

Office of Environmental Management – Grand Junction



Moab UMTRA Project
June 2010 Validation Data Package for
Performance Assessment of the
Monthly Sampling for the Ground Water
Interim Action and Excavation Seep
Sampling Events

September 2010



U.S. Department
of Energy

Office of Environmental Management

Moab UMTRA Project
June 2010 Validation Data Package for Performance Assessment of
the Monthly Sampling for the Ground Water Interim Action
and Excavation Seep Sampling Events

September 2010

**Moab UMTRA Project
June 2010 Monthly Ground Water and
Excavation Seep Sampling Events VDP**

Revision 0

Review and Approval

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Acronyms and Abbreviations

°C	degrees Centigrade
CCB	continuing calibration blank
CF	Configuration
cfs	cubic feet per second
COC	chain of custody
EB	equipment blank
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
ft bgs	feet below ground surface
IA	interim action
ICB	initial calibration blank
ICP	inductively coupled plasma
IDL	instrument detection limit
LCS	laboratory control sample
MB	method blank
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
RIN	report identification number
RL	reporting limit
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, excavation pore water, and evaporation pond samples collected from the Moab Uranium Mill Tailings Remedial Action (UMTRA) 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 1.0 presents the Summary Criteria, the Sampling Event Summary, and the Sampling and Analysis. Section 2.0 provides the Data Assessment Summaries, including the Field Activity Verification, Laboratory Performance Assessment, Field Analyses/Activities description, and the Certification. All flagged data, and the reasons for the applicable flags, are also presented in Section 2.0. The Data Presentation is contained in Section 3.0, which includes a summary of the anomalous data generated by the validation process. Various appendices contain the Water Sampling Field Activities Verification, Water Quality Data, Water Level Data, Minimums and Maximums Report, and the Blanks Report. Attachments 1 and 2 contain the trip reports. All Colorado River flow discussed in this document is measured from the U.S. Geological Survey (USGS) Cisco gauging station number 09180500.

This validation data package (VDP) presents the results of two June 2010 sampling events that were completed between June 22 and 24, 2010. It was necessary to submit the samples collected during this timeframe as two different report identification numbers (RINs) due to the difference between the required analyses for these two groups of samples. Ground water samples were collected from the Configuration (CF) 5 extraction wells and monitoring wells SMI-PW03, SMI-PZ3D2, SMI-PZ3M, SMI-PZ3S (PW03 cluster), and well 0410 on June 22 and 23 as part of RIN 1006048. These samples were submitted for the standard analyte list which includes ammonia as N, total dissolved solids (TDS), and uranium. Monitoring well 0410 was recently replaced due to damage to the original well 0410, and the PW03 cluster were sampled because they are located in the vicinity of the ongoing uranium plume delineation investigation.

On June 24, samples were collected from the excavation seep and the water stored in the evaporation pond (location 0548) as part of RIN 1006049. Samples were initially collected from these locations and submitted as part of RIN 1006047 in mid-June 2010. However, due to problems associated with the analytical laboratory, and the need for additional analyses, these locations were re-sampled and submitted as a separate RIN.

Section 1.0 contains the Summary Criteria with sample location map (Section 1.1), the Sampling Event Summary (Section 1.2), and the Sampling and Analyses (Section 1.3) for these June 2010 sampling events.

1.1 Summary Criteria

Sampling Period: June 22 through 24, 2010

The purpose of these sampling events was to collect data associated with the recently installed CF5 extraction wells and monitor the ground water chemistry in the vicinity of the uranium plume investigation, the excavation seep, and the evaporation pond. The CF5 sampling locations, the

locations in the vicinity of the uranium plume investigation, and the excavation seep/evaporation pond locations are shown as Figures 1, 2, and 3, respectively.

1. As a result of this sampling event, is there any indication of anomalous data that may be related to well field pump rate changes, river flow, or other known causes?

Yes. Of the locations sampled during this event, there were five anomalous data points from three different locations based on the Minimums and Maximums Report.

2. Were all interim action (IA) well field pumps operating within the planned parameters?

Yes. Wells SMI-PW02 (PW02) and 0815 were extracting ground water at a combined rate of approximately 36 gallons per minute.

3. Was the evaporation pond functioning properly?

Yes. The pond level was at 8.0 feet during this sampling event.

4. Were all proposed well (ground water) and surface water locations sampled during this event?

Yes.

5. Were there any site activities that have impacted or may impact the IA system?

Yes. Tailings pore water continues to be transferred into the evaporation pond, limiting the volume of ground water that can be stored in the pond.

1.2 Sampling Event Summary

This VDP presents the validated data associated with the samples collected during the June 2010 IA monthly sampling events at the former uranium tailings processing site in Moab, Utah. Included is 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). Attachments 1 and 2 contain the trip reports detailing the field events associated with these sampling events. In addition, time versus analyte concentration plots are provided where applicable.

The CF5 sampling indicated the ammonia, TDS, and uranium concentrations did not significantly change since these locations were first sampled in February 2010 despite the changes in the Colorado River stage. This response was expected due to the distance these extraction wells are located away from the river bank.

The sampling locations in the vicinity of the uranium plume delineation investigation indicated the analyte concentrations in general stayed within historical ranges. The sample collected from the water stored in the evaporation pond exhibited the impacts of pore water from the excavation being transferred into the pond. Significant increases in ammonia, copper, selenium, TDS, and uranium were observed since March 2010, at which time this transfer was initiated. Sampling results of the excavation seep indicate the highest concentrations of contaminants on site.

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 for either RIN 1006048 or 1006049. A Minimums and Maximums Report (presented in Section 3.1) was generated to determine if the applicable data are within a normal statistical range. Based on the limited results of the Minimums and Maximums Report, there are five anomalous data points associated with these sampling events (see Anomalous Data Review in Section 3.2).

