

Office of Environmental Management – Grand Junction



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

July 2010



U.S. Department
of Energy

Office of Environmental Management

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Routine Ground Water and
Surface Water Sampling Event**

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

Revision 0

Review and Approval

KWR

7/26/10

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Date

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8/3/10

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Date

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Acronyms and Abbreviations

°C	degrees centigrade
CCB	continuing calibration blank
cfs	cubic feet per second
COC	chain of custody
EB	equipment blank
EDD	electronic data deliverable
EPA	U.S. Environment Protection Agency
ICB	initial calibration blank
ICP	inductively coupled plasma
IDL	instrument detection limit
LCS	laboratory control samples
MB	method blank
MDL	method detection limit
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
UMTRA	Uranium Mill Tailings Remedial Action
USGS	U.S. Geological Survey
VDP	validation data package

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 April 2010 routine sampling event.

1.1 Summary Criteria

Sampling Period: April 20 through 22, 2010

The purpose of this sampling was to collect ground water and surface water samples from the standard routine event sampling locations to evaluate the overall water quality under Colorado River base-flow conditions. In addition to the standard routine event sampling locations, a sample of the tailings pore water discharging from an exposed wick was collected for analysis. Also, samples were collected from evaporation pond locations (0547 and 0548) and a recently installed monitoring well located off the side of the tailings pile (0453). All sampling locations are shown on Figure 1. The State of Utah Department of Environmental Quality was notified of this sampling event on April 20, 2010.

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 April 2010 in some instances increased compared to the concentrations measured during the previous routine sampling event completed in January 2010, especially in areas of the site influenced by the high river stage. 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)
Uranium	0.044	0401 (2.3), 0404 (2.2), 0438 (1.6), 0439 (0.79), 0492 (1.4), TP-02 (1.2)

mg/L = milligrams per liter

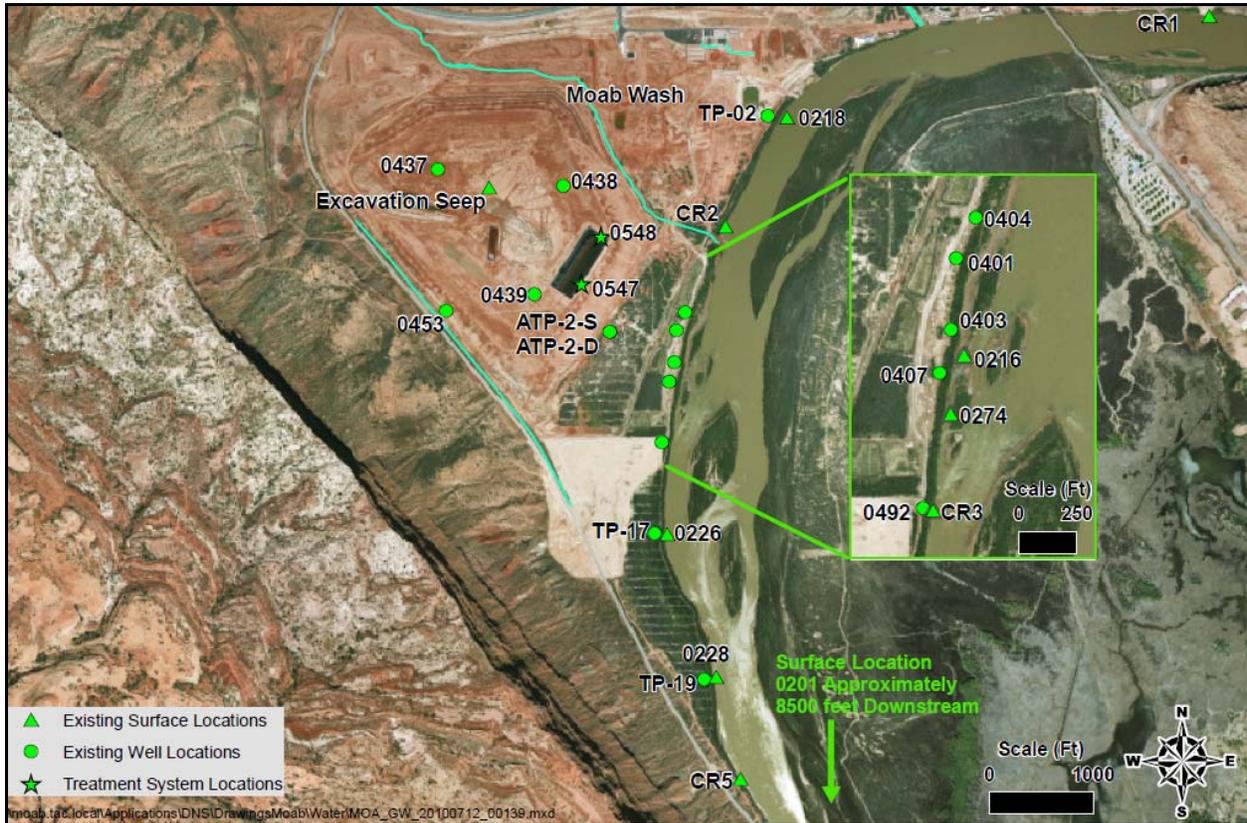


Figure 1. Routine Ground Water and Surface Water Sampling Locations (may include locations not sampled)

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 in surface water locations at elevated concentrations, primarily in isolated pools or slow-moving backwater areas during periods of low river stage adjacent to and just downstream from the tailings. However, the results from a previous high river stage sampling event in June 2009 indicate that the backwater areas are indistinguishable from background concentrations in the main channel of the Colorado River.

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, all samples were below this ground water standard.

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	4/21/10	0.0022	0.044
0226	4/20/10	0.0026	
0228	4/20/10	0.0026	
CR1	4/21/10	0.0023	
CR2	4/22/10	0.0025	
CR3	4/20/10	0.0025	
CR5	4/21/10	0.0023	

Loc = Location

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 ammonia concentrations in all surface water samples collected during the April 2010 sampling event did not exceed the acute or chronic criteria.

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	4/21/10	13.4	7.89	0.26	6.77	2.80
0226	4/20/10	14.0	8.20	0.1	3.83	1.79
0228	4/20/10	16.0	7.98	0.1	5.62	2.21
CR1	4/21/10	13.6	7.39	0.1	15.4	4.73
CR2	4/22/10	13.8	7.29	0.1	17.5	5.08
CR3	4/20/10	14.3	8.24	0.1	3.15	1.79
CR5	4/21/10	13.4	8.00	0.1	5.62	2.43

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 April 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. No data were rejected (flagged as “R”) as a result of this validation process. 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 April 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, total dissolved solids [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 90 mg/L over the past 2 years.

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 April 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.

