

Office of Environmental Management – Grand Junction



Moab UMTRA Project
January 2010 Validation Data Package
for the Routine Ground Water and
Surface Water Sampling Event

April 2010



U.S. Department
of Energy

Office of Environmental Management

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**Moab UMTRA Project
January 2010 Routine Ground Water Sampling Event VDP**

Revision 0

Review and Approval

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4/20/10

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Acronyms and Abbreviations

°C	degrees centigrade
CF	Configuration
COC	chain of custody
EB	equipment blank
EDD	electronic data deliverable
EPA	U.S. Environment Protection Agency
ft	feet
ICP	inductively coupled plasma
IDL	instrument detection limit
LCS	laboratory control samples
MB	method blank
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
RL	reporting limit
RIN	report identification number
RPD	relative percent difference
RS	replicate sample
SD	serial dilution
SDG	sample data group
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
UMTRA	Uranium Mill Tailings Remedial Action
USGS	U.S. Geological Survey
VDP	validation data package
WL	well

1.0 Introduction

The purpose of this document is to summarize the results of the data validation process associated with ground water and/or surface water samples collected from the Moab Uranium Mill Tailings Remedial Action (UMTRA) Project site. This data validation follows the criteria according to the *Environmental Procedures Catalog*, “Standard Practice for Validation of Laboratory Data,” GT-9(P) (2006).

As part of the scope of this document, the complete results of this data validation process are provided. Section 1 presents the Summary Criteria, the Sampling Event Summary, and Sampling and Analyses. Section 2 provides the Data Assessment Summaries, including the Field Activity Verification, Laboratory Performance Assessment, and Field Analyses/Activities description. All flagged data, and the reasons for the applicable flags, are also presented in Section 2. The Data Presentation is contained in Section 3, which includes a summary of the anomalous data generated by the validation process. Various Appendices contain the Water Quality Data, Water Level Data, Minimums and Maximums Report tables, and the Trip Report. All Colorado River flow discussed in this document are measured from the U. S. Geological Survey (USGS) Cisco gauging station No. 09180500.

This section contains the Summary Criteria with a sample location map (Section 1.2), a Sampling Event Summary (Section 1.2), and the Sampling and Analyses (Section 1.3) for the January 2010 routine sampling event.

1.1 Summary Criteria

Sampling Period: January 20 through 27, 2010

The purpose of this sampling was to collect ground water and surface water samples from the standard routine event sampling locations in order to evaluate the overall water quality under Colorado River base flow conditions. Sampling locations are shown on Figure 1.

1. As a result of this sampling round, is there any indication of unexpected contaminated ground water movement?

There is no indication of unexpected contaminated ground water movement along the bank of the Colorado River. As expected, contaminant concentrations in January 2010 in some instances increased compared to the concentrations measured during the previous routine sampling event completed in June 2009, especially in areas of the site influenced by the high river stage the previous year.

Wells that exceeded water quality standards are listed in Table 1.

Table 1. Ground Water Locations Sampled that Exceeded Selenium and Uranium Ground Water Standards

Analyte	Standard (mg/L)	Locations Exceeding Standards
Selenium	0.01	0404 (0.015) and 0537 (0.91)
Uranium	0.044	0401 (2.3), 0403 (0.82), 0404 (2.1), 0407 (0.89), 0438 (1.6), 0492 (0.42), 0537 (2.6), TP-02 (1.1)

mg/L = milligrams per liter

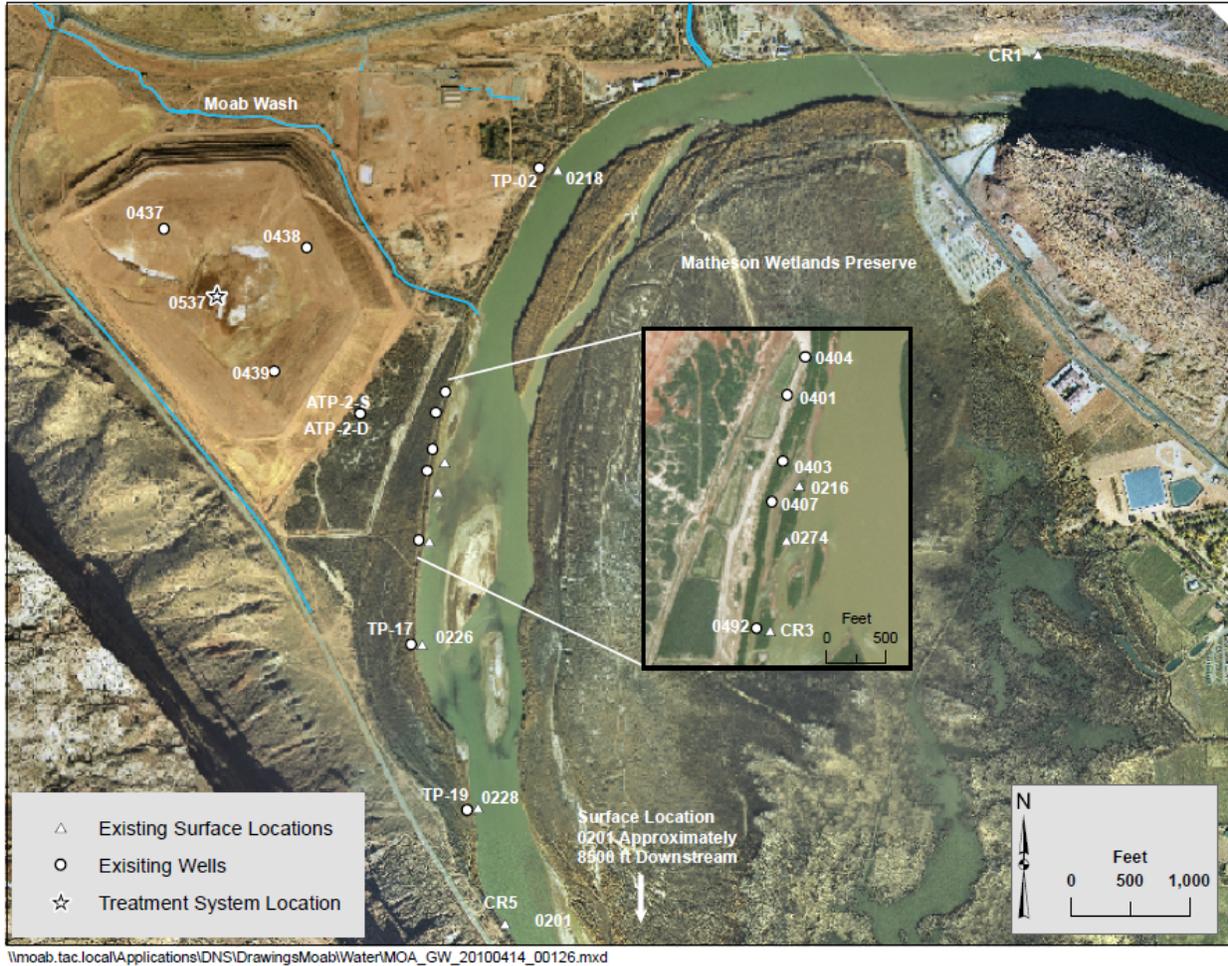


Figure 1. Routine Ground Water and Surface Water Sampling Locations (may include locations not sampled)

2. Is there statistical evidence that contaminants related to the Moab UMTRA Project were detected in a surface body of water in greater concentrations than upstream ambient water quality?

Since the monitoring of the site began, site contaminants have periodically occurred at elevated concentrations, primarily adjacent to and just downstream from the tailings pile in isolated pools or slow-moving backwater areas during periods of low river stage in the Colorado River. These samples were collected under very low river stage conditions, and some of the results from the sampling event in January 2010 indicate that areas sampled are above background concentrations in the side channel of the Colorado River off Configuration (CF) 1.

Table 2 compares the surface water uranium concentrations to the UMTRA ground water standard of 0.044 milligrams per liter (mg/L). This standard was used for comparison purposes due to the fact that there is no applicable surface water standard for uranium. Of the surface water samples collected during this event, the uranium concentration measured in the vicinity of location 0216 was 1.0 mg/L, which is above the 0.044 mg/L UMTRA standard for ground water. The sample collected from location 0274 was also elevated but just below this standard, while all other samples were below.

Table 2. Surface Water Uranium Concentrations Compared to the Uranium Ground Water Standard

Loc	Date	Uranium (mg/L)	UMTRA Ground Water Standard (mg/L)
0201	1/21/10	0.0056	0.044
0216	1/26/10	1.0	
0218	1/26/10	0.0078	
0226	1/21/10	0.0091	
0274	1/27/10	0.043	
CR1	1/20/10	0.0052	
CR3	1/20/10	0.021	
CR5	1/21/10	0.0068	

Loc = Location; mg/L = milligrams per liter

Table 3 presents a summary of the ammonia concentrations associated with the surface water samples collected during this sampling event. For comparison purposes, the applicable state of Utah and federal criteria for both acute and chronic concentrations (along with the temperature and pH data used to calculate these concentrations) are provided.

As shown in Table 3, the sample collected from location 0216 exceeded both the acute and chronic criteria, and the sample from location 0274 exceeded the chronic criteria. Both the state of Utah and the Grand County liaisons were contacted regarding the ammonia concentration measured at location 0216. This sample was collected for information purposes only after a check on the specific conductance suggested ground water discharge into this area under the low river stage conditions. This phenomenon has occurred previously under similar low river stage conditions. These samples were collected from very shallow bodies of water associated with minimal flow. No habitat was present, and no fish were observed in this area of the river.