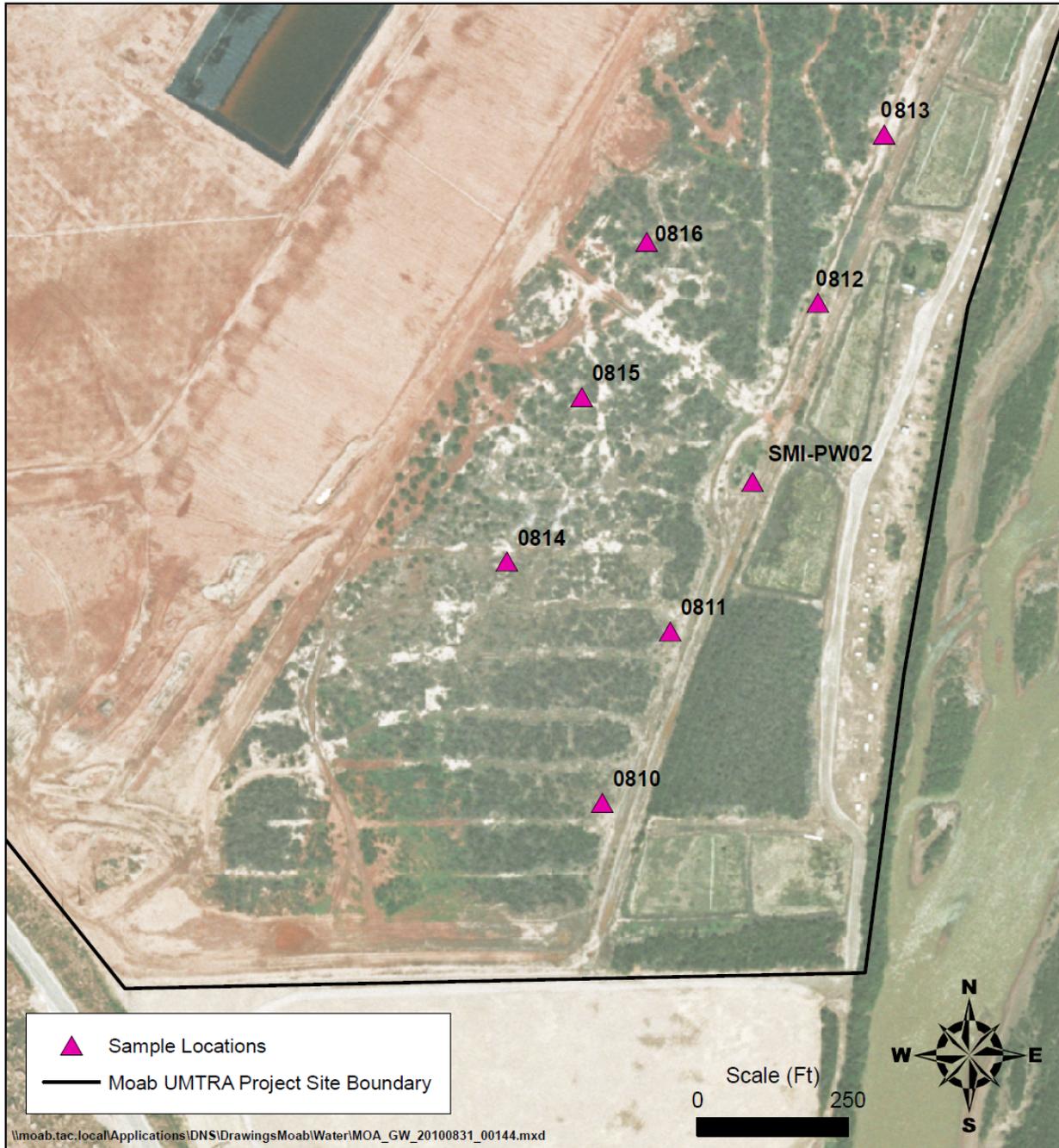


Figure 1. Map of CF5 Sample Locations



Figure 2. Map of Sample Locations in the Vicinity of the Uranium Plume (includes locations not sampled)

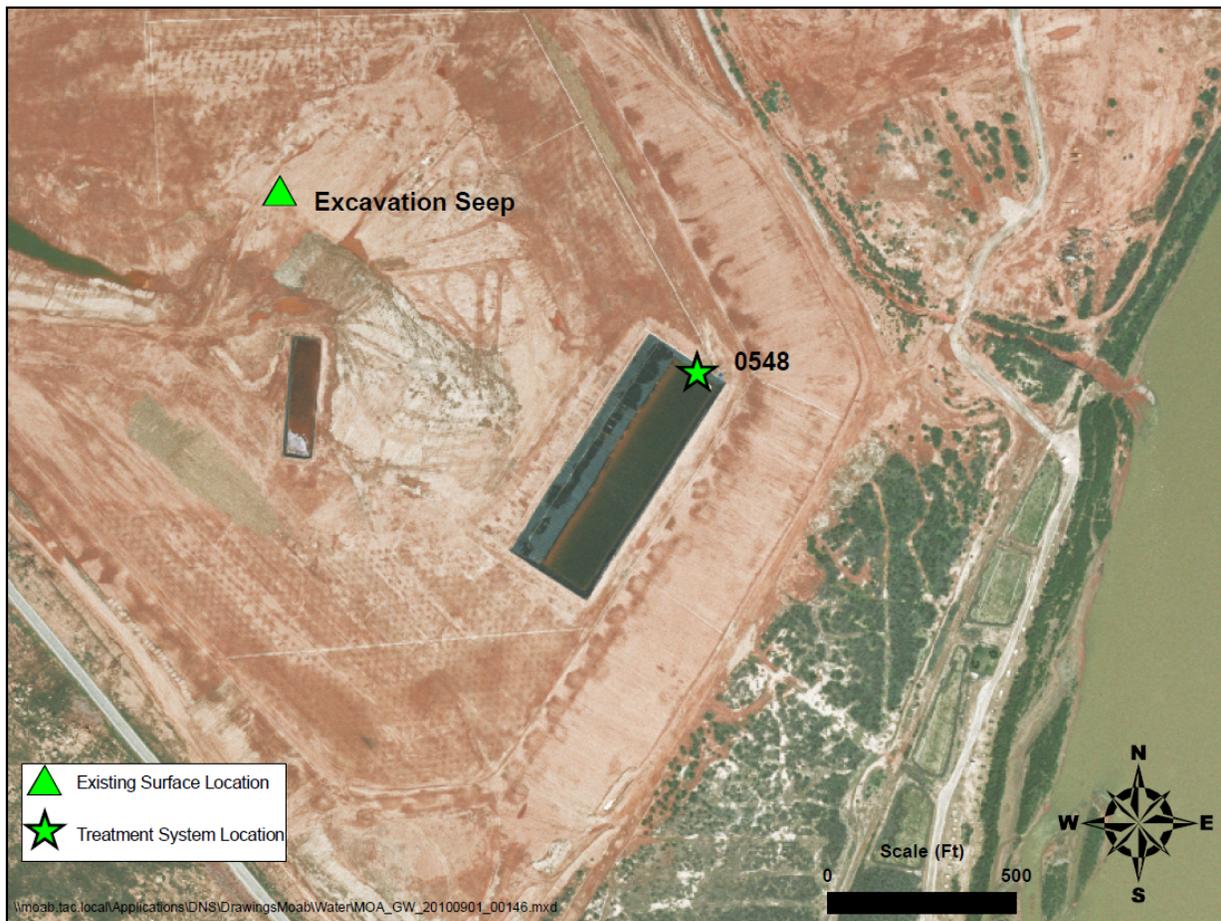


Figure 3. Map of Excavation Seep and Evaporation Pond Sample Locations

CF5 Extraction Wells 0810, 0811, PW02, 0812, and 0813

These locations are located along the southeastern edge of CF5, approximately 500 feet from the toe of the tailings pile (Figure 1). Time versus ammonia, TDS, and uranium time versus concentration plots are presented as Figures 4, 5, and 6, respectively. All locations, with the exception of PW02, were sampled near the middle of the well screen while the submersible pump was not operating. The sample from PW02 was collected while the pump was running (pump intake depth of 55 feet below ground surface [ft bgs]).