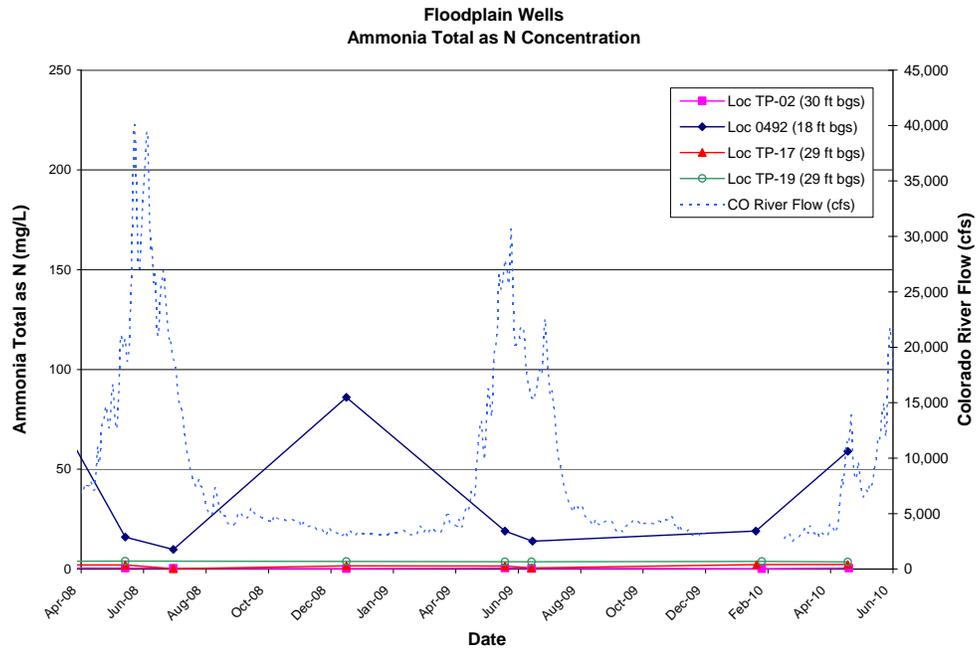


Figure 2. Floodplain Wells Time Versus Ammonia Total (as N) Concentration Plot

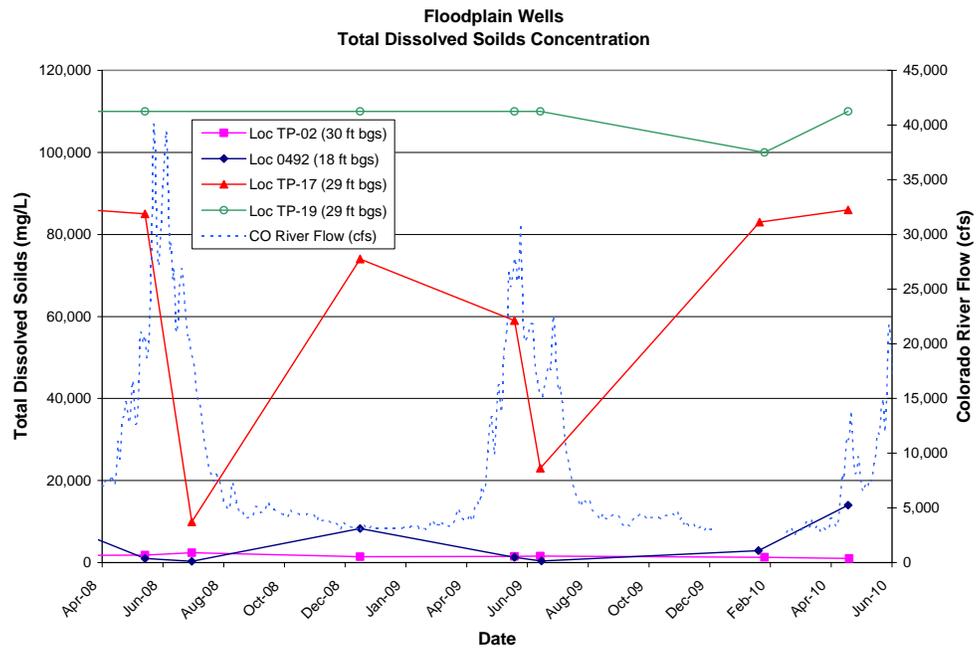


Figure 3. Floodplain Wells Time Versus TDS Concentration Plot

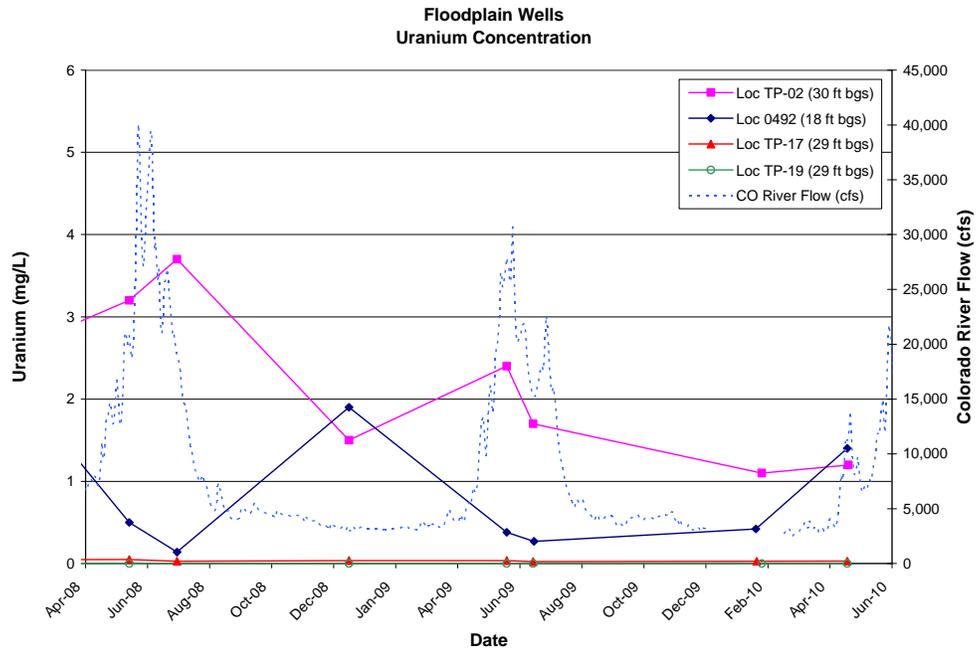


Figure 4. Floodplain Wells Time Versus Uranium Concentration Plot

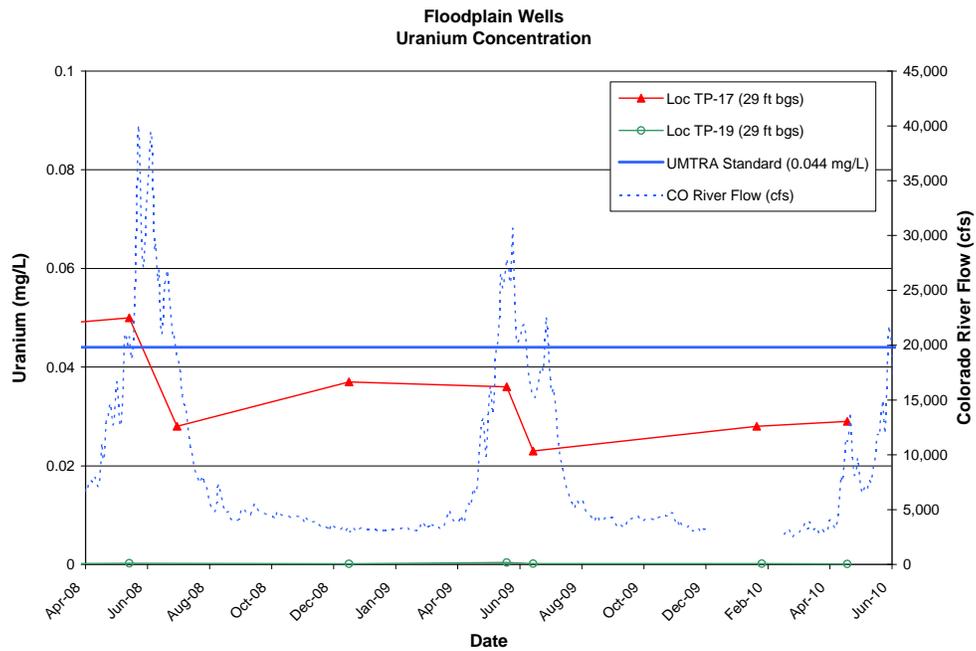


Figure 5. Floodplain Wells TP-17 and TP-19 Uranium Concentration Comparison to the UMTRA Standard

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 it is located with the excavation area and was not accessible. The samples collected from wells 0438 and 0439 in April 2010 showed ammonia concentrations that were within their historical ranges 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.