Table 3. Surface Water Ammonia Concentrations and Comparisons to State of Utah and Federal Criteria

Loc	Date	Temp (°C)	pH	Ammonia as N (mg/L)	State/Federal AWQC-Acute Total as N (mg/L) ¹	State/Federal AWQC-Chronic Total as N (mg/L) ²
0201	1/21/10	0.9	8.56	0.1	1.77	0.92
0216	1/26/10	5.6	7.25	80	17.5	5.08
0218	1/26/10	0.2	8.43	0.1	2.59	1.29
0226	1/21/10	1.0	8.55	0.12	1.77	0.92
0274	1/27/10	5.5	8.20	2.8	3.83	1.79
CR1	1/20/10	0.2	8.34	0.1	3.15	1.52
CR3	1/20/10	3.5	8.36	0.7	2.59	1.29
CR5	1/21/10	1.5	6.90	0.1	26.2	6.12

Notes: Loc = Location, Temp = Temperature, AWQC = Ambient Water Quality Criteria

- (1) State of Utah, Standards of Quality for Waters of the State (Effective May 1, 2008), Rule R317-2, Table 2.14.2, 1-Hour Average (Acute) Concentration of Total Ammonia as N (mg/L)
- (2) State of Utah, Standards of Quality for Waters of the State (Effective May 1, 2008), Rule R317-2, Table 2.14.2, 30-Day Average (Chronic) Concentration of Total Ammonia as N (mg/L), Fish Early Life Stages Present

1.2 Sampling Event Summary

This validation data package (VDP) presents the validated data associated with the ground water and surface water samples collected during the January 2010 routine ground water and surface water sampling event at the former uranium tailings processing site in Moab, Utah. This VDP includes a discussion of the data validation process in Section 2.0 with a description of how these data are qualified based on field and laboratory verification assessments (Sections 2.1 and 2.2). Attachment 1 contains the Trip Report detailing the field events associated with this sampling event.

A list of flagged data is presented in Table 5 in Section 2.2. Nitrate and nitrite data were rejected (flagged as “R”) as a result of this validation process due to weather conditions delaying delivery of samples for analyses, and holding times were exceeded. A Minimums and Maximums Report (presented in Section 3.1) was generated to determine if the data are within a normal statistical range. Any anomalous data, based on the results of the Minimums and Maximums Report, are presented in Section 3.2.

While independent of the data validation process, a brief summary of the most recent concentration trends based on the January 2010 data is provided for the wells located in the floodplain (along the bank of the Colorado River) and in the footprint of the tailings pile. Time versus concentration (ammonia, TDS, and uranium) plots for selected monitoring wells over the past 2 years are presented to display historical trends exhibited by the data. Colorado River flows over the same time frame are also plotted to determine the influences of the magnitude of river flows on analyte concentrations.

Flood Plain Wells

Time concentration plots were generated for wells TP-02, 0492, TP-17, and TP-19 (locations listed from north to south). These plots exhibit that samples collected from wells TP-02, TP-17, and TP-19 have historically contained low ammonia concentrations (Figure 2), while the concentration detected from well 0492 has fluctuated between approximately 10 and 120 mg/L over the past 2 years. An historical trend of samples from 0492 exhibiting increasing ammonia, TDS, and uranium concentrations during periods of low river flow was apparent again during January 2010.

The TDS plot (Figure 3) graphically shows that locations TP-17 and TP-19 are screened within the brine, while locations TP-02 and 0492 are screened above the brine-freshwater interface. Seasonal changes in the TDS concentration suggest freshwater inflow significantly lowers TDS concentrations in TP-17 during above average spring runoff river stages in the Colorado River. Well TP-02 has consistently contained less than 6,000 mg/L TDS.

Over the past 2 years, uranium concentrations have seasonally fluctuated in samples collected from 0492 and TP-02, and the samples collected in January 2010 continues this trend (Figure 4). Typical of wells screened within the brine, uranium concentrations in wells TP-17 and TP-19 are considerably lower compared to TP-02 and 0492. Since July 2006, samples collected from well TP-17 have contained uranium in concentrations near the 0.044 mg/L standard (Figure 5). As Figure 5 exhibits, uranium concentrations measured in samples collected from TP-17 have not been above this standard since May 2008.