CF5 Extraction Wells 0814, 0815, and 0816

Time versus ammonia, TDS, and uranium time versus concentration plots were also generated (presented as Figures 4, 5, and 6, respectively) for CF5 extraction wells 0814, 0815, and 0816. These wells (Figure 1) are all located approximately 200 feet from the toe of the pile. Wells 0814 and 0816 were sampled from the middle of the screened interval, while well 0815 was sampled while the pump was running (pump intake set 45 ft bgs) during this event.

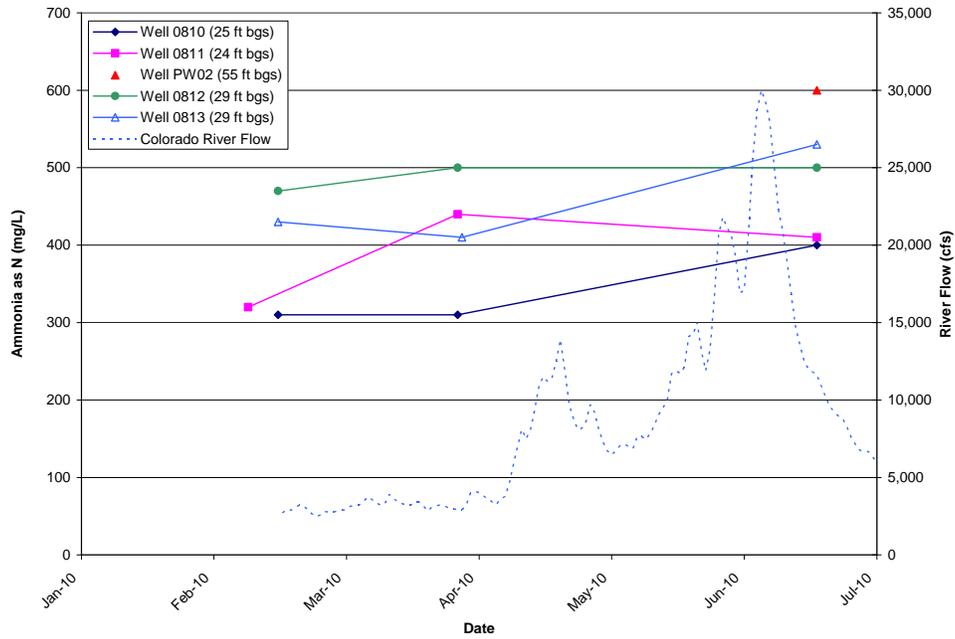


Figure 4. CF5 Extraction Wells 0810, 0811, PW02, 0812, and 0813 Time Versus Ammonia Total as N Concentration Plot

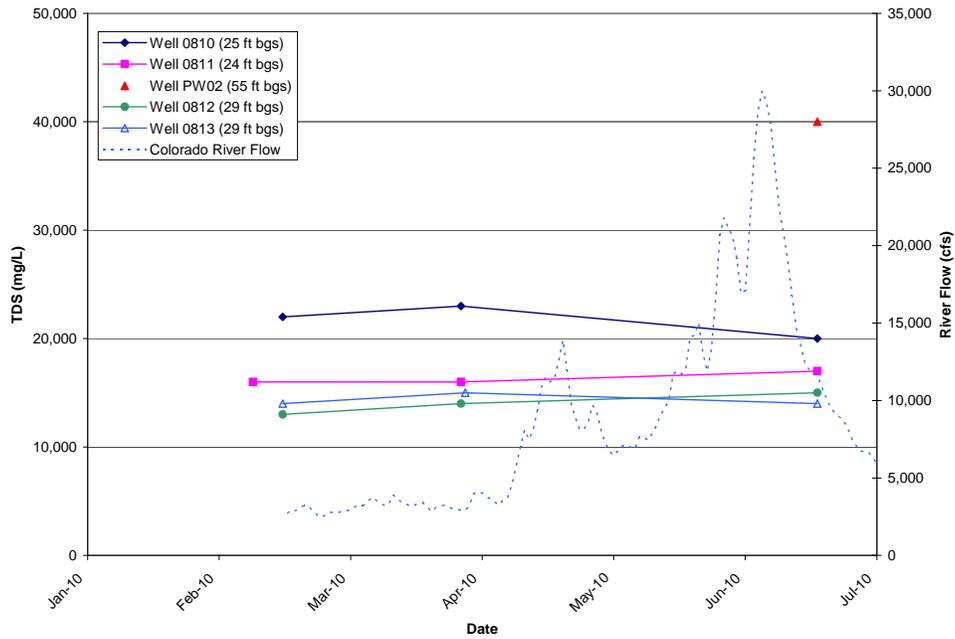


Figure 5. CF5 Extraction Wells 0810, 0811, PW02, 0812, and 0813 Time Versus TDS Concentration Plot

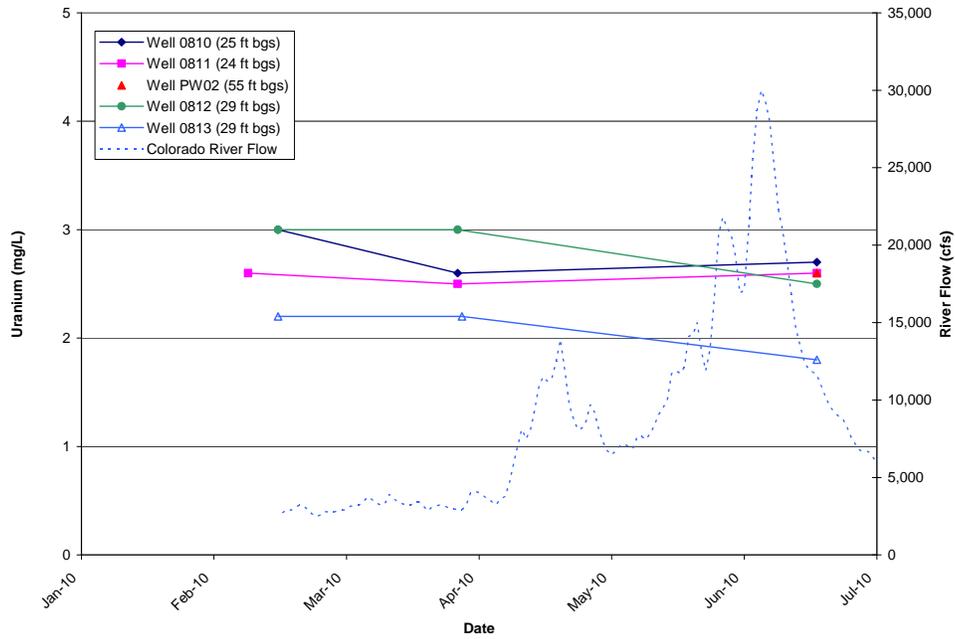


Figure 6. CF5 Extraction Wells 0810, 0811, PW02, 0812, and 0813 Time Versus Uranium Concentration Plot