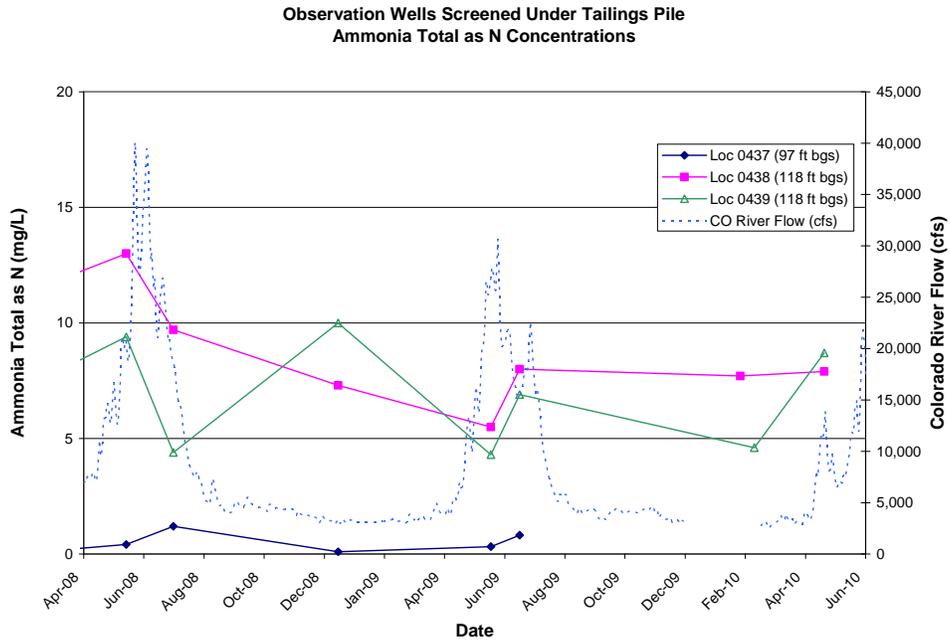


Figure 6. Tailings Pile Wells Time Versus Ammonia Total (as N) Concentration Plot

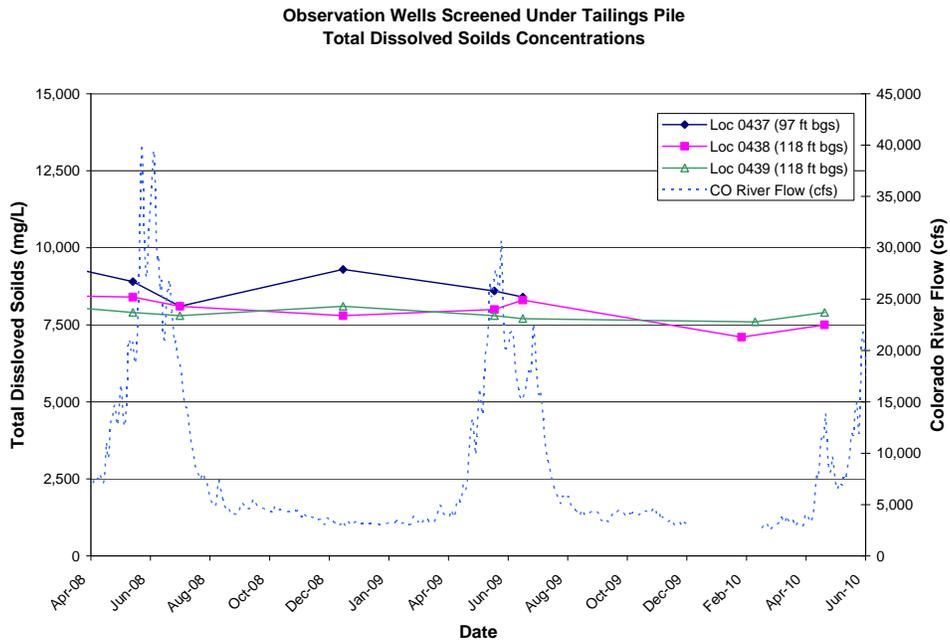


Figure 7. Tailings Pile Wells Time Versus TDS Concentration Plot

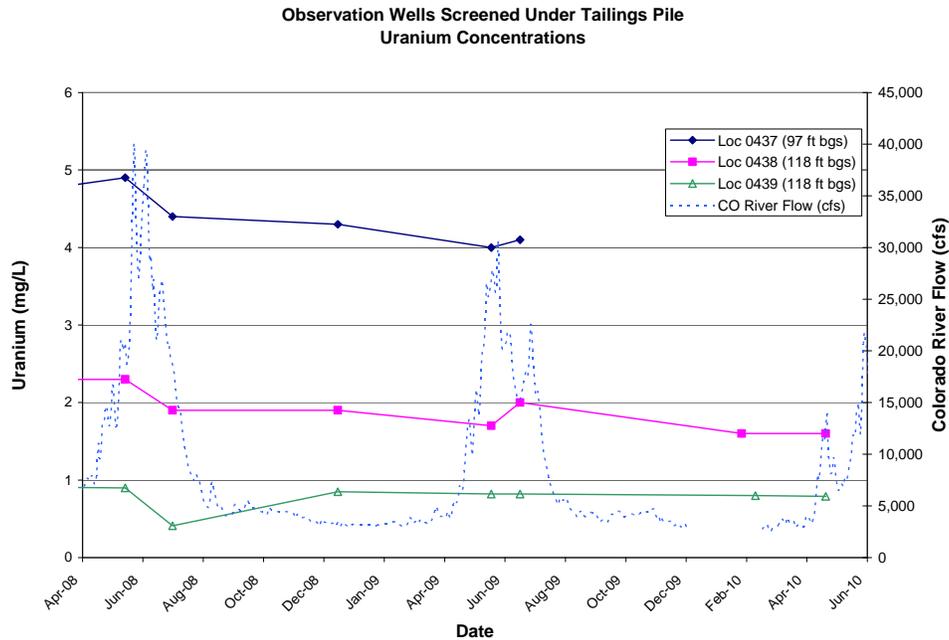


Figure 8. Tailings Pile Wells Time Versus Uranium Concentration Plot

Excavation Seep Sample

A sample was collected of the tailings pore water discharging from an exposed wick on April 22, 2010. This is the first time a sample was collected of the tailings pore water from a location other than the wick system sump, and it is representative of the water that drained into the excavation and was eventually transferred into the evaporation pond starting in March 2010. The sample location is shown on Figure 1, and a photo taken while this sample was collected is provided in the attached Trip Report. A summary of the analytical results associated with this sample is provided in Table 4.

Table 4. Excavation Seep Sample Analytical Results

Analyte	Concentration
Alkalinity, Bicarbonate (As CaCO ₃)	5 mg/L ^a
Alkalinity, Carbonate (As CaCO ₃)	5 mg/L ^a
Alkalinity, Total (As CaCO ₃)	5 mg/L ^a
Ammonia Total as N	10,000 mg/L
Calcium	400 mg/L
Chloride	7,700 mg/L
Dissolved Oxygen	3.65
Magnesium	11,000 mg/L
Manganese	430 mg/L
Oxidation Reduction Potential	355 mV
pH	2.71
Potassium	1,200 mg/L
Radium-226	57 pCi/L

Table 4. Excavation Seep Sample Analytical Results (continued)

Analyte	Concentration
Selenium	3.9
Sodium	22,000 mg/L
Specific Conductance	145,589 µmhos/cm
Sulfate	190,000 mg/L
Temperature	20.66 °C
Total Dissolved Solids	260,000 mg/L
Uranium	8.9 mg/L

^aConcentration equal to analyte detection limit

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.

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. 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 three locations with a total of six anomalous data points. Surface water location CR-2 had historic minimum results for manganese and TDS, the evaporation pond inlet (location 0547) had historic maximum result for manganese, and the water stored in the evaporation pond (location 0548) had historic maximum results for manganese and selenium (which included a duplicate). This was due to pumping of tailings fluids to the evaporation pond.

According to the USGS Cisco gauging station, the mean daily Colorado River flows ranged from 10,900 to 12,100 cubic feet per second (cfs) during this sampling event, indicating the beginning of spring runoff.

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

Report Identification No. (RIN): 1004045
 Sample Event: April 2010 IA Well Field Monthly Routine Sampling
 Site(s): Moab, Utah
 Laboratory: ALS Laboratory Group, Fort Collins, Colorado
 Sample Data Group (SDG) No.: 1004249
 Analysis: Inorganics, Metals, and Radium-226
 Validator: Rachel Cowan
 Review Date: July 5, 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, and 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.