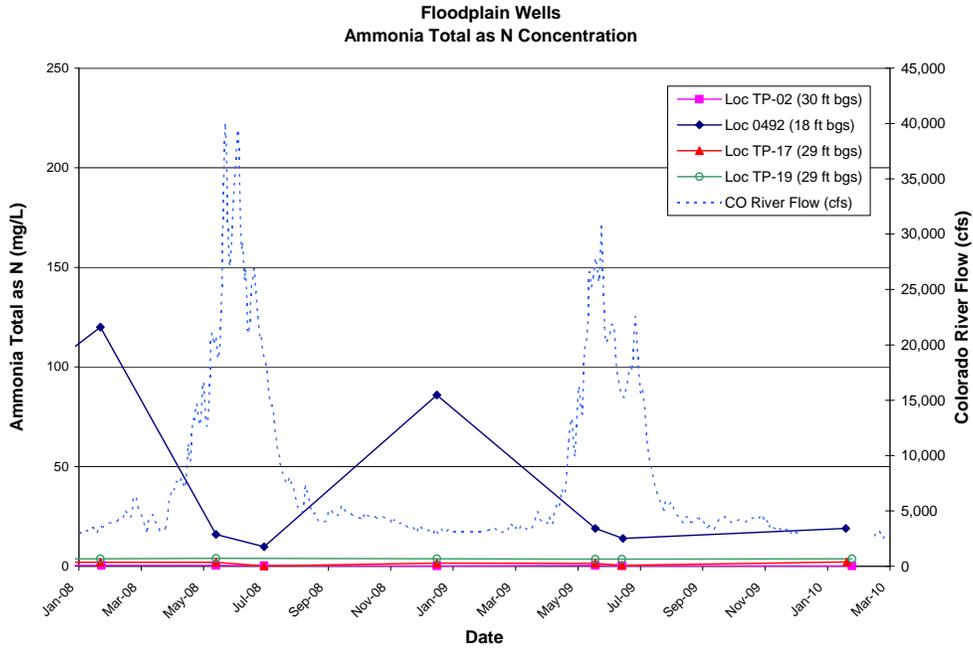


Figure 2. Floodplain Wells Time Versus Ammonia Total (as N) Concentration Plot

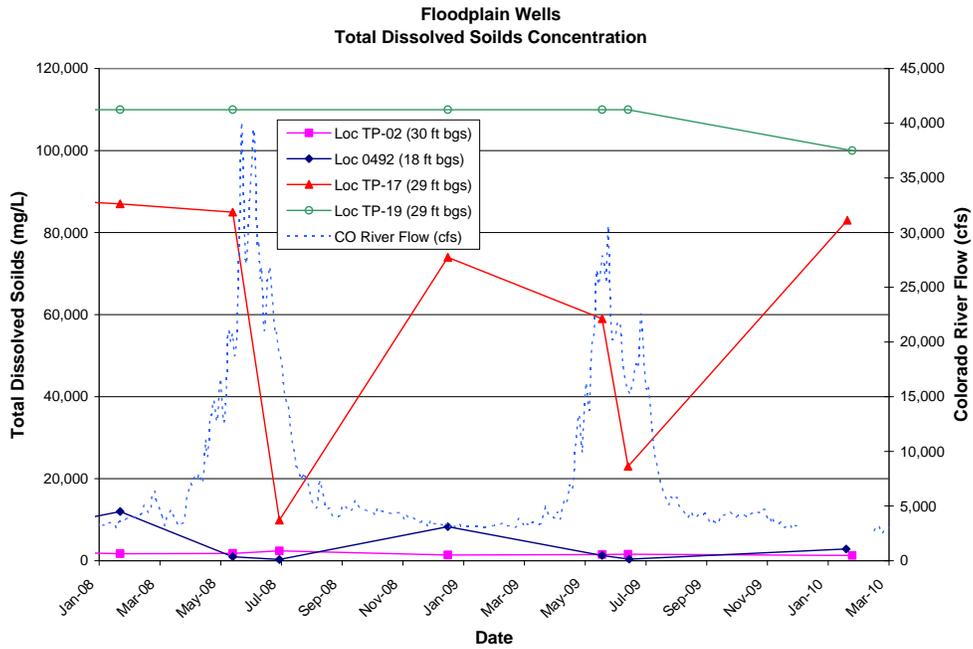


Figure 3. Floodplain Wells Time Versus TDS Concentration Plot

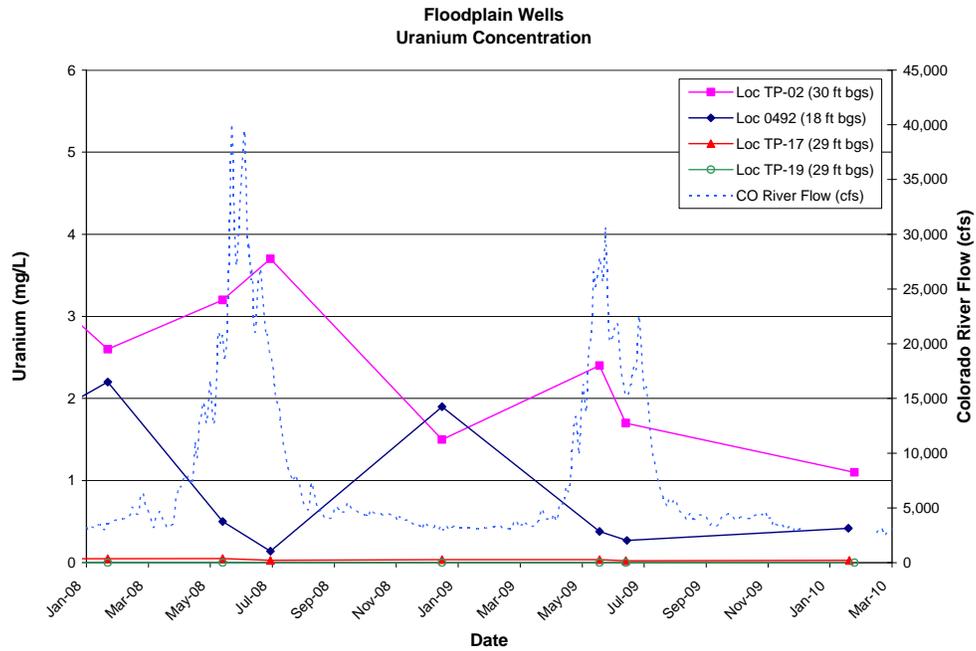


Figure 4. Floodplain Wells Time Versus Uranium Concentration Plot

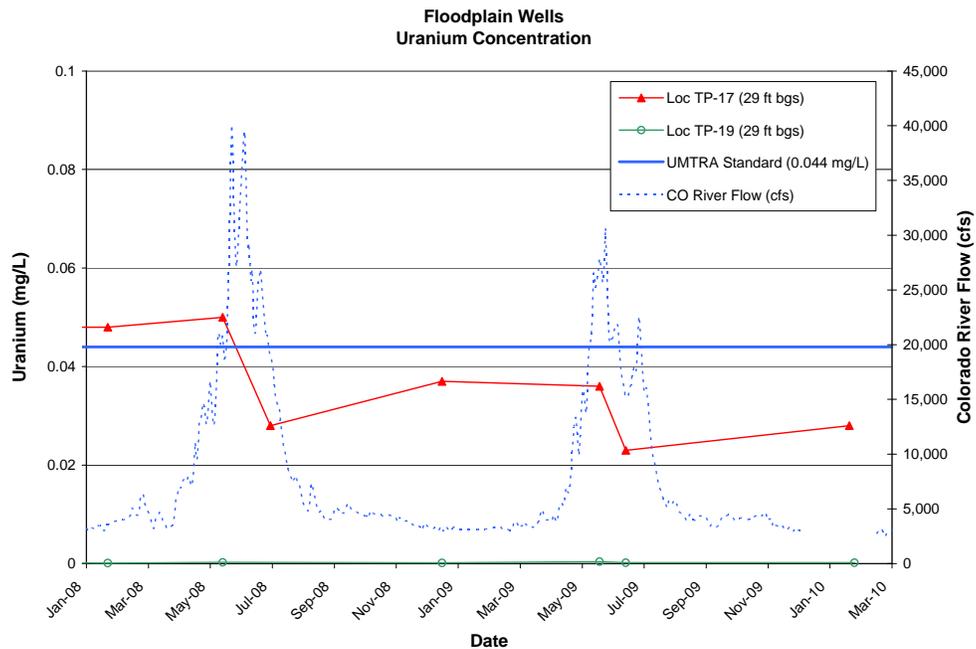


Figure 5. Floodplain Wells TP-17 and TP-19 Uranium Concentration Comparison to the UMTRA Standard

Tailings Pile Wells

The wells located on the tailings pile are screened within the alluvial material underlying the tailings. Well 0437 was not sampled during this event due to the fact that is located with the excavation area and was not accessible, and well 0439 was not sampled due to equipment issues. The sample collected from well 0438 in January 2010 showed an ammonia concentration that was within the historical range as shown in Figure 6. The TDS and uranium time concentration

plots (Figures 7 and 8, respectively) indicate that these concentrations did not significantly change over the past 2 years.

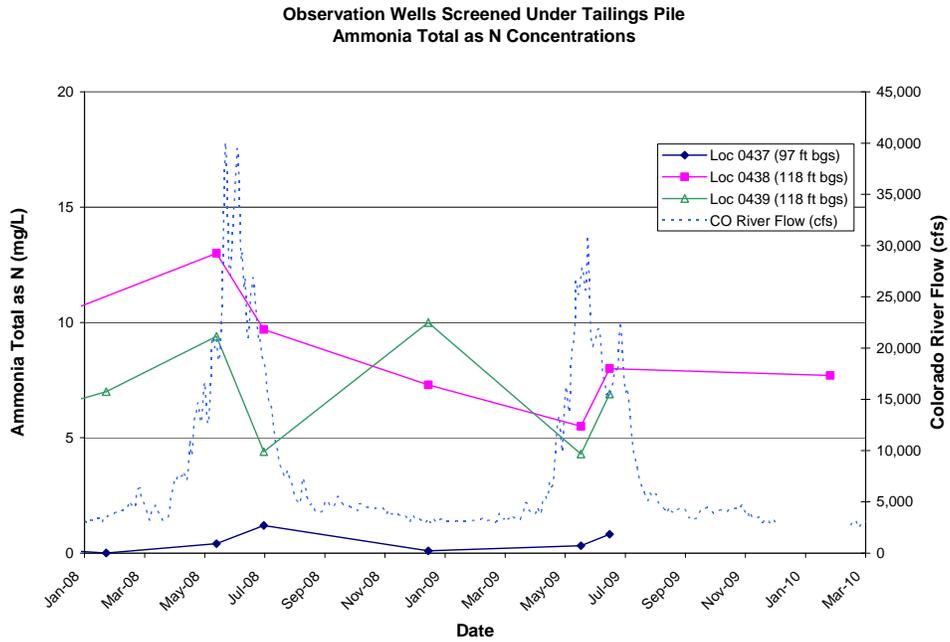


Figure 6. Tailings Pile Wells Time Versus Ammonia Total (as N) Concentration Plot

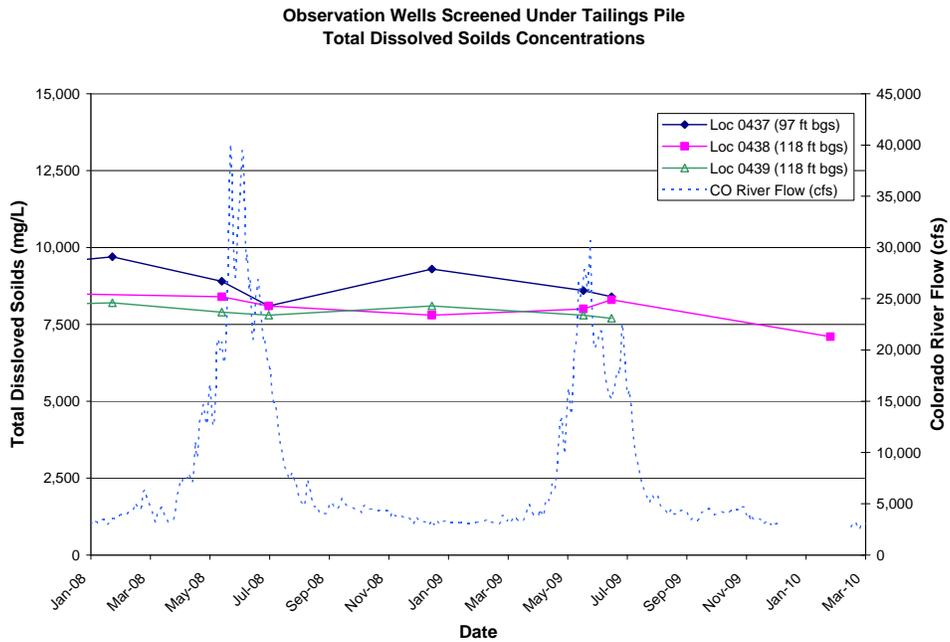


Figure 7. Tailings Pile Wells Time Versus TDS Concentration Plot

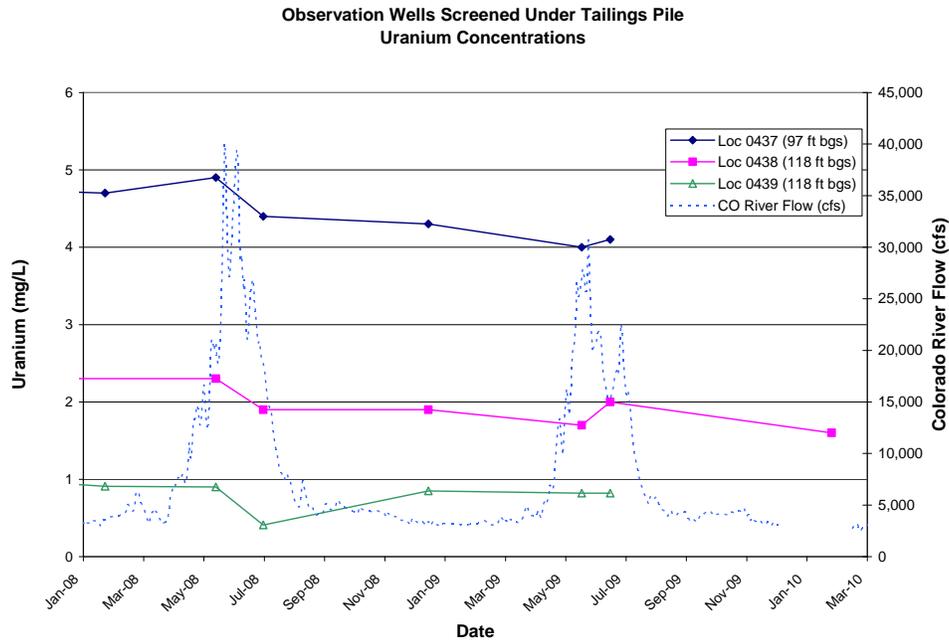


Figure 8. Tailings Pile Wells Time Versus Uranium Concentration Plot

Ammonia, Nitrate, Nitrite, and Total Kjehldahl Nitrogen Results

Typically low ammonia concentrations have been measured in samples collected from the wells completed in the alluvium underneath the tailings pile. In an effort determine the total nitrogen present and if other forms of nitrogen are more prevalent in this ground water system, four wells and the wick system sump (which contains tailings pore water) were sampled during this sampling event (Table 4). Each sample was analyzed for ammonia (as N), nitrate (as N), nitrite (as N), and total Kjehldahl nitrogen (TKN). Ammonia, nitrate, and nitrite are considered as the main inorganic forms of nitrogen, while TKN represents the combination of organically bound nitrogen and ammonia.

Table 4. Ammonia, Nitrate, Nitrite, and TKN Results, January 2010 Sampling Event

Location Number	Area of Site	Concentration (mg/L)			
		Ammonia (as N)	Nitrate (as N)	Nitrite (as N)	TKN
0438	Top of Pile	7.7	25	1 ^a	1.6
0537	Wick System	6100	760	5 ^a	560
ATP-2-S	Base of Pile (sample from 38 ft bgs)	500	4 ^a	2 ^a	64
ATP-2-D	Base of Pile (sample from 88 ft bgs)	710	20 ^a	10 ^a	530
0404	Along Colorado River bank (sample from 18 ft bgs)	330	150	1 ^a	1000

a = represents the reporting limit

As shown in Table 4, the sample collected from the native alluvium from under the tailings pile again contained a low ammonia concentration (typically these concentration have been below 15 mg/L since 2006), and also contained very low nitrite and TKN concentrations. The sample collected from the wick system contained the highest ammonia concentration of the locations

sampled, and also contained significant nitrate and TKN. Of the wells sampled downgradient of the tailings pile, the highest TKN concentration was detected in the sample collected from the sample collected just below the ground water surface along the bank of the Colorado River. All these results suggest geochemical processes are occurring to change the state in which nitrogen is present along the ground water flow path, and further study is required.