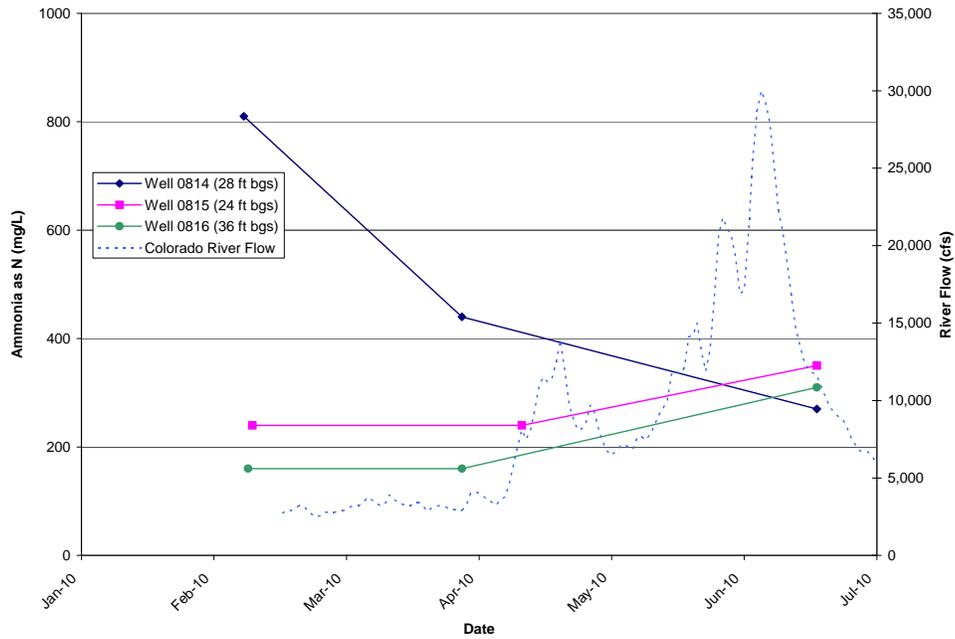


Figure 7. CF5 Extraction Wells 0814, 0815, and 0816 Time Versus Ammonia Total as N Concentration Plot

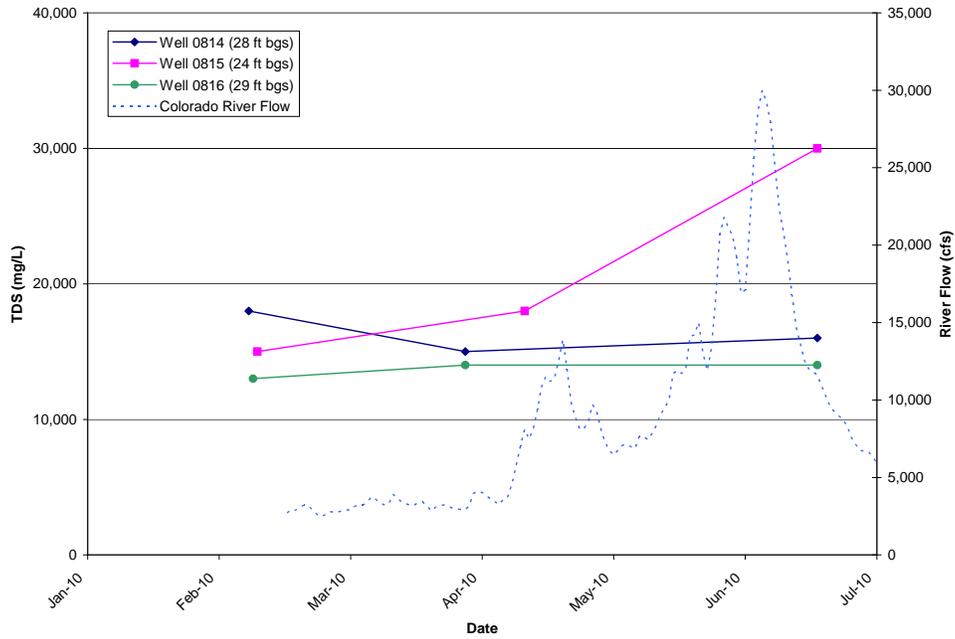


Figure 8. CF5 Extraction Wells 0814, 0815, and 0816 Time Versus TDS Concentration Plot

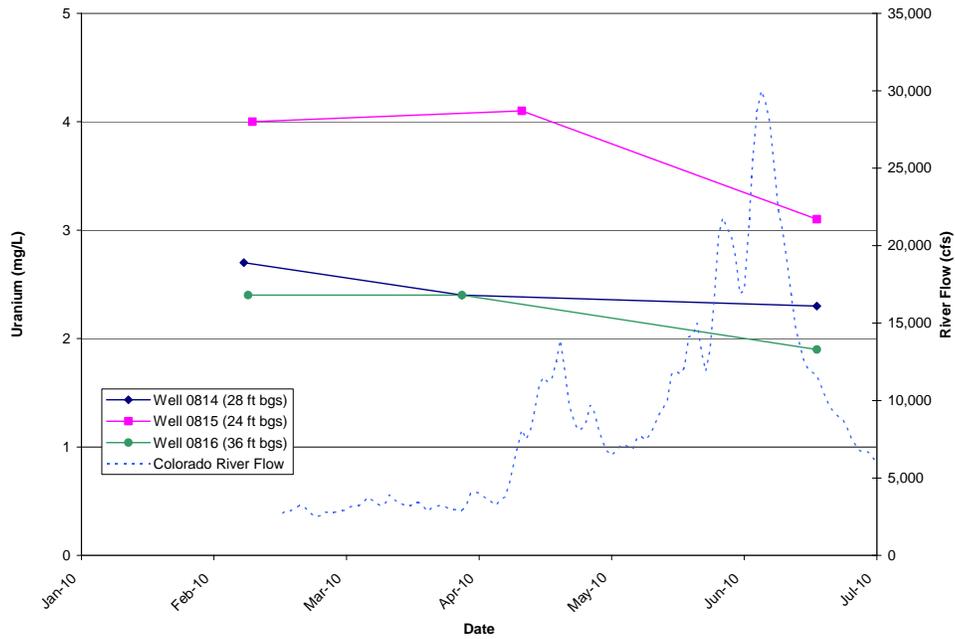


Figure 9. CF5 Extraction Wells 0814, 0815, and 0816 Time Versus Uranium Concentration Plot

PW03 Cluster Wells and Well 0410

Figures 10, 11, and 12 are the time versus ammonia, TDS, and uranium concentration plots (respectively) for the PW03 cluster wells and location 0410 over the past 2 years. All these monitoring wells are located within the area where the ongoing uranium plume delineation investigation is taking place.

