Control Number 09-0726

April 28, 2009

U.S. Department of Energy
Office of Legacy Management
ATTN: Jalena Dayvault
Site Manager
2597 B ¾ Road
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, Stoller
June 2009 Environmental Sampling at the Riverton, Wyoming, Disposal Site

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

Dear Ms. Dayvault:

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 disposal site. Water quality data will be collected from monitor wells, domestic wells, and surface locations at this site as part of the routine environmental sampling currently scheduled to begin the week of June 1, 2009.

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

Monitor Wells*

705 Se	716 Sf	719 Se	722R Sf	730 Se	788 Sf	824
707 Sf	717 Se	720 Sf	723 Se	735 Se	789 Sf	826
710 Sf	718 Sf	721 Se	729 Sf	784 Sf	809 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

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 call me at (970) 248-6654, if you have any questions.

Sincerely,

Sam Campbell
Site Lead

SC/lcg/lb

Enclosures (3)

cc: (electronic)
Cheri Bahrke, Stoller
Sam Campbell, Stoller
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
EDD Delivery
rc-grand.junction

Constituent Sampling Breakdown

Site	Riverton				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	50	18			
Field Measurements					
Alkalinity					
Dissolved Oxygen					
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					
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 analyte samples are considered unfiltered unless stated otherwise. 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: June 10, 2009

TO: Distribution

FROM: Sam Campbell

SUBJECT: Trip Report

Site: Riverton, Wyoming, Processing Site.

Dates of Sampling Event: June 1 to June 4, 2009.

Team Members: Sam Campbell and David Atkinson.

Number of Locations Sampled: 19 monitor wells, 9 surface water locations, and 6 domestic wells.

Locations Not Sampled/Reason: Monitor well 0735 was not sampled for safety concerns. High flows of the Little Wind River had eroded the escarpment (10 foot drop to the river) to the edge of the well.

Location Specific Information: Monitor wells 0705 and 0719 were purged and sampled using Category II criteria; all other monitor wells were purged and sampled using Category I criteria.

At the time of sampling, the Little Wind River was at flood stage and flowing through the Oxbow Lake.

Domestic well 0836 was sampled for the first time. The well is used for irrigation only, and the owner reports the well to be 700 feet deep. Owner contact information:

Patsy Watt
8 Welcome Road
Riverton, WY 82501
(307) 851-1040

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	0716	Duplicate	HGZ-217
2645	Equipment Blank	Equipment Blank	HGZ-218
2646	0789	Duplicate	HGZ-219

Requisition Numbers Assigned: All samples were assigned to report identification number (RIN) 09052319 and were shipped to the ALS Laboratory Group on June 8, 2009.

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

Well Inspection Summary: Concrete pads at monitor wells 0725 and 0726 have deteriorated; monitor well 0735 has been impacted by erosion from the Little Wind River and will likely be destroyed during the spring runoff. All other wells were in good shape.

Equipment: All equipment functioned properly. Successful testing of the upgrades to the Field Data Collection System, which included direct electronic transfer of the field data from field instrumentation into the FDCS, was completed during this event

Stakeholder/Regulatory: The Wind River Environmental Quality Commission (WREQC) observed sampling activities and split samples at monitor wells 0722R, 0824, and 0826.

Concerned citizen Owen Goggles stopped by during sampling to ask questions about well locations and sampling results.

Gerald Redman, director of the Northern Arapaho Utility Organization, stopped by during sampling of monitor well 0722R to discuss flushing of the alternate water supply system. One of his crews was flushing the adjacent hydrant.

Institutional Controls

Fences, Gates, Locks: No issues identified.
Signs: Warning signs installed around the oxbow lake were intact.
Trespassing/Site Disturbances: None

Access Issues: New phone numbers were obtained to contact owners of domestic well 0430: Lawrence Raymond (307) 851-3965 or Brent Raymond (307) 840-6243.

Corrective Action Required/Taken: New concrete pads are needed around monitor wells 0725 and 0726. Discussions are needed regarding the replacement of monitor well 0735.

(SEC/lcg)

cc: (electronic)
Jalena Dayvault, DOE
Cheri Bahrke, Stoller
Steve Donivan, Stoller
EDD Delivery