1.3 Sampling and Analyses

Sampling and analyses were conducted in accordance with the *Operations, Maintenance, and Performance Monitoring Plan for the Interim Action Ground Water Treatment System, April 2008* (DOE-EM/GJ1220). Although not listed here, the normal set of locations were sampled. Please refer to the attached Trip Report (Attachment 1) for specific sampled locations and an explanation of why some locations were not sampled, such as dry conditions at specific surface water locations.

The data validations indicate that the data meet the quality-control criteria specified for this project. An adequate number of equipment blanks (EBs) and duplicates were collected. Nitrate and nitrite data were rejected (flagged as “R”) as a result of this validation process due to weather conditions that delayed delivery of samples for analyses, and holding times were exceeded. No significant discrepancies were noted regarding sample shipping and receiving, preservation times, instrument calibration, method blanks (MBs), or matrix spikes (MSs), except as qualified or noted in the Laboratory Performance Assessment (Section 2.2).

There were no anomalous data points associated with this sampling event. According to the USGS Cisco gauging station, no mean daily Colorado River flow data were collected due to ice build-up at the measurement point.

2.0 Data Assessment Summary

This section contains the Water Sampling Field Activities Verification (Section 2.1), the Laboratory Performance Assessment (Section 2.2), the Field Analyses/Activities (Section 2.3), and Certification (Section 2.4).

2.1 Water Sampling Field Activities Verification

The field activities verification process for this sampling event was documented using the list provided in Appendix A. As the list exhibits, all sampling was conducted following the applicable procedures.

2.2 Laboratory Performance Assessment

General Information

Requisition No. (RIN):	1001040
Sample Event:	January 2010 Routine Surface Water/Ground Water Sampling
Site:	Moab, Utah
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Sample Data Group (SDG) Nos.:	1001236 and 1001283

General Information (continued)

Analysis: Metals, Radium-226, and Inorganics
Validator: Rachel Cowan
Review Date: March 28, 2010

This validation was performed according to the *Environmental Procedures Catalog* (STO 6), “Standard Practice for Validation of Laboratory Data,” GT-9(P) (2006). The procedure was applied at Level 1, Data Deliverables Examination. The Level 1 validation was performed on 100 percent of the samples, which included review of the chain of custody (COC), case narratives, field and sample identifications, holding times, preservation, and cooler receipt. When the case narrative identified items of concern, these items were further investigated in a targeted Level 3 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 5.

Data Qualifier Summary

Analytical results were qualified as listed in Table 6. Refer to Table 7 for an explanation of the data qualifiers applied.

Table 5. Analytes and Methods

Analyte	Line Item Code	Preparation Method	Analytical Method
Ammonia as N, NH ₃ -N	WCH-A-005	EPA 350.1	EPA 350.1
Manganese	G17	SW-846 3005A	SW-846 6010B
Nitrate as N	MIS-A-041	SW-9056	SW-9056
Nitrite as N	MIS-A-041	SW-9056	SW-9056
Radium-226	ASP-A-016	EPA-903.1	EPA-903.1
Total Kjeldahl Nitrogen (TKN)	WCH-A-039	EPA 351.2	EPA 351.2
Total Dissolved Solids	WIC-A-033	EPA 160.1	EPA 160.1
Selenium	G14	SW-846 3005A	SW-846 6020A
Uranium	G1	SW-846 3005A	SW-846 6020A

Table 6. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1001283-5	0438	TKN	J	MS1; RS1
1001283-4, -5, -6, -8, -9	0404, 0438, 0537, ATP-2-D, ATP-2-S	Nitrate as N; Nitrite as N	R	HT3
10011236-5, -6, -12	0401, 0404, TP-17	Selenium	J	RS1

J indicates results are estimated and becomes a UJ for analytical results below the detection limit.

Table 7. Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Nonetects)	Explanation
HT3	R	R	Samples were analyzed after two times the specified hold time expired.
MS1	J	UJ	Results for the affected analyte(s) are regarded as estimated (J) because the MS sample was (a) from another client, (b) of dissimilar matrix, (c) a field blank or EB, or (d) not analyzed at the proper frequency as stated in the appropriate analytical method.
RS1	J	UJ	Replicate sample frequency criteria were not met.

EB = equipment blank; MS = matrix spike

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received a total of 22 samples for RIN 1001040 in two shipments, which arrived on January 25, 2010 (SDG 1001236; UPS tracking number 1Z5W1Y514491931375) and January 29, 2010 (SDG 1001283; UPS tracking number 1Z5W1Y510193017789). Each of the SDGs was accompanied by a COC form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, signatures, and dates present indicating sample relinquishment and receipt. The sample submittal documents, including the COC forms and the sample tickets, had no errors or omissions

Preservation and Holding Times

SDGs 1001236 and 1001283 were received intact in two coolers with temperatures of 3.6 degrees centigrade (°C) (SDG 1001236) and 2.6°C (SDG 1001283). The samples within SDG 1001236 arrived at the laboratory 3 days after they were shipped due to weather delays. All samples were received in the correct container types and had been preserved correctly for the requested analyses, except samples 1001283-5 (location 0438) and 1001283-6 (location 0537), which had high pHs and were adjusted upon receipt at ALS Laboratories. All samples were analyzed within the applicable holding times, except samples 1001283-4, -5, -6, -8, -9, for analyses of nitrate as nitrogen and nitrite as nitrogen. These samples were analyzed after more than two times the applicable holding time and were flagged with an “R” for reason HT3.

Case Narratives

The case narratives were reviewed, and all detects were found to be within quality-control procedures except for the following.

Matrix Spike and Replicate Analysis

MS sample analysis, performed at a frequency of one per 20 samples unless otherwise noted, is a measure of the ability to recover analytes in a particular matrix. Replicate sample (RS) analysis consists of matrix spike duplicate (MSD) samples and field duplicates, analyzed at a frequency of one per 20 samples per method or procedural requirements. These RSs are indicators of laboratory precision for each sample matrix.

Method EPA 350.1, Ammonia

The measured ammonia concentration in the SDG 1001283 MS sample was too high. As per requirements, the ammonia results associated with this MS were not flagged for MS1, and since the ammonia field duplicate passed, no ammonia results in SDG 1001283 were “J”-flagged for reason RS1.

Method EPA 351.2, TKN

The measured TKN concentration in the SDG 1001283 MS sample for 1001283-6 was too high. As per requirements, the TKN result associated with this MS was not flagged for MS1; however, since there was no TKN MSD or field duplicate, this sample's TKN result was "J"-flagged for reason RS1.

Method SW-846 6020A, Selenium

The measured selenium concentration in the SDG 1001283 MS sample was too high. As per requirements, the selenium results associated with this MS were not flagged for MS1; however, since there was no selenium field duplicate, the SDG 1001283 selenium results were "J"-flagged for reason RS1.

Laboratory Control Sample

A laboratory control sample (LCS) must be analyzed at the correct frequency (one LCS per 20 samples) to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. LCSs were prepared and analyzed as appropriate with the following exception.

LCSs were not reported for manganese or uranium. As a standard practice, ALS Laboratories does not prepare LCSs for samples that are field-filtered and acidified and then run directly on the instrument without any additional sample preparation. Per national environmental laboratory accreditation requirements, an MS may be used in place of an LCS provided the acceptance samples are "J"-qualified for LCS failure.

The manganese, selenium, and uranium MS results from both SDGs were acceptable, so none were flagged for reason LCS1.

Method and Calibration Blanks

MBs are analyzed to assess any contamination that may have occurred during sample preparation. Initial calibration blanks and continuing calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. Detected sample results associated with blanks results greater than the method detection limit or instrument detection limit (IDL) (depending on method requirements) were "J"-qualified when the detections were less than five times the associated blank concentration. Nondetects were not qualified. According to the case narratives, all MBs passed requirements, so no results were flagged for this reason.

Metals Serial Dilution

Serial dilution (SD) samples were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Inductively coupled plasma (ICP)-mass spectrometry SD data are evaluated when the concentration of the undiluted sample is greater than 100 times the reporting limit (RL). ICP-atomic emission spectroscopy SD data are evaluated when the concentration of the undiluted sample is greater than 50 times the RL. All evaluated SD data were acceptable with the following exceptions.

According to the case narratives, the selenium SD in SDG 1001236 failed. However, the concentration in the undiluted SD sample was not greater than 100 times the RL, so no samples were "J"-flagged for reason SD1.

Field Duplicate Analysis

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 replicates, which measure only laboratory performance. Two duplicate samples were collected from locations 0401 (1001236-5) and TP-02 (1001283-10) in the January 2010 sampling event. The duplicate results met the U.S. Environmental Protection Agency (EPA)-recommended laboratory duplicate criteria of less than 20 relative percent difference (RPD) for results that are greater than five times the RL, except for the manganese result from 1001283-10, which had a 25 RPD. However, since the MSD had passed, none of the associated samples had to be flagged.

Equipment Blanks

An EB is a sample of analyte-free media collected from a rinse of nondedicated sampling equipment used to sample surface water. EBs are collected to document adequate decontamination of nondedicated equipment. One EB should be prepared with each preparation batch. Since all water samples were collected using dedicated equipment, no EBs were collected.

Completeness

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

Electronic Data Deliverable File

The Electronic Data Deliverable (EDD) files arrived on February 26, 2010. The contents of the EDD files were manually examined to verify that the sample results accurately reflected the data contained in the SDGs and that all and only the requested data were delivered.

2.3 Field Analyses/Activities

The following information summarizes the field analyses and activities for the January 2010 sampling event.

Field Activities

All monitor wells were purged and sampled using the low-flow sampling method; this method was not used at extraction wells. No EBs needed to be collected since all samples were collected using dedicated equipment. Two ground water duplicate samples were collected. There are no established regulatory criteria for the evaluation of field duplicate samples; therefore, EPA guidance for laboratory duplicates (which is conservative for field duplicates) was used to assess the precision of the field duplicates. All results met the criteria of ± 20 RPD and are considered acceptable, except for manganese in duplicate 2001, which had an RPD of ± 25 . However, since the associated manganese MSD samples passed requirements, no manganese results needed to be flagged for RS1.