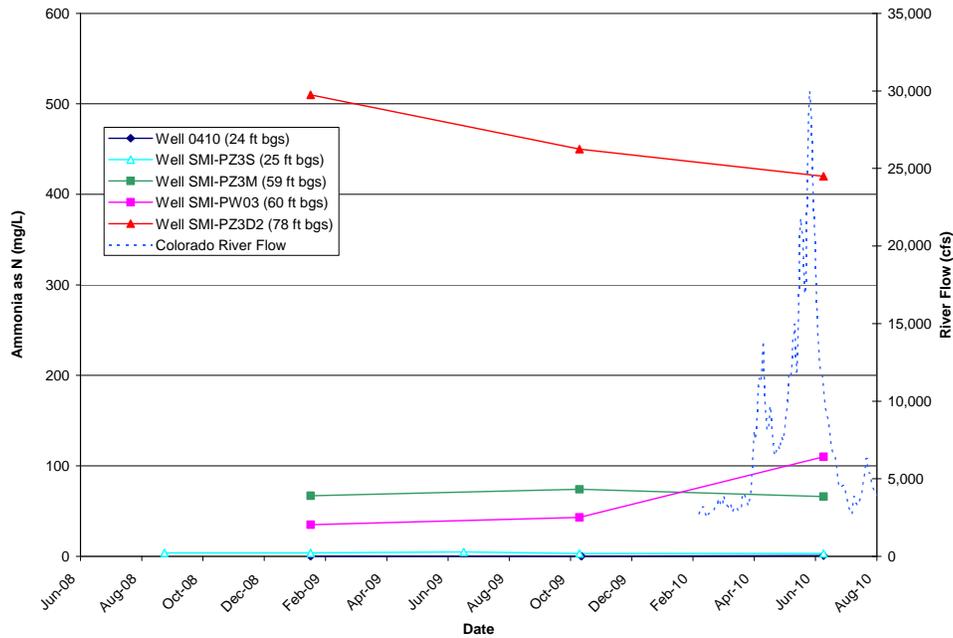


Figure 10. PW03 Cluster and Well 0410 Time Versus Ammonia Total as N Concentration Plot

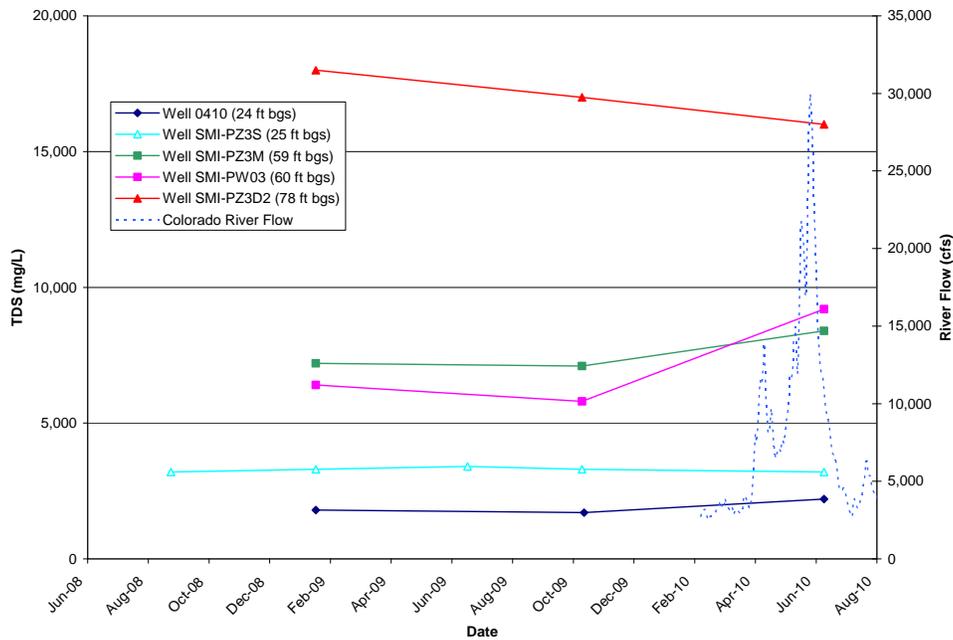


Figure 11. PW03 Cluster and Well 0410 Time Versus TDS Concentration Plot

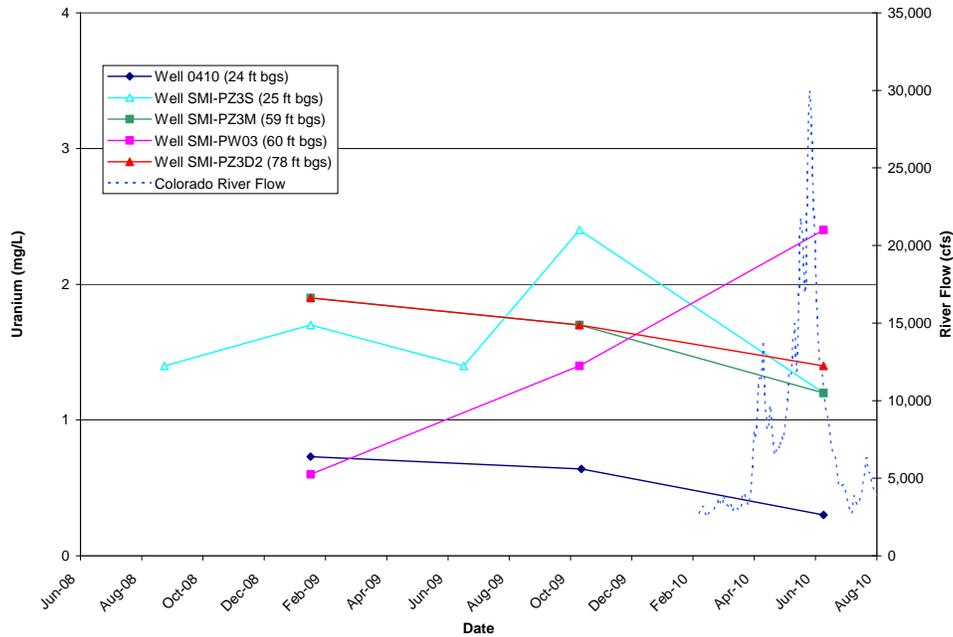


Figure 12. PW03 Cluster and Well 0410 Time Versus Uranium Concentration Plot

Excavation Seep and Evaporation Pond

Both filtered and unfiltered samples were collected from the excavation seep and evaporation pond locations. Table 1 presents the analytical results of the samples collected from the excavation seep location, and Table 2 presents the results of the water stored in the evaporation pond.