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
Calcium	MET-A-020	SW-846 3005A	SW-846 6010B
Chloride	MIS-A-039	SW-846 9056	SW-846 9056
Magnesium	MET-A-020	SW-846 3005A	SW-846 6010B
Manganese	G17	SW-846 3005A	SW-846 6010B
Potassium	MET-A-020	SW-846 3005A	SW-846 6010B
Radium-226	ASP-A-016	EPA 903.1	EPA 903.1
Sodium	MET-A-020	SW-846 3005A	SW-846 6010B
Selenium	G14	SW-846 3005A	SW-846 6020A
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
TDS	WIC-A-033	EPA 160.1	EPA 160.1
Uranium	G1	SW-846 3005A	SW-846 6020A

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 6. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1004249-2 through -9, -19 through -24	CR-2, 0226, 0228, 0401, 0404, 0547, 0438, 0439, CR-5, Excavation Seep, TP-02, TP-17, TP-19, 0548	Ammonia	J	MS1
100424920	Excavation Seep	Chloride	J	RS1
100424920	Excavation Seep	Calcium, Magnesium, Potassium, Sodium	J	LCS1, MS1, RS1, SD1
All 1004249 samples	All 1004249 locations	Manganese	J	LCS1, MS1, SD1
1004249-21 through -24	TP-02, TP-17, TP-19, 0548	Manganese	J	RS1
1004249-21 through -24	TP-02, TP-17, TP-19, 0548	Uranium	J	RS1
1004249-23	TP-19	Uranium	U	B2

Notes: 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 (Nondetects)	Explanation
B2	NA	U	The blank concentration was greater than the instrument detection level, and so associated analyte results less than five times the blank's concentration are qualified (U).
LCS1	J	UJ	A laboratory control sample was not analyzed at the proper frequency.
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.
SD1	J	NA	Serial dilution sample frequency criteria were not met.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received a total of 24 samples for RIN 1004045 in one shipment, which arrived on April 24, 2010 (UPS tracking number 1Z5W1Y510192594050). The sample group 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 and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents, including the COC forms and the sample tickets, had no errors or omissions, except that the time on the COC for sample 1004249-12 was incorrectly labeled compared to the field notebook.

Preservation and Holding Times

SDG 1004249 was received intact in two coolers with the temperatures of 1.8 and 2.8°C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses, except for sample 1004249-20, which had a pH of 3. ALS Laboratory Group adjusted the pH immediately upon receipt to less than 2. All samples were analyzed within the applicable holding times.

Case Narratives

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

MS 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 ammonia samples in RIN 1004045 did not have the appropriate number of MS samples as per method requirements, so ammonia results from samples 1004249-2 through -9 and 1004249-19 through -24 were J-flagged for MS1.

In addition, the native ammonia concentration in the 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 duplicates passed, no ammonia results were “J”-flagged for reason RS1.

Method SW-846 9056, Chloride and Sulfate

The chloride MS sample from SDG 1004249 selected for testing matrix-specific quality control had too high a chloride concentration. As per procedure, the chloride result was not flagged for MS1, but since the MSD failed and there was no chloride field duplicate, the chloride result was flagged for RS1.

Method SW-846 6010B, Calcium, Magnesium, Manganese, Potassium, and Sodium

There were no samples from SDG 1004249 selected for testing matrix-specific quality control samples for calcium, magnesium, manganese, potassium, and sodium. Therefore, there were no MSs for calcium, magnesium, manganese, potassium, or sodium, so all SDG 1004249 calcium, iron, and manganese results were flagged for MS-1. There were no MSDs or field duplicates for calcium, magnesium, potassium, and sodium in SDG 1004249, so these results were also flagged for RS1. Although there were no MSDs for manganese, one of the field duplicate RSs passed for manganese, so only manganese results for 1004249-21 through -24 were flagged for 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 calcium, magnesium, manganese, potassium, sodium, or uranium. As a standard practice, ALS Laboratory Group 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.

Since, there were no calcium, magnesium, manganese, potassium or sodium MSs, the associated

results were flagged for LCS1. The uranium passed requirements, but there was only one LCS for 24 samples, so uranium results from 1004249-21 through -24 were qualified for LCS-1.

Method and Calibration Blanks

MBs are analyzed to assess any contamination that may have occurred during sample preparation. Initial calibration blanks (ICB) and continuing calibration blanks (CCB) 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 (MDL) 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 ICBs and CCBs for all analytes passed requirements.

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 100 times the reporting limit RL. All evaluated SD data were acceptable with the following exceptions.

Method SW-846 6010B, Calcium, Magnesium, Manganese, Potassium, and Sodium

Since no SD samples were selected for calcium, magnesium, manganese, potassium, and sodium, all results for these analytes were “J”-flagged for reason SD1.

EBs

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.

Seven surface water samples were collected using nondedicated equipment. One EB was collected and analyzed, so no results from this location were “J”-qualified for this reason. Ammonia, manganese, and TDS results from the EB were nondetectable. However, the uranium EB result was above its IDL, and was also greater than five times its IDL. All surface water uranium results were manually checked. All surface water uranium results were greater than five times the EB’s uranium concentrations except for 1004249-23 (location TP-19), so this uranium result was qualified “U” for reason B2.

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 May 24, 2010. The contents of the EDD files were manually examined to verify that the sample results accurately reflected the data contained in the sample data package 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 April 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. One EB was collected for the seven surface water samples collected using nondedicated equipment. Two duplicate samples were collected for 24 total samples. There are no established regulatory criteria for the evaluation of field duplicate samples; therefore, Environmental Protection Agency (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 relative percent difference (RPD) and are considered acceptable, except for manganese in duplicate 2010, which had an RPD of ± 133 . Manganese results from 1004249-21 through -24 were 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*, Document Number 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 six anomalous results from three locations associated with this sampling event based on the Minimums and Maximums Report (Appendix B). The location, analyte, type of anomaly, and disposition are listed below.

<u>Loc. No.</u>	<u>Analyte</u>	<u>Type of Anomaly</u>	<u>Disposition</u>
0547	manganese	high	Concentration impacted by the ground water extraction from Configuration 5 well 0815.
0548	manganese	high	Likely impacted by addition of pore water from the wick sump.
0548	selenium	high	Likely impacted by addition of pore water from the wick sump.
0548	selenium	high	Duplicate sample.
CR-2	manganese	low	Ten or less samples collected; still establishing concentration range.
CR-2	TDS	low	Ten or fewer samples collected; still establishing concentration range.

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

Seven samples were collected using nondedicated equipment; as a result, an EB was necessary, and one was collected during this sampling event. The results are presented in Appendix E. One of the analytes, uranium, was detected in the EB, but at a concentration much lower than the RL. Following validation procedure, all uranium results from the seven samples were visually checked to see if the results were less than five times the concentration of uranium in the EB. One of the uranium results was less than five times the concentration of uranium in the EB, so the uranium result from sample 1004249-23 was qualified with a "U."

3.6 Conclusions

Ground water samples were collected from the standard routine sampling event locations in April 2010, prior to the spring runoff peak. Samples were also collected independently from the routine locations, which include samples collected from the evaporation pond and pore water in the excavation (excavation seep). A summary of the analytical results associated with this excavation seep sample are provided in Table 4.

Regarding the standard routine event sampling locations, the analytical data indicate that, in general, the ammonia, TDS, and uranium concentrations are all within historical ranges. The exception is surface water location CR2, which contained historical low TDS and magnesium concentrations.

Ground water samples that exceeded the selenium ground water standard of 0.01 mg/L included well 0404, which is similar to previous events. Samples collected from wells 0410, 0404, 0438, 0439, 0492, and TP-02 exceeded the UMTRA uranium ground water standard of 0.044 mg/L. Each of these locations typically has concentrations above this standard, and no additional locations were added to this list.

This UMTRA uranium ground water was also compared to the surface water locations, and no surface water samples exceeded this limit. Uranium surface water concentrations ranged from 0.0022 to 0.0026 mg/L. Ammonia concentrations measured in surface water samples ranged from 0.1 (the detection limit) to 0.26 mg/L and did not exceed the acute or chronic state of Utah and federal criteria.

Appendix A.
Water Sampling Field Activities Verification

Appendix A. Water Sampling Field Activities Verification

Sampling Event / RIN	April 2010 Routine Event/1004045	Date(s) of Water Sampling	April 20-22, 2010
Date(s) of Verification	July 5, 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	Surface water location 0218 was not sampled due to access problems; instead, a sample was collected from location CR-2. In addition, monitoring wells 0401, 0404, and 0453 were added.
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 21 samples.