2.4 Certification

Results were reported in correct units for all analytes requested. Appropriate contract-required laboratory qualifiers and target analyte lists were used. The RLs were met. All analytical quality-control criteria were met except as qualified on the Ground Water Quality Data by Parameter, Surface Water Quality by Parameter, or equipment/trip blank database printouts. The meaning of

data qualifiers is defined on the database printouts or defined in the EPA *Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media Multi-Concentration*, (ILMO2.0) (1991). All data in this package are considered validated and may be treated as final results.

3.0 Data Presentation

This section contains the Minimums and Maximums Report (Section 3.1), the Anomalous Data Review Check Sheet (Section 3.2), a table containing the Water Quality and Water Level Data (Sections 3.3 and 3.4, respectively), and the Blanks Report (Section 3.5).

3.1 Minimums and Maximums Report

The Minimums and Maximums Report (see Appendix B) is generated by the Sample Management System used to query the SEEPro database. The DataVal program compares the new data set with historical data and lists all new data that fall outside the historical data range. Values listed in the report are further screened, and the results are not considered anomalous if: (1) identified low concentrations are the result of low detection limits; (2) the concentration detected is within 50 percent of historical minimum or maximum values; or (3) there were fewer than five historical samples for comparison.

3.2 Anomalous Data Review

There were no anomalous results associated with this sampling event based on the Minimums and Maximums Report (Appendix B).

3.3 Water Quality Data

All water quality data are presented in Appendix C.

3.4 Water Level Data

All water level data are presented in Appendix D.

3.5 Blanks Report

All samples were collected using dedicated equipment, and as a result, an EB was not necessary and was not collected during this sampling event.

Appendix A.
Water Sampling Field Activities Verification

Appendix A. Water Sampling Field Activities Verification

Sampling Event / RIN	January 2010 Routine Event/1001040	Date(s) of Water Sampling	January 20-27, 2010
Date(s) of Verification	March 31, 2010	Name of Verifier	Rachel Cowan

	Response (Yes, No, NA)	Comments
1. Is the Sampling and Analysis Plan the primary document directing field procedures? List other documents, standard operating procedures, instructions.	Yes	
	NA	
2. Were the sampling locations specified in the planning documents sampled?	No	Well 0439 was not sampled due to pump problems, and surface water location 0228 and evaporation pond location 0548 were not sampled because of ice.
3. Was a pre-trip calibration conducted as specified in the aforementioned documents?	Yes	
4. Was an operational check of the field equipment conducted twice daily? Did the operational checks meet criteria?	Yes	
	Yes	
5. Were the number and types (alkalinity, temperature, electrical conductivity, pH, turbidity, dissolved oxygen, oxidation reduction potential) 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? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements stabilize prior to sampling? Was the flow rate less than 500 milliliters per minute (mL/min)? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	Yes	
	NA	
8. Were the following conditions met when purging a Category II well: Was the flow rate less than 500 mL/min? Was one pump/tubing volume removed prior to sampling?	Yes	
	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Two duplicates were collected for 22 samples.

Appendix A. Water Sampling Field Activities Verification (continued)

Sampling Event / RIN	January 2010 Routine Event/1001040	Date(s) of Water Sampling	January 20-27, 2010
Date(s) of Verification	March 31, 2010	Name of Verifier	Rachel Cowan
		Response (Yes, No, NA)	Comments
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?		NA	
11. Were trip blanks prepared and included with each shipment of volatile organic compound samples?		NA	
12. Were quality-control samples assigned a fictitious site identification number?		Yes	
Was the true identity of the samples recorded on the quality assurance sample log?		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 COC records completed, and was sample custody maintained?		Yes	
17. Are field data sheets signed and dated by both team members?		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?		No	Ice in the cooler was not documented for surface water sample 0216, but the preceding sample was documented for ice in the cooler.
20. Were water levels measured at the locations specified in the planning documents?		Yes	

Appendix B.
Minimums and Maximums Report

Appendix B. Minimums and Maximums Report

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: PARAGON (Fort Collins, CO)

RIN: 1001040

Comparison: All Historical Data

Report Date: 4/8/2010

Site Code	Location Code	Sample Date	Analyte	Current		Historical Maximum			Historical Minimum			Count	
				Result	Qualifiers Lab Data	Result	Qualifiers Lab Data	Result	Qualifiers Lab Data	N	N Below Detect		
MOA01	0216	01/26/2010	Uranium	1		0.84		0.0011			48	1	
MOA01	0438	01/27/2010	Total Dissolved Solids	7100		14800	Q	7250	Q		18	0	
MOA01	0537	01/27/2010	Manganese	33		218	Q	51	J		5	0	
MOA01	0537	01/27/2010	Nitrate as NO3	760	R	7140	Q	820	J		5	0	
MOA01	0537	01/27/2010	Total Dissolved Solids	36000		216000	Q	48000			6	0	
MOA01	0537	01/27/2010	Uranium	2.6		15.3	Q	3.6	J		7	0	
MOA01	ATP-2-D	01/27/2010	Ammonia Total as N	710		680		300	FQ		23	0	
MOA01	ATP-2-S	01/27/2010	Manganese	0.12		6.62		0.15			22	0	
MOA01	TP-02	01/26/2010	Manganese	0.21		0.75		0.27			20	1	
MOA01	TP-02	01/26/2010	Total Dissolved Solids	1300		5820		1400			29	0	
MOA01	TP-02	01/26/2010	Uranium	1.1		26		1.5			33	0	
MOA01	TP-02	01/26/2010	Uranium	1		26		1.5			33	0	

Analyte concentrations presented in blue text represent the historical value exceeded by the concentration presented in red, which is associated with this current sampling event.

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 Tentatively identified compound is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and the contract-required detection limit. Organic: Analyte also found in MB.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative.
- H Holding time expired; value suspect.
- I Increased detection limit due to required dilution.
- J Estimated.

Appendix B. Minimums and Maximums Report (continued)

N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound.
P > 25% difference in detected pesticide or Aroclor concentrations between two columns.
U Analytical result below detection limit.
W Postdigestion 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 three 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.		