Table 1. Analytical Results for the Excavation Seep Samples

Analyte	Filtered Concentration	Unfiltered Concentration
NH ₃ -N	12,000 mg/L	15,000 mg/L
Fluoride	84 mg/L	84 mg/L
Aluminum	130 mg/L	1,000 mg/L
Antimony	0.150 mg/L	0.150 mg/L
Arsenic	0.200 mg/L	0.200 mg/L
Barium	0.009 mg/L	0.009 mg/L
Beryllium	0.085 mg/L	0.089 mg/L
Cadmium	2.4 mg/L	2.5 mg/L
Calcium	460 mg/L	560 mg/L
Chromium	2.0 mg/L	1.8 mg/L
Cobalt	150 mg/L	15 mg/L
Copper	86 mg/L	88 mg/L
Iron	2,500 mg/L	2,600 mg/L
Lead	0.064 mg/L	0.068 mg/L

Table 1. Analytical Results for the Excavation Seep Samples (continued)

Analyte	Filtered Concentration	Unfiltered Concentration
Magnesium	9,700 mg/L	10,000 mg/L
Manganese	300 mg/L	310 mg/L
Nickel	11 mg/L	10 mg/L
Potassium	1,000 mg/L	1,100 mg/L
Selenium	3.8 mg/L	4 mg/L
Silver	0.054 mg/L	0.054 mg/L
Sodium	18,000 mg/L	18,000 mg/L
Thallium	0.310 mg/L	0.180 mg/L
Uranium	5.6 mg/L	5.3 mg/L
Vanadium	440 mg/L	46 mg/L
Zinc	70 mg/L	68 mg/L
Thorium - 228	16 +/- 13 pCi/L	28 +/- 18 pCi/L
Thorium - 230	152000 +/- 24000 pCi/L	151000 +/- pCi/L
Thorium - 232	225 +/- 48 pCi/L	231 +/- 50 pCi/L
Uranium - 234	2500 +/- 390 pCi/L	2270 +/- 350 pCi/L
Uranium - 235	129 +/- 24 pCi/L	125 +/- 24 pCi/L
Uranium-238	2550 +/- 400 pCi/L	2350 +/- 370 pCi/L
Thorium-234	1930 +/- 270	2010 +/- 260 pCi/L
Americum-241	-16 +/- 38 pCi/L	-45 +/- 18 pCi/L
Cerium-144	-14 +/- 25 pCi/L	-2 +/- 31 pCi/L
Cobalt-60	2.8 +/- 5.1 pCi/L	1.5 +/- 4.4 pCi/L
Cesium-134	-2.7 +/- 4.4 pCi/L	-4 +/- 3.8 pCi/L
Cesium-137	1.8 +/- 4.5 pCi/L	0.4 +/- 4.0 pCi/L
Europium-152	6 +/- 22 pCi/L	14.9 +/- 10 pCi/L
Europium-154	-22 +/- 37 pCi/L	-42 +/- 36 pCi/L
Europium-155	-8 +/- 15 pCi/L	-19 +/- 15 pCi/L
Potassium-40	580 +/-140 pCi/L	670 +/- 130 pCi/L
Lead-212	17 +/- 11 pCi/L	37 +/- 11 pCi/L
Promethium-144	-0.3 +/- 4.9 pCi/L	7.1 +/- 4.4 pCi/L

Table 1. Analytical Results for the Excavation Seep Samples (continued)

Analyte	Filtered Concentration	Unfiltered Concentration
Promethium-146	1.3 +/- 4.6 pCi/L	1.0 +/- 4.7 pCi/L
Ruthenium-106	-20 +/- 45 pCi/L	-9 +/- 38 pCi/L
Antimony-125	19.5 +/- 9.8 pCi/L	28.7 +/- 9.9 pCi/L
Thorium-234	1930+- 270 pCi/L	2010 +/- 260 pCi/L
Uranium-235	129 +/- 24 pCi/L	689 +/- 88 pCi/L
Yttrium-88	3.9 +/- 5.1 pCi/L	6.1 +/- 4.9 pCi/L
Actinium-228	7 +/- 15 pCi/L	25 +/- 20 pCi/L
Nitrite as N	5 mg/L	NA
Nitrate as N	970 mg/L	NA

mg/L = milligrams per liter; NA = not applicable; NH₃-N = ammonia; pCi/L = picocuries per liter

Table 2. Analytical Results for the Water Stored in the Evaporation Pond (Location 0548)

Analyte	Filtered Concentration	Unfiltered Concentration
NH3-N	3,600 mg/L	3,500 mg/L
Fluoride	28 mg/L	29 mg/L
Aluminum	100 mg/L	100 mg/L
Antimony	0.150 mg/L	0.150 mg/L
Arsenic	0.200 mg/L	0.200 mg/L
Barium	0.009 mg/L	0.009 mg/L
Beryllium	0.008 mg/L	0.008 mg/L
Cadmium	0.490 mg/L	0.470 mg/L
Calcium	510 mg/L	510 mg/L
Chromium	0.026 mg/L	0.026 mg/L
Cobalt	2.7 mg/L	2.6 mg/L
Copper	13 mg/L	12 mg/L
Iron	120 mg/L	140 mg/L
Lead	0.064 mg/L	0.064 mg/L
Magnesium	2,400 mg/L	2,300 mg/L
Manganese	65 mg/L	62 mg/L
Nickel	2.4 mg/L	2.3 mg/L
Potassium	550 mg/L	530 mg/L
Selenium	0.70 mg/L	0.560 mg/L
Silver	0.50 mg/L	0.054 mg/L
Sodium	14,000 mg/L	14,000 mg/L

Table 2. Analytical Results for the Water Stored in the Evaporation Pond (Location 0548) (continued)