Appendix A. Water Sampling Field Activities Verification (continued)

Sampling Event / RIN	April 2010 Routine Event/1004045	Date(s) of Water Sampling	April 20-22, 2010
Date(s) of Verification	July 5, 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?	Yes	One EB was taken for seven samples collected on nondedicated equipment.
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	Sample 1004249-20 (Excavation Seep) had to have its pH adjusted when received by ALS Laboratory Group.
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?	Yes	
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 (continued)

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: PARAGON (Fort Collins, CO)

RIN: 1004045

Comparison: All Historical Data

Report Date: 7/6/2010

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	0201	04/21/2010	Ammonia Total as N	0.26	N		0.22			0.0659	B		22	13
MOA01	0201	04/21/2010	Manganese	0.0026	B	J	0.11		J	0.0036	B		14	1
MOA01	0226	04/20/2010	Manganese	0.0026	B	J	0.53			0.0032	B		7	0
MOA01	0228	04/20/2010	Manganese	0.0017	B	J	0.033			0.0021	B		5	0
MOA01	0492	04/20/2010	Manganese	8.2		J	6.7			0.07			11	0
MOA01	0547	04/22/2010	Manganese	200		J	5.2			2.5		J	28	0
MOA01	0547	04/22/2010	Total Dissolved Solids	31000			30000			8100			55	0
MOA01	0548	04/22/2010	Manganese	170		J	44			2			17	0
MOA01	0548	04/22/2010	Selenium	0.35			0.008			0.0033			8	0
MOA01	0548	04/22/2010	Selenium	0.34			0.008			0.0033			8	0
MOA01	CR2	04/22/2010	Manganese	0.0035	B	J	0.0981			0.0099	B	U	10	4
MOA01	CR2	04/22/2010	Total Dissolved Solids	310			1220			727			5	0
MOA01	CR5	04/21/2010	Manganese	0.002	B	J	0.11			0.0031	B	J	22	7
MOA01	CR5	04/21/2010	Manganese	0.0023	B	J	0.11			0.0031	B	J	22	7
MOA01	TP-02	04/21/2010	Total Dissolved Solids	980			5820			1300			31	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.

Appendix B. Minimums and Maximums Report (continued)

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.
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: 7/6/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers		Detection Limit	Uncertainty
											Data	QA		
Alkalinity, Bicarbonate (As CaCO3)	mg/L	Excavation Seep	SL	04/22/2010	0001	0	-	0	5	U	#	5		
Alkalinity, Carbonate (As CaCO3)	mg/L	Excavation Seep	SL	04/22/2010	0001	0	-	0	5	U	#	5		
Alkalinity, Total (As CaCO3)	mg/L	Excavation Seep	SL	04/22/2010	0001	0	-	0	5	U	#	5		
Ammonia Total as N	mg/L	0201	SL	04/21/2010	0001	0.58	-	0.58	0.26	N	#	0.1		
Ammonia Total as N	mg/L	0226	SL	04/20/2010	0001	1	-	1	0.1	U	J	0.1		
Ammonia Total as N	mg/L	0228	SL	04/20/2010	0001	0.5	-	0.5	0.1	U	J	0.1		
Ammonia Total as N	mg/L	0404	WL	04/21/2010	0001	18	-	18	410		J	20		
Ammonia Total as N	mg/L	0438	WL	04/22/2010	0001	118	-	118	7.9		J	0.5		
Ammonia Total as N	mg/L	0439	WL	04/22/2010	0001	118	-	118	8.7		J	0.5		
Ammonia Total as N	mg/L	0453	WL	04/22/2010	0001	80	-	80	380		#	20		
Ammonia Total as N	mg/L	0492	WL	04/20/2010	0001	18	-	18	59		#	5		
Ammonia Total as N	mg/L	0547	TS	04/22/2010	0001	0	-	0	640		J	20		
Ammonia Total as N	mg/L	0548	TS	04/22/2010	0001	0	-	0	1800		J	50		
Ammonia Total as N	mg/L	0548	TS	04/22/2010	0002	0	-	0	1900		#	50		
Ammonia Total as N	mg/L	ATP-2-D	WL	04/21/2010	0001	88	-	88	540		#	20		
Ammonia Total as N	mg/L	ATP-2-S	WL	04/21/2010	0001	38	-	38	400		#	20		
Ammonia Total as N	mg/L	CR1	SL	04/21/2010	0001	0.25	-	0.25	0.1	U	#	0.1		
Ammonia Total as N	mg/L	CR2	SL	04/22/2010	0001	0.42	-	0.42	0.1	U	J	0.1		
Ammonia Total as N	mg/L	CR3	SL	04/20/2010	0001	0.08	-	0.08	0.1	U	#	0.1		
Ammonia Total as N	mg/L	CR5	SL	04/21/2010	0001	1	-	1	0.1	U	J	0.1		
Ammonia Total as N	mg/L	CR5	SL	04/21/2010	0002	1	-	1	0.1	U	#	0.1		
Ammonia Total as N	mg/L	Excavation Seep	SL	04/22/2010	0001	0	-	0	10000		J	500		
Ammonia Total as N	mg/L	TP-02	WL	04/21/2010	0001	30	-	30	0.41		J	0.1		
Ammonia Total as N	mg/L	TP-17	WL	04/20/2010	0001	28	-	28	2.3		J	0.1		
Ammonia Total as N	mg/L	TP-19	WL	04/20/2010	0001	29	-	29	3.5		J	0.1		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/6/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Calcium	mg/L	Excava-tion Seep	SL	04/22/2010	0001	0	-	0	400	J	#		0.06	
Chloride	mg/L	Excava-tion Seep	SL	04/22/2010	0001	0	-	0	7700	N	J	#	1000	
Dissolved Oxygen	mg/L	0201	SL	04/21/2010	0001	0.58	-	0.58	9.25			#		
Dissolved Oxygen	mg/L	0226	SL	04/20/2010	0001	1	-	1	8.85			#		
Dissolved Oxygen	mg/L	0228	SL	04/20/2010	0001	0.5	-	0.5	10.19			#		
Dissolved Oxygen	mg/L	0404	WL	04/21/2010	0001	18	-	18	2.23			#		
Dissolved Oxygen	mg/L	0438	WL	04/22/2010	0001	118	-	118	1.74			#		
Dissolved Oxygen	mg/L	0439	WL	04/22/2010	0001	118	-	118	2.96			#		
Dissolved Oxygen	mg/L	0453	WL	04/22/2010	0001	80	-	80	1.58			#		
Dissolved Oxygen	mg/L	0492	WL	04/20/2010	0001	18	-	18	1.12			#		
Dissolved Oxygen	mg/L	0547	TS	04/22/2010	0001	0	-	0	6.52			#		
Dissolved Oxygen	mg/L	0548	TS	04/22/2010	0001	0	-	0	6.73			#		
Dissolved Oxygen	mg/L	ATP-2-D	WL	04/21/2010	0001	88	-	88	0.5			#		
Dissolved Oxygen	mg/L	ATP-2-S	WL	04/21/2010	0001	38	-	38	0.96			#		
Dissolved Oxygen	mg/L	CR1	SL	04/21/2010	0001	0.25	-	0.25	8.99			#		
Dissolved Oxygen	mg/L	CR2	SL	04/22/2010	0001	0.42	-	0.42	9.01			#		
Dissolved Oxygen	mg/L	CR3	SL	04/20/2010	0001	0.08	-	0.08	8.15			#		
Dissolved Oxygen	mg/L	CR5	SL	04/21/2010	0001	1	-	1	9.05			#		
Dissolved Oxygen	mg/L	Excava-tion Seep	SL	04/22/2010	N001	0	-	0	3.65			#		
Dissolved Oxygen	mg/L	TP-02	WL	04/21/2010	0001	30	-	30	0.77			#		
Dissolved Oxygen	mg/L	TP-17	WL	04/20/2010	0001	28	-	28	0.55			#		
Dissolved Oxygen	mg/L	TP-19	WL	04/20/2010	0001	29	-	29	0.55			#		
Magnesium	mg/L	Excava-tion Seep	SL	04/22/2010	0001	0	-	0	11000	J	#		1.3	
Manganese	mg/L	0201	SL	04/21/2010	0001	0.58	-	0.58	0.0026	B	J	#	0.00011	
Manganese	mg/L	0226	SL	04/20/2010	0001	1	-	1	0.0026	B	J	#	0.00011	
Manganese	mg/L	0228	SL	04/20/2010	0001	0.5	-	0.5	0.0017	B	J	#	0.00011	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/6/2010