Appendix C.
Water Quality Data

Appendix C. Water Quality Data

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers		Detection Limit	Uncertainty
											Data	QA		
Ammonia Total as N	mg/L	0201	SL	01/21/2010	0001	0	-	0	0.1	U	#	0.1		
Ammonia Total as N	mg/L	0216	SL	01/26/2010	0001	0.042	-	0.042	80		#	10		
Ammonia Total as N	mg/L	0218	SL	01/26/2010	0001	0.042	-	0.042	0.1	U	#	0.1		
Ammonia Total as N	mg/L	0226	SL	01/21/2010	0001	0	-	0	0.12		#	0.1		
Ammonia Total as N	mg/L	0274	SL	01/27/2010	0001	0.02	-	0.02	2.8		#	0.1		
Ammonia Total as N	mg/L	0401	WL	01/20/2010	0001	18	-	18	310		#	10		
Ammonia Total as N	mg/L	0401	WL	01/20/2010	0002	18	-	18	300		#	10		
Ammonia Total as N	mg/L	0403	WL	01/22/2010	0001	18	-	18	17		#	1		
Ammonia Total as N	mg/L	0404	WL	01/20/2010	0001	18	-	18	330		#	10		
Ammonia Total as N	mg/L	0407	WL	01/22/2010	0001	17	-	17	140		#	10		
Ammonia Total as N	mg/L	0438	WL	01/27/2010	0001	118	-	118	7.7		#	0.5		
Ammonia Total as N	mg/L	0492	WL	01/20/2010	0001	18	-	18	19		#	1		
Ammonia Total as N	mg/L	0537	TS	01/27/2010	0001	0	-	0	6100		#	200		
Ammonia Total as N	mg/L	ATP-2-D	WL	01/27/2010	0001	88	-	88	710		#	20		
Ammonia Total as N	mg/L	ATP-2-S	WL	01/27/2010	0001	38	-	38	500		#	20		
Ammonia Total as N	mg/L	CR1	SL	01/20/2010	0001	0.042	-	0.042	0.1	U	#	0.1		
Ammonia Total as N	mg/L	CR3	SL	01/20/2010	0001	0	-	0	0.7		#	0.1		
Ammonia Total as N	mg/L	CR5	SL	01/21/2010	0001	0	-	0	0.1	U	#	0.1		
Ammonia Total as N	mg/L	TP-02	WL	01/26/2010	0001	30	-	30	0.18		#	0.1		
Ammonia Total as N	mg/L	TP-02	WL	01/26/2010	0002	30	-	30	0.19		#	0.1		
Ammonia Total as N	mg/L	TP-17	WL	01/21/2010	0001	28	-	28	2.2		#	0.1		
Ammonia Total as N	mg/L	TP-19	WL	01/26/2010	0001	29	-	29	3.8		#	0.1		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data	QA					
Dissolved Oxygen	mg/L	0201	SL	01/21/2010	0001	0	-	0	12.23		#		
Dissolved Oxygen	mg/L	0216	SL	01/26/2010	0001	0.042	-	0.042	6.68		#		
Dissolved Oxygen	mg/L	0218	SL	01/26/2010	0001	0.042	-	0.042	13.55		#		
Dissolved Oxygen	mg/L	0226	SL	01/21/2010	0001	0	-	0	11.81		#		
Dissolved Oxygen	mg/L	0274	SL	01/27/2010	0001	0.02	-	0.02	12.62		#		
Dissolved Oxygen	mg/L	0401	WL	01/20/2010	0001	18	-	18	0.75		#		
Dissolved Oxygen	mg/L	0403	WL	01/22/2010	0001	18	-	18	0.51		#		
Dissolved Oxygen	mg/L	0404	WL	01/20/2010	0001	18	-	18	0.84		#		
Dissolved Oxygen	mg/L	0407	WL	01/22/2010	0001	17	-	17	0.65		#		
Dissolved Oxygen	mg/L	0438	WL	01/27/2010	0001	118	-	118	0.47		#		
Dissolved Oxygen	mg/L	0492	WL	01/20/2010	0001	18	-	18	0.76		#		
Dissolved Oxygen	mg/L	0537	TS	01/27/2010	0001	0	-	0	8.57		#		
Dissolved Oxygen	mg/L	ATP-2-D	WL	01/27/2010	0001	88	-	88	0.17		#		
Dissolved Oxygen	mg/L	ATP-2-S	WL	01/27/2010	0001	38	-	38	3.08		#		
Dissolved Oxygen	mg/L	CR1	SL	01/20/2010	0001	0.042	-	0.042	12.97		#		
Dissolved Oxygen	mg/L	CR3	SL	01/20/2010	0001	0	-	0	12.69		#		
Dissolved Oxygen	mg/L	CR5	SL	01/21/2010	0001	0	-	0	13.35		#		
Dissolved Oxygen	mg/L	TP-02	WL	01/26/2010	0001	30	-	30	0.98		#		
Dissolved Oxygen	mg/L	TP-17	WL	01/21/2010	0001	28	-	28	2.7		#		
Dissolved Oxygen	mg/L	TP-19	WL	01/26/2010	0001	29	-	29	0.27		#		
Manganese	mg/L	0201	SL	01/21/2010	0001	0	-	0	0.015		#	0.0002	
Manganese	mg/L	0216	SL	01/26/2010	0001	0.042	-	0.042	2.4		#	0.001	
Manganese	mg/L	0218	SL	01/26/2010	0001	0.042	-	0.042	0.014		#	0.0002	
Manganese	mg/L	0226	SL	01/21/2010	0001	0	-	0	0.019		#	0.0002	
Manganese	mg/L	0274	SL	01/27/2010	0001	0.02	-	0.02	0.072		#	0.0002	
Manganese	mg/L	0401	WL	01/20/2010	0001	18	-	18	2.5		#	0.002	
Manganese	mg/L	0401	WL	01/20/2010	0002	18	-	18	2.4		#	0.002	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
									Lab	Data QA		
Manganese	mg/L	0403	WL	01/22/2010	0001	18	-	18		#	0.001	
Manganese	mg/L	0404	WL	01/20/2010	0001	18	-	18		#	0.002	
Manganese	mg/L	0407	WL	01/22/2010	0001	17	-	17		#	0.001	
Manganese	mg/L	0438	WL	01/27/2010	0001	118	-	118		#	0.001	
Manganese	mg/L	0492	WL	01/20/2010	0001	18	-	18		#	0.001	
Manganese	mg/L	0537	TS	01/27/2010	0001	0	-	0		#	0.005	
Manganese	mg/L	ATP-2-D	WL	01/27/2010	0001	88	-	88		#	0.02	
Manganese	mg/L	ATP-2-S	WL	01/27/2010	0001	38	-	38		#	0.002	
Manganese	mg/L	CR1	SL	01/20/2010	0001	0.042	-	0.042		#	0.0002	
Manganese	mg/L	CR3	SL	01/20/2010	0001	0	-	0		#	0.0002	
Manganese	mg/L	CR5	SL	01/21/2010	0001	0	-	0	U	#	0.01	
Manganese	mg/L	TP-02	WL	01/26/2010	0001	30	-	30		#	0.0002	
Manganese	mg/L	TP-02	WL	01/26/2010	0002	30	-	30		#	0.0002	
Manganese	mg/L	TP-17	WL	01/21/2010	0001	28	-	28		#	0.0002	
Manganese	mg/L	TP-19	WL	01/26/2010	0001	29	-	29	B	#	0.01	
Nitrate as Nitrogen	mg/L	0404	WL	01/20/2010	0001	18	-	18		R #	2	
Nitrate as Nitrogen	mg/L	0438	WL	01/27/2010	0001	118	-	118		R #	2	
Nitrate as Nitrogen	mg/L	0537	TS	01/27/2010	0001	0	-	0		R #	10	
Nitrate as Nitrogen	mg/L	ATP-2-D	WL	01/27/2010	0001	88	-	88	U	R #	20	
Nitrate as Nitrogen	mg/L	ATP-2-S	WL	01/27/2010	0001	38	-	38	U	R #	4	
Nitrite as Nitrogen	mg/L	0404	WL	01/20/2010	0001	18	-	18	U	R #	1	
Nitrite as Nitrogen	mg/L	0438	WL	01/27/2010	0001	118	-	118	U	R #	1	
Nitrite as Nitrogen	mg/L	0537	TS	01/27/2010	0001	0	-	0	U	R #	5	
Nitrite as Nitrogen	mg/L	ATP-2-D	WL	01/27/2010	0001	88	-	88	U	R #	10	
Nitrite as Nitrogen	mg/L	ATP-2-S	WL	01/27/2010	0001	38	-	38	U	R #	2	
Oxidation Reduction Potential	mV	0201	SL	01/21/2010	0001	0	-	0		#		
Oxidation Reduction Potential	mV	0216	SL	01/26/2010	0001	0.042	-	0.042		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Oxidation Reduction Potential	mV	0218	SL	01/26/2010	0001	0.042	-	0.042	-24.8		#		
Oxidation Reduction Potential	mV	0226	SL	01/21/2010	0001	0	-	0	70.9		#		
Oxidation Reduction Potential	mV	0274	SL	01/27/2010	0001	0.02	-	0.02	31.3		#		
Oxidation Reduction Potential	mV	0401	WL	01/20/2010	0001	18	-	18	79.4		#		
Oxidation Reduction Potential	mV	0403	WL	01/22/2010	0001	18	-	18	70		#		
Oxidation Reduction Potential	mV	0404	WL	01/20/2010	0001	18	-	18	149.4		#		
Oxidation Reduction Potential	mV	0407	WL	01/22/2010	0001	17	-	17	119		#		
Oxidation Reduction Potential	mV	0438	WL	01/27/2010	0001	118	-	118	196.8		#		
Oxidation Reduction Potential	mV	0492	WL	01/20/2010	0001	18	-	18	-80.3		#		
Oxidation Reduction Potential	mV	0537	TS	01/27/2010	0001	0	-	0	170.9		#		
Oxidation Reduction Potential	mV	ATP-2-D	WL	01/27/2010	0001	88	-	88	-280		#		
Oxidation Reduction Potential	mV	ATP-2-S	WL	01/27/2010	0001	38	-	38	-147		#		
Oxidation Reduction Potential	mV	CR1	SL	01/20/2010	0001	0.042	-	0.042	191.2		#		
Oxidation Reduction Potential	mV	CR3	SL	01/20/2010	0001	0	-	0	226.7		#		
Oxidation Reduction Potential	mV	CR5	SL	01/21/2010	0001	0	-	0	60.8		#		
Oxidation Reduction Potential	mV	TP-02	WL	01/26/2010	0001	30	-	30	-156.7		#		
Oxidation Reduction Potential	mV	TP-17	WL	01/21/2010	0001	28	-	28	-160.7		#		
Oxidation Reduction Potential	mV	TP-19	WL	01/26/2010	0001	29	-	29	-227.4		#		
pH	s.u.	0201	SL	01/21/2010	0001	0	-	0	8.56		#		
pH	s.u.	0216	SL	01/26/2010	0001	0.042	-	0.042	7.25		#		
pH	s.u.	0218	SL	01/26/2010	0001	0.042	-	0.042	8.43		#		
pH	s.u.	0226	SL	01/21/2010	0001	0	-	0	8.55		#		
pH	s.u.	0274	SL	01/27/2010	0001	0.02	-	0.02	8.2		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Date	ID					Lab	Data	QA		
pH	s.u.	0401	WL	01/20/2010	0001	18	-	18	6.7			#		
pH	s.u.	0403	WL	01/22/2010	0001	18	-	18	6.82			#		
pH	s.u.	0404	WL	01/20/2010	0001	18	-	18	6.73			#		
pH	s.u.	0407	WL	01/22/2010	0001	17	-	17	6.97			#		
pH	s.u.	0438	WL	01/27/2010	0001	118	-	118	6.78			#		
pH	s.u.	0492	WL	01/20/2010	0001	18	-	18	7.05			#		
pH	s.u.	0537	TS	01/27/2010	0001	0	-	0	7.31			#		
pH	s.u.	ATP-2-D	WL	01/27/2010	0001	88	-	88	8.22			#		
pH	s.u.	ATP-2-S	WL	01/27/2010	0001	38	-	38	8.94			#		
pH	s.u.	CR1	SL	01/20/2010	0001	0.042	-	0.042	8.34			#		
pH	s.u.	CR3	SL	01/20/2010	0001	0	-	0	8.36			#		
pH	s.u.	CR5	SL	01/21/2010	0001	0	-	0	6.9			#		
pH	s.u.	TP-02	WL	01/26/2010	0001	30	-	30	7.44			#		
pH	s.u.	TP-17	WL	01/21/2010	0001	28	-	28	7.24			#		
pH	s.u.	TP-19	WL	01/26/2010	0001	29	-	29	6.76			#		
Radium-226	pCi/L	0404	WL	01/20/2010	0001	18	-	18	0.44	U		#	0.44	0.26
Radium-226	pCi/L	0438	WL	01/27/2010	0001	118	-	118	0.46	U		#	0.46	0.29
Radium-226	pCi/L	0537	TS	01/27/2010	0001	0	-	0	13.8			#	0.4	3.7
Radium-226	pCi/L	ATP-2-D	WL	01/27/2010	0001	88	-	88	1.08			#	0.42	0.52
Radium-226	pCi/L	ATP-2-S	WL	01/27/2010	0001	38	-	38	0.54	U		#	0.54	0.33
Selenium	mg/L	0401	WL	01/20/2010	0001	18	-	18	0.01	E	J	#	0.00013	
Selenium	mg/L	0401	WL	01/20/2010	0002	18	-	18	0.0097		J	#	0.00013	
Selenium	mg/L	0404	WL	01/20/2010	0001	18	-	18	0.015		J	#	0.00013	
Selenium	mg/L	0438	WL	01/27/2010	0001	118	-	118	0.00058		J	#	0.00012	
Selenium	mg/L	0537	TS	01/27/2010	0001	0	-	0	0.91		J	#	0.00012	
Selenium	mg/L	ATP-2-D	WL	01/27/2010	0001	88	-	88	0.0046		J	#	0.00012	
Selenium	mg/L	ATP-2-S	WL	01/27/2010	0001	38	-	38	0.0031		J	#	0.00012	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Selenium	mg/L	TP-17	WL	01/21/2010	0001	28	-	28	0.00052	J	#	0.00013		
Selenium	mg/L	TP-19	WL	01/26/2010	0001	29	-	29	0.0036	J	#	0.00012		
Specific Conductance	µmhos/cm	0201	SL	01/21/2010	0001	0	-	0	1400		#			
Specific Conductance	µmhos/cm	0216	SL	01/26/2010	0001	0.042	-	0.042	5846		#			
Specific Conductance	µmhos/cm	0218	SL	01/26/2010	0001	0.042	-	0.042	1309		#			
Specific Conductance	µmhos/cm	0226	SL	01/21/2010	0001	0	-	0	3578		#			
Specific Conductance	µmhos/cm	0274	SL	01/27/2010	0001	0.02	-	0.02	3785		#			
Specific Conductance	µmhos/cm	0401	WL	01/20/2010	0001	18	-	18	16235		#			
Specific Conductance	µmhos/cm	0403	WL	01/22/2010	0001	18	-	18	4897		#			
Specific Conductance	µmhos/cm	0404	WL	01/20/2010	0001	18	-	18	17062		#			
Specific Conductance	µmhos/cm	0407	WL	01/22/2010	0001	17	-	17	6100		#			
Specific Conductance	µmhos/cm	0438	WL	01/27/2010	0001	118	-	118	8830		#			
Specific Conductance	µmhos/cm	0492	WL	01/20/2010	0001	18	-	18	3885		#			
Specific Conductance	µmhos/cm	0537	TS	01/27/2010	0001	0	-	0	46381		#			
Specific Conductance	µmhos/cm	ATP-2-D	WL	01/27/2010	0001	88	-	88	132621		#			
Specific Conductance	µmhos/cm	ATP-2-S	WL	01/27/2010	0001	38	-	38	19005		#			
Specific Conductance	µmhos/cm	CR1	SL	01/20/2010	0001	0.042	-	0.042	1253		#			
Specific Conductance	µmhos/cm	CR3	SL	01/20/2010	0001	0	-	0	1284		#			
Specific Conductance	µmhos/cm	CR5	SL	01/21/2010	0001	0	-	0	1267		#			
Specific Conductance	µmhos/cm	TP-02	WL	01/26/2010	0001	30	-	30	2227		#			
Specific Conductance	µmhos/cm	TP-17	WL	01/21/2010	0001	28	-	28	111198		#			
Specific Conductance	µmhos/cm	TP-19	WL	01/26/2010	0001	29	-	29	139903		#			
Temperature	C	0201	SL	01/21/2010	0001	0	-	0	0.85		#			