Analyte	Filtered Concentration	Unfiltered Concentration
Thallium	0.018 mg/L	0.180 mg/L
Uranium	3.5 mg/L	3.3 mg/L
Vanadium	0.50 mg/L	0.027 mg/L
Zinc	12 mg/L	12 mg/L
Thorium-228	2.3 +/- 2.7 pCi/L	1.1 +/- 3.5 pCi/L
Thorium -230	3030 +/- 480 pCi/L	1970 +/- 320 pCi/L
Thorium -232	5.8 +/- 2.8 pCi/L	0.9 +/- 1.3 pCi/L
Uranium-234	1680 +/- 260 pCi/L	2990 +/- 490 pCi/L
Uranium -235	74 +/- 13 pCi/L	139 +/- 25 pCi/L
Uranium -238	1640 +/- 260 pCi/L	2990 +/- 490 pCi/L
Thorium-234	630 +/- 110 pCi/L	600 +/- 120 pCi/L
Americum-241	3 +/- 23 pCi/L	12 +/- 34 pCi/L
Cerium-144	14 +/- 17 pCi/L	-7 +/- 21 pCi/L
Cobalt-60	2.6 +/- 2.5 pCi/L	1.7 +/- 4.4 pCi/L
Cesium-134	-1.9 +/- 2.7 pCi/L	-4.0 +/- 4.2 pCi/L
Cesium-137	-0.1 +/- 2.4 pCi/L	-1.0 +/- 3.9 pCi/L
Europium-152	-11 +/- 13 pCi/L	4 +/- 20 pCi/L
Europium-154	-39 +/- 21 pCi/L	-6 +/- 28 pCi/L
Europium-155	5.8 +/- 9.4 pCi/L	-2 +/- 13 pCi/L
Potassium-40	414 +/- 78 pCi/L	335 +/- 97 pCi/L
Lead-212	2.2 +/- 8.0 pCi/L	3.4 +/- 7.6 pCi/L
Promethium-144	-2.0 +/- 4.2 pCi/L	0.5 +/- 3.9 pCi/L
Promethium-146	-0.3 +/- 2.8 pCi/L	-2.1 +/- 4.5 pCi/L
Ruthenium-106	-24 +/- 24 pCi/L	16 +/- 35 pCi/L
Antimony-125	-1.3 +/- 5.7 pCi/L	1.1 +/- 9.9 pCi/L

Table 2. Analytical Results for the Water Stored in the Evaporation Pond (Location 0548) (continued)

Analyte	Filtered Concentration	Unfiltered Concentration
Thorium-234	630 +/- 110 pCi/L	600 +/- 120 pCi/L
Uranium-235	93 +/- 19 pCi/L	98 +/- 22 pCi/L
Yttrium-88	-0.5 +/- 4.1 pCi/L	1.7 +/- 7.4 pCi/L
Actinium-228	11 +/- 11 pCi/L	-3 +/- 27 pCi/L

mg/L = milligrams per liter; NA = not applicable; NH₃-N = ammonia; pCi/L = picocuries per liter

Tailings pore water originating from the excavation was transferred into the evaporation pond starting in March 2010. Figures 13, 14, and 15 are the time versus analyte concentration plots for water stored in the evaporation pond (location 0548). These plots were generated using the evaporation pond level as opposed to the Colorado River flow, as the pond level data is more applicable. As Figures 13, 14, and 15 display, the ammonia, TDS, and uranium concentrations have all increased since the time when this pore water was added to the pond, suggesting the water chemistry signature of this water is significantly different compared to the ground water historically stored in the pond.

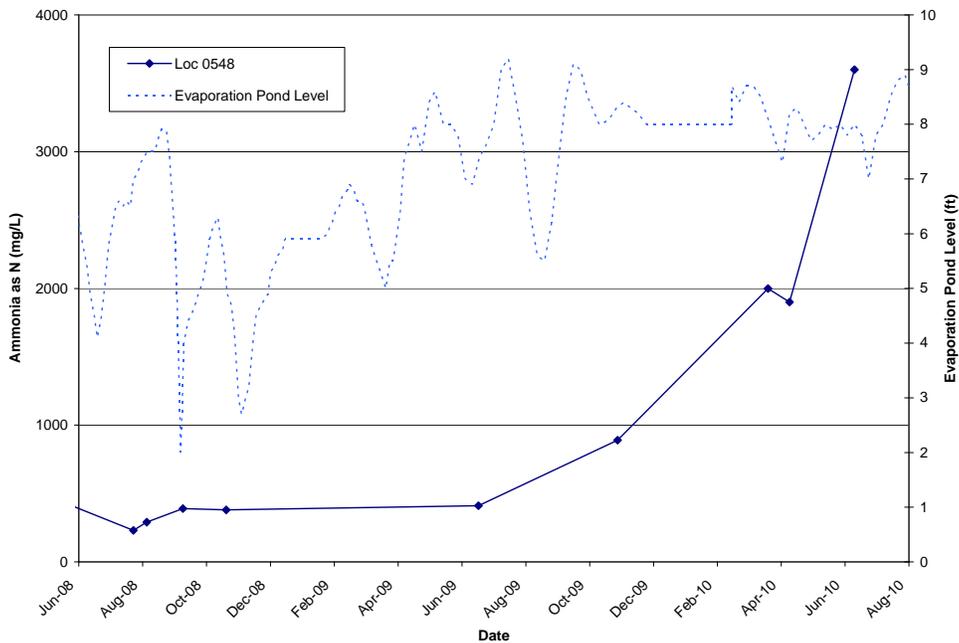


Figure 13. Evaporation Pond Location 0548 Time Versus Ammonia Total as N Concentration Plot