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	0404	WL	04/21/2010	0001	18	- 18	4.9	J	#		0.0011	
Manganese	mg/L	0438	WL	04/22/2010	0001	118	- 118	2.4	J	#		0.0011	
Manganese	mg/L	0439	WL	04/22/2010	0001	118	- 118	2	J	#		0.0011	
Manganese	mg/L	0453	WL	04/22/2010	0001	80	- 80	0.69	J	#		0.0057	
Manganese	mg/L	0492	WL	04/20/2010	0001	18	- 18	8.2	J	#		0.0028	
Manganese	mg/L	0547	TS	04/22/2010	0001	0	- 0	200	J	#		0.0057	
Manganese	mg/L	0548	TS	04/22/2010	0001	0	- 0	34	J	#		0.0057	
Manganese	mg/L	0548	TS	04/22/2010	0002	0	- 0	170	J	#		0.0057	
Manganese	mg/L	ATP-2-D	WL	04/21/2010	0001	88	- 88	1.4	J	#		0.011	
Manganese	mg/L	ATP-2-S	WL	04/21/2010	0001	38	- 38	0.17	J	#		0.0028	
Manganese	mg/L	CR1	SL	04/21/2010	0001	0.25	- 0.25	0.0025	B	J	#	0.00011	
Manganese	mg/L	CR2	SL	04/22/2010	0001	0.42	- 0.42	0.0035	B	J	#	0.00011	
Manganese	mg/L	CR3	SL	04/20/2010	0001	0.08	- 0.08	0.0029	B	J	#	0.00011	
Manganese	mg/L	CR5	SL	04/21/2010	0001	1	- 1	0.002	B	J	#	0.00011	
Manganese	mg/L	CR5	SL	04/21/2010	0002	1	- 1	0.0023	B	J	#	0.00011	
Manganese	mg/L	Excavation Seep	SL	04/22/2010	0001	0	- 0	430	J	#		0.011	
Manganese	mg/L	TP-02	WL	04/21/2010	0001	30	- 30	0.24	J	#		0.00011	
Manganese	mg/L	TP-17	WL	04/20/2010	0001	28	- 28	2.3	J	#		0.011	
Manganese	mg/L	TP-19	WL	04/20/2010	0001	29	- 29	0.025	B	J	#	0.011	
Oxidation Reduction Potential	mV	0201	SL	04/21/2010	0001	0.58	- 0.58	83		#			
Oxidation Reduction Potential	mV	0226	SL	04/20/2010	0001	1	- 1	-65		#			
Oxidation Reduction Potential	mV	0228	SL	04/20/2010	0001	0.5	- 0.5	68		#			
Oxidation Reduction Potential	mV	0404	WL	04/21/2010	0001	18	- 18	69		#			
Oxidation Reduction Potential	mV	0438	WL	04/22/2010	0001	118	- 118	180		#			
Oxidation Reduction Potential	mV	0439	WL	04/22/2010	0001	118	- 118	198		#			
Oxidation Reduction Potential	mV	0453	WL	04/22/2010	0001	80	- 80	170		#			

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/6/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data	QA					
Oxidation Reduction Potential	mV	0492	WL	04/20/2010	0001	18	-	18	-44		#		
Oxidation Reduction Potential	mV	0547	TS	04/22/2010	0001	0	-	0	186.8		#		
Oxidation Reduction Potential	mV	0548	TS	04/22/2010	0001	0	-	0	241		#		
Oxidation Reduction Potential	mV	ATP-2-D	WL	04/21/2010	0001	88	-	88	-262		#		
Oxidation Reduction Potential	mV	ATP-2-S	WL	04/21/2010	0001	38	-	38	-161		#		
Oxidation Reduction Potential	mV	CR1	SL	04/21/2010	0001	0.25	-	0.25	66		#		
Oxidation Reduction Potential	mV	CR2	SL	04/22/2010	0001	0.42	-	0.42	82		#		
Oxidation Reduction Potential	mV	CR3	SL	04/20/2010	0001	0.08	-	0.08	7		#		
Oxidation Reduction Potential	mV	CR5	SL	04/21/2010	0001	1	-	1	75		#		
Oxidation Reduction Potential	mV	Excavation Seep	SL	04/22/2010	N001	0	-	0	355		#		
Oxidation Reduction Potential	mV	TP-02	WL	04/21/2010	0001	30	-	30	-78		#		
Oxidation Reduction Potential	mV	TP-17	WL	04/20/2010	0001	28	-	28	-172		#		
Oxidation Reduction Potential	mV	TP-19	WL	04/20/2010	0001	29	-	29	-267		#		
pH	s.u.	0201	SL	04/21/2010	0001	0.58	-	0.58	7.89		#		
pH	s.u.	0226	SL	04/20/2010	0001	1	-	1	8.2		#		
pH	s.u.	0228	SL	04/20/2010	0001	0.5	-	0.5	7.98		#		
pH	s.u.	0404	WL	04/21/2010	0001	18	-	18	6.73		#		
pH	s.u.	0438	WL	04/22/2010	0001	118	-	118	6.74		#		
pH	s.u.	0439	WL	04/22/2010	0001	118	-	118	6.84		#		
pH	s.u.	0453	WL	04/22/2010	0001	80	-	80	7.04		#		
pH	s.u.	0492	WL	04/20/2010	0001	18	-	18	6.83		#		
pH	s.u.	0547	TS	04/22/2010	0001	0	-	0	6.81		#		
pH	s.u.	0548	TS	04/22/2010	0001	0	-	0	6.92		#		
pH	s.u.	ATP-2-D	WL	04/21/2010	0001	88	-	88	7.8		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/6/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty	
						Lab	Data	QA						
pH	s.u.	ATP-2-S	WL	04/21/2010	0001	38	-	38	8.66		#			
pH	s.u.	CR1	SL	04/21/2010	0001	0.25	-	0.25	7.39		#			
pH	s.u.	CR2	SL	04/22/2010	0001	0.42	-	0.42	7.29		#			
pH	s.u.	CR3	SL	04/20/2010	0001	0.08	-	0.08	8.24		#			
pH	s.u.	CR5	SL	04/21/2010	0001	1	-	1	8		#			
pH	s.u.	Excava- tion Seep	SL	04/22/2010	N001	0	-	0	2.71		#			
pH	s.u.	TP-02	WL	04/21/2010	0001	30	-	30	7.32		#			
pH	s.u.	TP-17	WL	04/20/2010	0001	28	-	28	7.15		#			
pH	s.u.	TP-19	WL	04/20/2010	0001	29	-	29	6.87		#			
Potassium	mg/L	Excava- tion Seep	SL	04/22/2010	0001	0	-	0	1200		J	#	0.54	
Radium-226	pCi/L	Excava- tion Seep	SL	04/22/2010	0001	0	-	0	57			#	1	14
Selenium	mg/L	0404	WL	04/21/2010	0001	18	-	18	0.014			#	0.00032	
Selenium	mg/L	0438	WL	04/22/2010	0001	118	-	118	0.00072	B		#	0.00032	
Selenium	mg/L	0439	WL	04/22/2010	0001	118	-	118	0.0016			#	0.00032	
Selenium	mg/L	0548	TS	04/22/2010	0001	0	-	0	0.35			#	0.00065	
Selenium	mg/L	0548	TS	04/22/2010	0002	0	-	0	0.34			#	0.00065	
Selenium	mg/L	Excava- tion Seep	SL	04/22/2010	0001	0	-	0	3.9			#	0.032	
Selenium	mg/L	TP-17	WL	04/20/2010	0001	28	-	28	0.0015	B		#	0.00065	
Selenium	mg/L	TP-19	WL	04/20/2010	0001	29	-	29	0.006			#	0.00065	
Sodium	mg/L	Excava- tion Seep	SL	04/22/2010	0001	0	-	0	22000		J	#	3.3	
Specific Conductance	µmhos /cm	0201	SL	04/21/2010	0001	0.58	-	0.58	532			#		
Specific Conductance	µmhos /cm	0226	SL	04/20/2010	0001	1	-	1	710			#		
Specific Conductance	µmhos /cm	0228	SL	04/20/2010	0001	0.5	-	0.5	603			#		
Specific Conductance	µmhos /cm	0404	WL	04/21/2010	0001	18	-	18	17535			#		
Specific Conductance	µmhos /cm	0438	WL	04/22/2010	0001	118	-	118	9479			#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/6/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Specific Conductance	µmhos/cm	0439	WL	04/22/2010	0001	118	-	118	10369			#		
Specific Conductance	µmhos/cm	0453	WL	04/22/2010	0001	80	-	80	29678			#		
Specific Conductance	µmhos/cm	0492	WL	04/20/2010	0001	18	-	18	18666			#		
Specific Conductance	µmhos/cm	0547	TS	04/22/2010	0001	0	-	0	46963			#		
Specific Conductance	µmhos/cm	0548	TS	04/22/2010	0001	0	-	0	56400			#		
Specific Conductance	µmhos/cm	ATP-2-D	WL	04/21/2010	0001	88	-	88	128224			#		
Specific Conductance	µmhos/cm	ATP-2-S	WL	04/21/2010	0001	38	-	38	19074			#		
Specific Conductance	µmhos/cm	CR1	SL	04/21/2010	0001	0.25	-	0.25	532			#		
Specific Conductance	µmhos/cm	CR2	SL	04/22/2010	0001	0.42	-	0.42	1137			#		
Specific Conductance	µmhos/cm	CR3	SL	04/20/2010	0001	0.08	-	0.08	771			#		
Specific Conductance	µmhos/cm	CR5	SL	04/21/2010	0001	1	-	1	531			#		
Specific Conductance	µmhos/cm	Excavation Seep	SL	04/22/2010	N001	0	-	0	145589			#		
Specific Conductance	µmhos/cm	TP-02	WL	04/21/2010	0001	30	-	30	1582			#		
Specific Conductance	µmhos/cm	TP-17	WL	04/20/2010	0001	28	-	28	128231			#		
Specific Conductance	µmhos/cm	TP-19	WL	04/20/2010	0001	29	-	29	157074			#		
Sulfate	mg/L	Excavation Seep	SL	04/22/2010	0001	0	-	0	190000			#	2500	
Temperature	C	0201	SL	04/21/2010	0001	0.58	-	0.58	13.42			#		
Temperature	C	0226	SL	04/20/2010	0001	1	-	1	14.03			#		
Temperature	C	0228	SL	04/20/2010	0001	0.5	-	0.5	16.02			#		
Temperature	C	0404	WL	04/21/2010	0001	18	-	18	14.09			#		
Temperature	C	0438	WL	04/22/2010	0001	118	-	118	14.34			#		
Temperature	C	0439	WL	04/22/2010	0001	118	-	118	14.18			#		
Temperature	C	0453	WL	04/22/2010	0001	80	-	80	15.37			#		
Temperature	C	0492	WL	04/20/2010	0001	18	-	18	15.28			#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/6/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range		Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	(Ft BLS)	Lab		Data	QA		
Temperature	C	0547	TS	04/22/2010	0001	0	- 0	17.84		#		
Temperature	C	0548	TS	04/22/2010	0001	0	- 0	18.34		#		
Temperature	C	ATP-2-D	WL	04/21/2010	0001	88	- 88	17.6		#		
Temperature	C	ATP-2-S	WL	04/21/2010	0001	38	- 38	16.56		#		
Temperature	C	CR1	SL	04/21/2010	0001	0.25	- 0.25	13.6		#		
Temperature	C	CR2	SL	04/22/2010	0001	0.42	- 0.42	13.8		#		
Temperature	C	CR3	SL	04/20/2010	0001	0.08	- 0.08	14.27		#		
Temperature	C	CR5	SL	04/21/2010	0001	1	- 1	13.38		#		
Temperature	C	Excava- tion Seep	SL	04/22/2010	N001	0	- 0	20.66		#		
Temperature	C	TP-02	WL	04/21/2010	0001	30	- 30	14.97		#		
Temperature	C	TP-17	WL	04/20/2010	0001	28	- 28	13.84		#		
Temperature	C	TP-19	WL	04/20/2010	0001	29	- 29	13.73		#		
Total Dissolved Solids	mg/L	0201	SL	04/21/2010	0001	0.58	- 0.58	320		#	20	
Total Dissolved Solids	mg/L	0226	SL	04/20/2010	0001	1	- 1	350		#	20	
Total Dissolved Solids	mg/L	0228	SL	04/20/2010	0001	0.5	- 0.5	340		#	20	
Total Dissolved Solids	mg/L	0404	WL	04/21/2010	0001	18	- 18	14000		#	200	
Total Dissolved Solids	mg/L	0438	WL	04/22/2010	0001	118	- 118	7500		#	400	
Total Dissolved Solids	mg/L	0439	WL	04/22/2010	0001	118	- 118	7900		#	400	
Total Dissolved Solids	mg/L	0453	WL	04/22/2010	0001	80	- 80	20000		#	2000	
Total Dissolved Solids	mg/L	0492	WL	04/20/2010	0001	18	- 18	14000		#	400	
Total Dissolved Solids	mg/L	0547	TS	04/22/2010	0001	0	- 0	31000		#	2000	
Total Dissolved Solids	mg/L	0548	TS	04/22/2010	0001	0	- 0	40000		#	2000	
Total Dissolved Solids	mg/L	0548	TS	04/22/2010	0002	0	- 0	42000		#	2000	
Total Dissolved Solids	mg/L	ATP-2-D	WL	04/21/2010	0001	88	- 88	95000		#	2000	
Total Dissolved Solids	mg/L	ATP-2-S	WL	04/21/2010	0001	38	- 38	14000		#	400	
Total Dissolved Solids	mg/L	CR1	SL	04/21/2010	0001	0.25	- 0.25	320		#	20	
Total Dissolved Solids	mg/L	CR2	SL	04/22/2010	0001	0.42	- 0.42	310		#	20	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/6/2010