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data	QA					
Temperature	C	0216	SL	01/26/2010	0001	0.042	-	0.042	5.62		#		
Temperature	C	0218	SL	01/26/2010	0001	0.042	-	0.042	0.22		#		
Temperature	C	0226	SL	01/21/2010	0001	0	-	0	1		#		
Temperature	C	0274	SL	01/27/2010	0001	0.02	-	0.02	5.45		#		
Temperature	C	0401	WL	01/20/2010	0001	18	-	18	13.35		#		
Temperature	C	0403	WL	01/22/2010	0001	18	-	18	13.87		#		
Temperature	C	0404	WL	01/20/2010	0001	18	-	18	13.8		#		
Temperature	C	0407	WL	01/22/2010	0001	17	-	17	13.16		#		
Temperature	C	0438	WL	01/27/2010	0001	118	-	118	14.09		#		
Temperature	C	0492	WL	01/20/2010	0001	18	-	18	14.01		#		
Temperature	C	0537	TS	01/27/2010	0001	0	-	0	4.95		#		
Temperature	C	ATP-2-D	WL	01/27/2010	0001	88	-	88	13.48		#		
Temperature	C	ATP-2-S	WL	01/27/2010	0001	38	-	38	13.66		#		
Temperature	C	CR1	SL	01/20/2010	0001	0.042	-	0.042	0.19		#		
Temperature	C	CR3	SL	01/20/2010	0001	0	-	0	3.45		#		
Temperature	C	CR5	SL	01/21/2010	0001	0	-	0	1.51		#		
Temperature	C	TP-02	WL	01/26/2010	0001	30	-	30	13.99		#		
Temperature	C	TP-17	WL	01/21/2010	0001	28	-	28	11.83		#		
Temperature	C	TP-19	WL	01/26/2010	0001	29	-	29	12.69		#		
Total Dissolved Solids	mg/L	0201	SL	01/21/2010	0001	0	-	0	750		#	20	
Total Dissolved Solids	mg/L	0216	SL	01/26/2010	0001	0.042	-	0.042	5000		#	80	
Total Dissolved Solids	mg/L	0218	SL	01/26/2010	0001	0.042	-	0.042	740		#	40	
Total Dissolved Solids	mg/L	0226	SL	01/21/2010	0001	0	-	0	760		#	20	
Total Dissolved Solids	mg/L	0274	SL	01/27/2010	0001	0.02	-	0.02	890		#	40	
Total Dissolved Solids	mg/L	0401	WL	01/20/2010	0001	18	-	18	14000		#	200	
Total Dissolved Solids	mg/L	0401	WL	01/20/2010	0002	18	-	18	14000		#	200	
Total Dissolved Solids	mg/L	0403	WL	01/22/2010	0001	18	-	18	3900		#	80	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data		QA			
Total Dissolved Solids	mg/L	0404	WL	01/20/2010	0001	18	- 18	14000		#	200	
Total Dissolved Solids	mg/L	0407	WL	01/22/2010	0001	17	- 17	4200		#	80	
Total Dissolved Solids	mg/L	0438	WL	01/27/2010	0001	118	- 118	7100		#	200	
Total Dissolved Solids	mg/L	0492	WL	01/20/2010	0001	18	- 18	2900		#	80	
Total Dissolved Solids	mg/L	0537	TS	01/27/2010	0001	0	- 0	36000		#	1000	
Total Dissolved Solids	mg/L	ATP-2-D	WL	01/27/2010	0001	88	- 88	86000		#	2000	
Total Dissolved Solids	mg/L	ATP-2-S	WL	01/27/2010	0001	38	- 38	13000		#	400	
Total Dissolved Solids	mg/L	CR1	SL	01/20/2010	0001	0.042	- 0.042	750		#	40	
Total Dissolved Solids	mg/L	CR3	SL	01/20/2010	0001	0	- 0	780		#	40	
Total Dissolved Solids	mg/L	CR5	SL	01/21/2010	0001	0	- 0	780		#	2000	
Total Dissolved Solids	mg/L	TP-02	WL	01/26/2010	0001	30	- 30	1300		#	40	
Total Dissolved Solids	mg/L	TP-02	WL	01/26/2010	0002	30	- 30	1300		#	40	
Total Dissolved Solids	mg/L	TP-17	WL	01/21/2010	0001	28	- 28	83000		#	40	
Total Dissolved Solids	mg/L	TP-19	WL	01/26/2010	0001	29	- 29	100000		#	2000	
Total Kjeldahl Nitrogen	mg/L	0404	WL	01/20/2010	0001	18	- 18	1000	Q	0	100	
Total Kjeldahl Nitrogen	mg/L	0438	WL	01/27/2010	0001	118	- 118	1.6		0	1	
Total Kjeldahl Nitrogen	mg/L	0537	TS	01/27/2010	0001	0	- 0	560	Q	0	100	
Total Kjeldahl Nitrogen	mg/L	ATP-2-D	WL	01/27/2010	0001	88	- 88	530	Q	0	100	
Total Kjeldahl Nitrogen	mg/L	ATP-2-S	WL	01/27/2010	0001	38	- 38	64	Q	0	10	
Turbidity	NTU	0201	SL	01/21/2010	0001	0	- 0	13.3		#		
Turbidity	NTU	0216	SL	01/26/2010	0001	0.042	- 0.042	27.6		#		
Turbidity	NTU	0218	SL	01/26/2010	0001	0.042	- 0.042	13.4		#		
Turbidity	NTU	0226	SL	01/21/2010	0001	0	- 0	15.6		#		
Turbidity	NTU	0274	SL	01/27/2010	0001	0.02	- 0.02	49.8		#		
Turbidity	NTU	0401	WL	01/20/2010	0001	18	- 18	1.41		#		
Turbidity	NTU	0403	WL	01/22/2010	0001	18	- 18	2.02		#		
Turbidity	NTU	0404	WL	01/20/2010	0001	18	- 18	0.74		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data	QA					
Turbidity	NTU	0407	WL	01/22/2010	0001	17	-	17	1.97		#		
Turbidity	NTU	0438	WL	01/27/2010	0001	118	-	118	1.55		#		
Turbidity	NTU	0492	WL	01/20/2010	0001	18	-	18	1.76		#		
Turbidity	NTU	0537	TS	01/27/2010	0001	0	-	0	5.65		#		
Turbidity	NTU	ATP-2-D	WL	01/27/2010	0001	88	-	88	8.64		#		
Turbidity	NTU	ATP-2-S	WL	01/27/2010	0001	38	-	38	2.29		#		
Turbidity	NTU	CR1	SL	01/20/2010	0001	0.042	-	0.042	8.35		#		
Turbidity	NTU	CR3	SL	01/20/2010	0001	0	-	0	9.35		#		
Turbidity	NTU	CR5	SL	01/21/2010	0001	0	-	0	11.6		#		
Turbidity	NTU	TP-02	WL	01/26/2010	0001	30	-	30	4.91		#		
Turbidity	NTU	TP-17	WL	01/21/2010	0001	28	-	28	20.8		#		
Turbidity	NTU	TP-19	WL	01/26/2010	0001	29	-	29	5.87		#		
Uranium	mg/L	0201	SL	01/21/2010	0001	0	-	0	0.0056		#	2.4E-006	
Uranium	mg/L	0216	SL	01/26/2010	0001	0.042	-	0.042	1		#	8.8E-005	
Uranium	mg/L	0218	SL	01/26/2010	0001	0.042	-	0.042	0.0078		#	1.8E-006	
Uranium	mg/L	0226	SL	01/21/2010	0001	0	-	0	0.0091		#	2.4E-006	
Uranium	mg/L	0274	SL	01/27/2010	0001	0.02	-	0.02	0.043		#	8.8E-006	
Uranium	mg/L	0401	WL	01/20/2010	0001	18	-	18	2.3		#	0.00012	
Uranium	mg/L	0401	WL	01/20/2010	0002	18	-	18	2.2		#	0.00012	
Uranium	mg/L	0403	WL	01/22/2010	0001	18	-	18	0.82		#	0.00012	
Uranium	mg/L	0404	WL	01/20/2010	0001	18	-	18	2.1		#	0.00012	
Uranium	mg/L	0407	WL	01/22/2010	0001	17	-	17	0.89		#	0.00012	
Uranium	mg/L	0438	WL	01/27/2010	0001	118	-	118	1.6		#	8.8E-005	
Uranium	mg/L	0492	WL	01/20/2010	0001	18	-	18	0.42		#	0.00012	
Uranium	mg/L	0537	TS	01/27/2010	0001	0	-	0	2.6		#	8.8E-005	
Uranium	mg/L	ATP-2-D	WL	01/27/2010	0001	88	-	88	0.012		#	1.8E-006	
Uranium	mg/L	ATP-2-S	WL	01/27/2010	0001	38	-	38	0.0099		#	1.8E-006	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 4/7/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Uranium	mg/L	CR1	SL	01/20/2010	0001	0.042	-	0.042	0.0052		#	2.4E-006	
Uranium	mg/L	CR3	SL	01/20/2010	0001	0	-	0	0.021		#	2.4E-006	
Uranium	mg/L	CR5	SL	01/21/2010	0001	0	-	0	0.0068		#	2.4E-006	
Uranium	mg/L	TP-02	WL	01/26/2010	0001	30	-	30	1		#	8.8E-005	
Uranium	mg/L	TP-02	WL	01/26/2010	0002	30	-	30	1.1		#	8.8E-005	
Uranium	mg/L	TP-17	WL	01/21/2010	0001	28	-	28	0.028		#	2.4E-006	
Uranium	mg/L	TP-19	WL	01/26/2010	0001	29	-	29	0.00017	B	#	8.8E-006	