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	CR3	SL	04/20/2010	0001	0.08 - 0.08	320		#	20	
Total Dissolved Solids	mg/L	CR5	SL	04/21/2010	0001	1 - 1	310		#	20	
Total Dissolved Solids	mg/L	CR5	SL	04/21/2010	0002	1 - 1	310		#	20	
Total Dissolved Solids	mg/L	Excavation Seep	SL	04/22/2010	0001	0 - 0	260000		#	4000	
Total Dissolved Solids	mg/L	TP-02	WL	04/21/2010	0001	30 - 30	980		#	80	
Total Dissolved Solids	mg/L	TP-17	WL	04/20/2010	0001	28 - 28	86000		#	2000	
Total Dissolved Solids	mg/L	TP-19	WL	04/20/2010	0001	29 - 29	110000		#	2000	
Turbidity	NTU	0404	WL	04/21/2010	0001	18 - 18	2.36		#		
Turbidity	NTU	0438	WL	04/22/2010	0001	118 - 118	9.16		#		
Turbidity	NTU	0439	WL	04/22/2010	0001	118 - 118	3.41		#		
Turbidity	NTU	0453	WL	04/22/2010	0001	80 - 80	7.38		#		
Turbidity	NTU	0492	WL	04/20/2010	0001	18 - 18	3.06		#		
Turbidity	NTU	0547	TS	04/22/2010	0001	0 - 0	6.88		#		
Turbidity	NTU	0548	TS	04/22/2010	0001	0 - 0	16		#		
Turbidity	NTU	ATP-2-D	WL	04/21/2010	0001	88 - 88	16		#		
Turbidity	NTU	ATP-2-S	WL	04/21/2010	0001	38 - 38	5.16		#		
Turbidity	NTU	CR2	SL	04/22/2010	0001	0.42 - 0.42	881		#		
Turbidity	NTU	TP-02	WL	04/21/2010	0001	30 - 30	7.09		#		
Turbidity	NTU	TP-17	WL	04/20/2010	0001	28 - 28	9.69		#		
Turbidity	NTU	TP-19	WL	04/20/2010	0001	29 - 29	6.08		#		
Uranium	mg/L	0201	SL	04/21/2010	0001	0.58 - 0.58	0.0022		#	1.8E-006	
Uranium	mg/L	0226	SL	04/20/2010	0001	1 - 1	0.0026		#	8.8E-006	
Uranium	mg/L	0228	SL	04/20/2010	0001	0.5 - 0.5	0.0026		#	1.8E-006	
Uranium	mg/L	0404	WL	04/21/2010	0001	18 - 18	2.2		#	8.8E-005	
Uranium	mg/L	0438	WL	04/22/2010	0001	118 - 118	1.6		#	8.8E-005	
Uranium	mg/L	0439	WL	04/22/2010	0001	118 - 118	0.79		#	8.8E-005	
Uranium	mg/L	0453	WL	04/22/2010	0001	80 - 80	1.6		#	8.8E-005	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/6/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Uranium	mg/L	0492	WL	04/20/2010	0001	18	-	18	1.4			#	8.8E-005	
Uranium	mg/L	0547	TS	04/22/2010	0001	0	-	0	2.6			#	8.8E-005	
Uranium	mg/L	0548	TS	04/22/2010	0001	0	-	0	2.2		J	#	8.8E-005	
Uranium	mg/L	0548	TS	04/22/2010	0002	0	-	0	2.1			#	8.8E-005	
Uranium	mg/L	ATP-2-D	WL	04/21/2010	0001	88	-	88	0.018			#	1.8E-006	
Uranium	mg/L	ATP-2-S	WL	04/21/2010	0001	38	-	38	0.01			#	1.8E-006	
Uranium	mg/L	CR1	SL	04/21/2010	0001	0.25	-	0.25	0.0023			#	1.8E-006	
Uranium	mg/L	CR2	SL	04/22/2010	0001	0.42	-	0.42	0.0025			#	1.8E-006	
Uranium	mg/L	CR3	SL	04/20/2010	0001	0.08	-	0.08	0.0025			#	1.8E-006	
Uranium	mg/L	CR5	SL	04/21/2010	0001	1	-	1	0.0023			#	1.8E-006	
Uranium	mg/L	CR5	SL	04/21/2010	0002	1	-	1	0.0024			#	1.8E-006	
Uranium	mg/L	Excavation Seep	SL	04/22/2010	0001	0	-	0	8.9		U	#	0.0029	
Uranium	mg/L	TP-02	WL	04/21/2010	0001	30	-	30	1.2		J	#	8.8E-005	
Uranium	mg/L	TP-17	WL	04/20/2010	0001	28	-	28	0.029		J	#	1.8E-006	
Uranium	mg/L	TP-19	WL	04/20/2010	0001	29	-	29	0.00012	B	J	#	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.