Ft BLS = feet below land surface; C = centigrade; µmhos/cm = micromhos per centimeter; mV = millivolt; NTU = nephelometric turbidity unit; SL = surface location; S.U. = standard unit; TS = treatment system; WL = well

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 Tentatively identified compound is a suspected aldol-condensation product.
- B Inorganic: Result is between the instrument detection limit and contract-required detection limit. Organic: Analyte also found in method blank.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference; see case narrative.
- 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.
- P > 25% difference in detected pesticide or Aroclor concentrations between two columns.
- U Analytical result below detection limit.
- W Postdigestion 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 three 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.

Appendix D.
Water Level Data

Appendix D. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site
REPORT DATE: 4/7/2010

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0401	O	3969.6	01/20/2010		15.6	3954	
0403	O	3968.95	01/22/2010		15.63	3953.32	
0404	O	3968.3	01/20/2010		14.01	3954.29	
0407	O	3969.09	01/22/2010		16	3953.09	
0438	O	4054.22	01/27/2010		97.15	3957.07	
0492		3967.64	01/20/2010		14.74	3952.9	
ATP-2-D	O	3967.05	01/27/2010		15.1	3951.95	
ATP-2-S	O	3967.04	01/27/2010		12.43	3954.61	
TP-02	O	3975.55	01/26/2010		13.99	3961.56	
TP-17	D	3963.69	01/21/2010		10.82	3952.87	
TP-19	D	3962.17	01/26/2010		10.04	3952.13	

Flow Codes: B = background; C = cross gradient; D = downgradient; O = on site; U = upgradient
 Water Level Flags: D = dry
 Ft = feet

Attachment 1.
January 2010 Routine Sampling Trip Report

Attachment 1.
January 2010 Routine Sampling Event Trip Report



Date: February 05, 2010
To: Ken Pill
From: James Ritchey
Subject: January 2010 Routine Sampling Trip Report

Site: Moab, Utah

Date of Sampling Event: January 20-27, 2010

Team Members: E. Glowiak, T. Meadows, J. Ritchey

RIN Number Assigned: All samples were assigned to RIN 1001040

Sample Shipment: The coolers were shipped overnight UPS to ALS Laboratory Group, Inc., from Moab, Utah, on January 22 and January 28, 2009 (Tracking Nos. 4491931375 and 0193017789). The shipment on January 28 was scheduled to depart on January 27, but weather conditions delayed the departure by a day.

Number of Locations Sampled: The January routine sampling event was conducted during base-flow conditions of the Colorado River. Eleven monitor wells and eight surface water locations were sampled during the sampling event. Also, one sample was collected from the wick pond. Including two duplicates, a total of 22 samples were collected.

Locations Not Sampled/Reason: Well 0439 was not sampled due to complications with the bladder pump controller. Surface water location 0228 was not collected as the river was frozen over, and no place could be found to safely acquire a sample. Also, the location 0548 sample was not collected because the evaporation pond was frozen over, and a grab sample could not be collected.

Field Variance: Interim action monitoring wells 0401, 0403, 0404, 0407, and 0537 and surface water location 0216 and 0274 were added to the routine sampling list for the month of January. Samples from locations 0404, 0438, 0537, ATP-2-S, ATP-2-D were submitted for analyses of radium-226, TKN, NO₃-N, and NO₂-N. However, due to snow and grounding of postal flights, the NO₃-N and NO₂-N samples arrived at the laboratory after the required holding time of 48 hours. Samples from 0404 were split between the two shipments. The samples for routine analyses (uranium, manganese, TDS, and NH₃-N) were shipped on January 22, and the additional analyses were shipped on January 28.

Attachment 1. January 2010 Routine Sampling Event Trip Report (continued)

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2000	0401	Duplicate from 18 ft bgs	Ground Water	JAN004
2001	TP-02	Duplicate from 30 ft bgs	Ground Water	JAN016

ft bgs = feet below ground surface; ID = identification

Location-Specific Information: Sample 0438 was sampled using a dedicated bladder pump. All other remaining monitor wells were sampled using a peristaltic pump and dedicated tubing. A grab sample was collected from the wick sump (0537). Each surface water sample was collected using a peristaltic pump and dedicated tubing. The table below provides additional information:

Sample ID	Location	Date	Sample Depth	Comments
JAN001	0404	1/20/2010	18 ft bgs	Se, TKN, Ra-226, NO ₃ -N, and NO ₂ -N analysis
JAN002	0492	1/20/2010	18 ft bgs	Located at southern end of well field
JAN003	0401	1/20/2010	18 ft bgs	Duplicate collected
JAN005	CR-1	1/20/2010	<0.5 ft bws	Taken just off bank after breaking through ice, no flow noticeable at sample location
JAN006	CR-3	1/20/2010	Surface	Sample collected just off bank, river was frozen over, no flow noticeable at river bank
JAN007	TP-17	1/21/2010	28 ft bgs	Unidentifiable odor, dark color, little sulfur odor, Se
JAN008	0226	1/21/2010	Surface	Grab sample, no flow noticeable, frozen over, sample collected from surface
JAN009	0201	1/21/2010	Surface	Frozen over, grab sample little plant debris, no flow noticeable
JAN010	CR-5	1/21/2010	Surface	Frozen over, sample off of river bank, grab sample, no river flow noticeable
JAN011	0403	1/22/2010	18 ft bgs	Located at northern end of CF1
JAN012	0407	1/22/2010	17 ft bgs	Located at southern end of CF1
JAN013	TP-19	1/26/2010	29 ft bgs	Sulfur odor, Se
JAN014	TP-02	1/26/2010	30 ft bgs	Duplicate collected
JAN015	0218	1/26/2010	<0.5 ft bws	Sample collected 12" from bank, under ice
JAN017	0216	1/26/2010	< 0.5 ft bws	Off of south bank 12", depth 1-2", low flow through channel
JAN018	0438	1/27/2010	118 ft bgs	Top of casing corroded, particles collected in/on well cap, Se, Ra-226, TKN
JAN020	ATP-2-S	1/27/2010	38 ft bgs	Type II well, Ra-226, TKN, NO ₃ -N, and NO ₂ -N
JAN021	ATP-2-D	1/27/2010	88 ft bgs	Ra-226, TKN, NO ₃ -N, and NO ₂ -N
JAN022	0274	1/27/2010	<0.2 ft bws	2" deep, channel is flowing through to river
JAN023	0537	1/27/2010	Surface	Sample was in refrigerator before parameters, Se, Ra-226, TKN, NO ₃ -N, and NO ₂ -N

ft bws = feet below water surface; ft bgs = feet below ground surface; NO₃-N = nitrate as nitrogen ; NO₂-N nitrite as nitrogen; Ra-226 = Radium 226; Se = selenium; TKN = Total Kjeldahl Nitrogen

Attachment 1.
January 2010 Routine Sampling Event Trip Report (continued)



Surface Water Location CR-1



Surface Water Location 0201

Attachment 1.
January 2010 Routine Sampling Event Trip Report (continued)



Surface Water Location CR-5



Surface Water Location 0218

Attachment 1.
January 2010 Routine Sampling Event Trip Report (continued)



Surface Water Location 0216



Surface Water Location 0226

Attachment 1.
January 2010 Routine Sampling Event Trip Report (continued)



Surface Water Location CR-3



Surface Water Location 0274

Attachment 1.
January 2010 Routine Sampling Event Trip Report (continued)

Water Level Measurements: Water level data are provided in the table below. These data represent depth to water (feet below top of casing) measurements.

Well No.	Date	Time	Depth to Water (ft btoc)
0401	1/20/2010	11:13	15.60
0403	1/22/2010	09:00	15.63
0404	1/20/2010	10:01	14.01
0407	1/22/2010	08:43	16.00
0438	1/27/2010	09:35	97.15
0439	1/27/2010	10:48	98.40
0492	1/20/2010	10:41	14.74
ATP-2-S	1/27/2010	13:00	12.43
ATP-2-D	1/27/2010	13:13	15.10
TP-02	1/26/2010	10:20	20.98
TP-17	1/21/2010	10:29	10.82
TP-19	1/26/2010	08:36	10.04

ft btoc = feet below top of casing

Well Inspection Summary: A well inspection was not conducted.

Equipment: The QED MP10 bladder pump controller failed to operate properly during the sampling of well 0439. Further investigation of the controller will be performed outside the control area to assess condition prior to further action.

Regulatory: None.

Site Issues: According to the USGS Cisco gauging station (No. 09180500), the mean daily Colorado River flow data during this sampling event were not collected due to ice present at the measurement point.

Date	Daily Mean Flow (cfs)
01/20/2010	Ice
01/21/2010	Ice
01/22/2010	Ice
01/23/2010	Ice
01/24/2010	Ice
01/25/2010	Ice
01/26/2010	Ice
01/27/2010	Ice

cfs = cubic feet per second

Corrective Action Required/Taken: None