Appendix C. Water Quality Data (continued)

DATA QUALIFIERS:

F Low-flow sampling method used.

L Less than three bore volumes purged prior to sampling.

U Parameter analyzed for but was not detected.

G Possible grout contamination; pH > 9.

Q Qualitative result due to sampling technique.

X Location is undefined.

J Estimated value.

R Unusable result.

QA QUALIFIER:

Validated according to quality assurance guidelines.

Appendix D.
Water Level Data

Appendix D. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site
REPORT DATE: 7/6/2010

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0404	O	3968.3	04/21/2010		13.1	3955.2	
0438	O	4054.22	04/22/2010		96.84	3957.38	
0439	O	4055.27	04/22/2010		97.9	3957.37	
0453			04/22/2010		73.9		
0492		3967.64	04/20/2010		13.6	3954.04	
ATP-2-D	O	3967.05	04/21/2010		14	3953.05	
ATP-2-S	O	3967.04	04/21/2010		12.93	3954.11	
TP-02	O	3975.55	04/21/2010		19.46	3956.09	
TP-17	D	3963.69	04/20/2010		9.63	3954.06	
TP-19	D	3962.17	04/20/2010		7.5	3954.67	

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

Attachment 1.
April 2010 Routine Sampling Trip Report

Attachment 1.
April 2010 Routine Sampling Event Trip Report



Date: May 10, 2010
To: Ken Pill
From: James Ritchey
Subject: April 2010 Routine Sampling Event Trip Report
Site: Moab, Utah

Date of Sampling Event: April 20-22, 2010

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

RIN Number Assigned: All samples were assigned to RIN 1004045

Sample Shipment: Two coolers were shipped overnight UPS to ALS Laboratory Group from Moab, Utah, on April 23, 2009 (Tracking Nos. 4490206848 and 4492591050).

Number of Locations Sampled: The April routine sampling event was conducted during the ascending limb of the Colorado River hydrograph. Eleven monitor wells and seven surface water locations were sampled during the sampling event. Also, two samples were collected from the evaporation pond, and one sample was collected from a seep occurring in the pile excavation. Including two duplicates and one EB, a total of 24 samples were collected.

Locations Not Sampled/Reason: Surface location 0218 could not be accessed due to the slope of the bank. Location CR-2 (the confluence of the river and the Moab Wash) was sampled instead.

Field Variance: Interim action monitoring wells 0401, 0404, and 0453 were added to the routine sampling list for the month of April.

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
2008	CR-5	Duplicate from 12 inches bws	Surface Water	APR113
2009	NA	Equipment Blank	DI Water	APR115
2010	0548	Duplicate from surface	Surface Water	APR121

bws = below water surface; DI = deionized; ID = identification

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

Location-specific Information: Wells 0453, 0437, and 0438 were sampled using dedicated bladder pumps. All other remaining monitor wells were sampled using a peristaltic pump and dedicated tubing. A grab sample was collected from the evaporation pond (0548). Each surface water sample was collected using a peristaltic pump and nondedicated tubing. The table below provides additional information:

Sample ID	Location	Date	Sample Depth	Comments
APR100	0492	4/20/2010	18 ft bgs	NA
APR101	CR-3	4/20/2010	Surface	Taken ~1 foot off bank, 1 inch below water surface, moderate flow
APR102	TP-19	4/20/2010	29 ft bgs	Sulfur odor, selenium analysis added
APR103	0228	4/20/2010	~6 inches bws	Taken in ~6 inches of water, water is turbid and flowing at a moderate velocity
APR104	TP-17	4/20/2010	28 ft bgs	Water is gray, selenium analysis added
APR105	0226	4/20/2010	~1 foot	Taken off main channel, turbid, moderate flow
APR106	ATP-2-D	4/21/2010	88 ft bgs	Turbidity has stabilized in the teens, won't decline
APR107	ATP-2-S	4/21/2010	38 ft bgs	Category II well, water level not consistent
APR108	0401	4/21/2010	18 ft bgs	Selenium analysis added
APR109	0404	4/21/2010	18 ft bgs	Selenium analysis added
APR110	CR-1	4/21/2010	3 inches bws	NA
APR111	0201	4/21/2010	7 inches bws	Taken off main channel, moderate/high velocity, turbid
APR112	CR-5	4/21/2010	12 inches bws	Taken off of main channel, very turbid, fast velocity (white caps on waves)
APR114	TP-02	4/21/2010	30 ft bgs	NA
APR116	0439	4/22/2010	118 ft bgs	NA
APR117	0438	4/22/2010	118 ft bgs	NA
APR118	0453	4/22/2010	80 ft bgs	Water level dropped below top of pump
APR119	0547	4/22/2010	NA	Pond at 8.3 feet
APR120	0548	4/22/2010	NA	Duplicate collected, pond at 8.3 feet
APR122	Excavation Seep	4/22/2010	NA	Green color, collected from a wick drain in the pile excavation, flowing ~15 gallons per minute, not filtered
APR123	CR-2	4/22/2010	~5 inches	Taken from main channel confluence with the Moab Wash, 1 foot off bank, very turbid, taken in a slight eddy.

ft bws = feet below water surface, ft bgs = feet below ground surface; ID = identification

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



Surface Water Location CR-1



Surface Water Location 0201

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



Surface Water Location CR-5



Surface Water Location 0226

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



Surface Water Location 0228



Surface Water Location CR-3

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



Surface Water Location CR-2



Sample Collected at Pile Excavation Seep

Attachment 1.
April 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	4/21/2010	11:01	14.90
0404	4/21/2010	11:24	13.10
0438	4/22/2010	11:35	96.84
0439	4/22/2010	11:05	97.90
0453	4/22/2010	12:10	73.90
0492	4/20/2010	13:18	13.60
ATP-2-S	4/21/2010	10:30	12.93
ATP-2-D	4/21/2010	09:48	14.00
TP-02	4/21/2010	15:42	19.46
TP-17	4/20/2010	15:56	9.63
TP-19	4/20/2010	14:35	7.50

ft btoc = feet below top of casing

Well Inspection Summary: A well inspection was not conducted.

Equipment: None.

Regulatory: None.

Site Issues: Mean Colorado River flow data during this sampling event, according to the USGS Cisco gauging station (Station No. 09180500), are shown below.

Date	Daily Mean Flow (cfs)
04/20/2010	10,900
04/21/2010	11,000
04/22/2010	12,100

Corrective Action Required/Taken: None