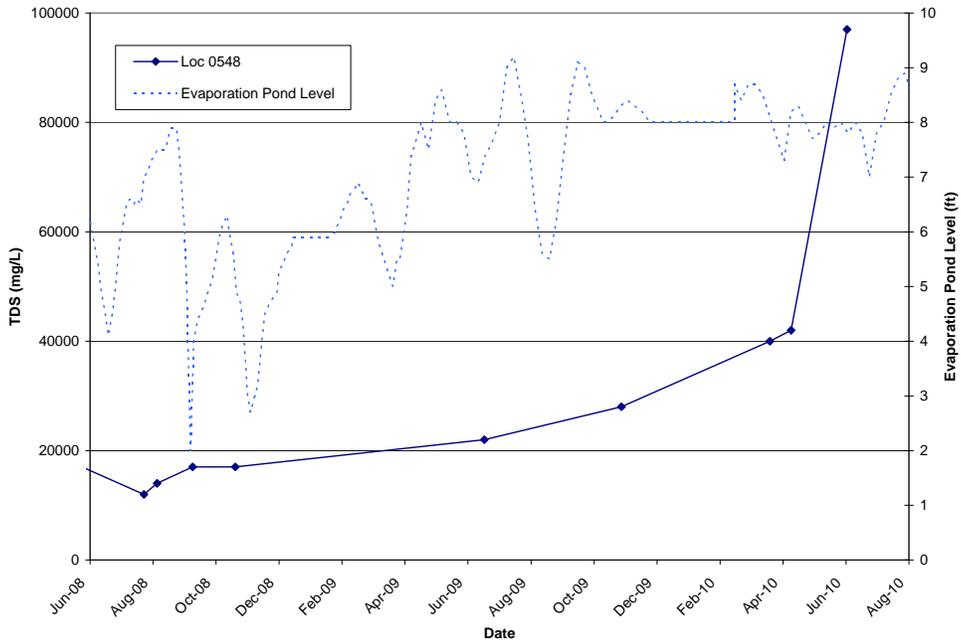


Figure 14. Evaporation Pond Location 0548 Time Versus TDS Concentration Plot

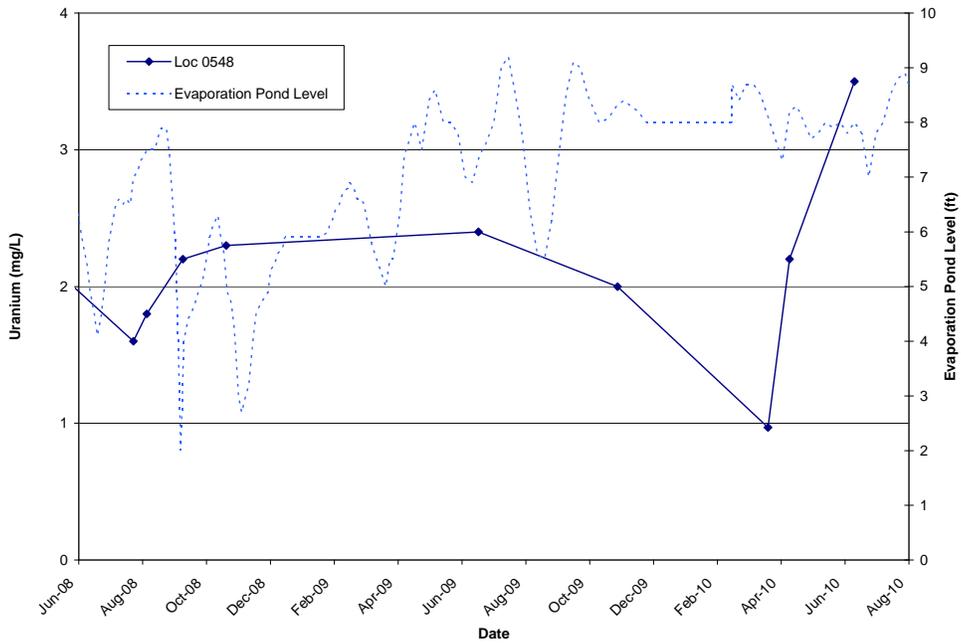


Figure 15. Evaporation Pond Location 0548 Time Versus Uranium Concentration Plot

Surface Water Sampling Results

There were no surface water locations sampled during this sampling event.

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*, June 2008 (DOE-EM/GJ1220). Although not listed here, the normal set of locations were sampled. Please refer to the attached trip reports (Attachments 1 and 2) for specific sampled locations.

The data validations indicate that the data meet the quality-control criteria specified for this project. An adequate number of duplicates were collected; and because some of the samples were collected on non-dedicated equipment, one equipment blank (EB) was collected. All samples were analyzed within their prescribed holding times except as noted in Section 2.2. No significant discrepancies were noted regarding chain of custody (COC), case narratives, presence of field and sample identifications, holding times, preservation, and cooler receipts, except as qualified or noted in the Laboratory Performance Assessment (Section 2.2).

There were three locations with five total anomalous data points. See Section 3.2 for further discussion of these locations and data points.

According to the USGS Cisco gauging station, the mean daily Colorado River flows ranged from 10,200 to 11,600 cubic feet per second (cfs) during these sampling events.

2.0 Data Assessment Summaries

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 these sampling events was documented using the checklist in Appendix A. As the checklist exhibits, all sampling was conducted following the applicable procedures. Please see Appendix A for the field activities verification checklist.

2.2 Laboratory Performance Assessments

2.2.1 General Information – RIN 1006048

RIN: 1006048

Sample Event:	June 2010 IA Well Field Monthly Sampling
Site(s): Moab,	Utah
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Sample Data Group (SDG) Number:	1006270
Analysis:	Metals and Inorganics
Validator: Rachel	Cowan
Review Date:	September 8, 2010

This validation was performed according to the *Environmental Procedures Catalog*, “Standard Practice for Validation of Laboratory Data,” GT-9(P) (2006). The procedure was applied at Level 1, Data Deliverables Examination, on 100 percent of the samples. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 3.

Table 3. Analytes and Methods RIN 1006048

Analyte	Line Item Code	Preparation Method	Analytical Method
Ammonia as N, NH ₃ -N	WCH-A-005	EPA 350.1	EPA 350.1
Total Dissolved Solids	WIC-A-033	EPA 160.1	EPA 160.1
Uranium	G1	SW-846 3005A	SW-846 6020A

Data Qualifier Summary

It was not necessary to qualify any of the data based on this validation process for this RIN.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received a total of 15 samples for RIN 1006048 in one shipment, which arrived on June 25, 2010 (SDG 1006270; UPS tracking number 1Z5W1Y510192298157). This SDG 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.

Preservation and Holding Times

SDG 1006270 was received intact and at appropriate temperature (1.6 degrees Centigrade [°C]). All samples were received in the correct container types and had been preserved correctly for the requested analyses, except for 1006270-5, which was at a pH of 7. ALS corrected the pH upon receipt, and, since this happened in less than 24 hours, no results were qualified. 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.

Matrix Spike and Replicate Analysis

Matrix spike (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 SW-846 6020A, Uranium

The MS sample had a native concentration for uranium that was too high. According to procedure, the uranium results were not qualified for MS failure, but the MSD could not be analyzed either. The field duplicate for uranium passed, thus no uranium results had to be qualified for RS either.

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 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 uranium MS results were acceptable according to the procedure, so no uranium results were flagged.

Method and Calibration Blanks

Method blanks (MBs) are analyzed to assess any contamination that may have occurred during sample preparation. Initial calibration blanks (ICBs) and continuing calibration blanks (CCBs) 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. Non-detects were not qualified. All blanks passed these criteria with the following exceptions.

According to the case narratives, all MBs, ICBs and CCBs 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 serial dilution data were acceptable.

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. One duplicate sample was collected from location 0816-M (1006270-8) in this June 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 5 times the reporting level.

EBs

An EB is a sample of analyte-free media collected from a rinse of non-dedicated sampling equipment used to sample surface water. EBs are collected to document adequate decontamination of non-dedicated equipment. One EB should be prepared with each preparation batch.

Eight extraction well water samples were collected using non-dedicated equipment. One EB was collected and analyzed, so no results from this location were “J”-qualified for this reason. Ammonia and TDS results from the EB were non-detectable. However, the uranium EB result was above its IDL, and was also greater than 5 times its IDL. All uranium results were manually checked. All uranium results were greater than five times the EB’s uranium concentration, so no uranium results needed to be qualified.

Completeness

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

Electronic Data Deliverable Files

The Electronic Data Deliverable (EDD) files arrived on July 1, 2010. The contents of the EDD files were manually examined to verify that the sample results accurately reflected the data contained in the SDG and that all and only the requested data were delivered.

2.2.2 General Information – RIN 1006049

RIN: 1006049

Sample Event: June 2010 IA Well Field Excavation Seep and Evaporation Pond Sampling

Site(s): Moab, Utah

Laboratory: ALS Laboratory Group, Fort Collins, Colorado

Sample Data Group (SDG) Number: 1006269

Analysis: Ga mma Spectroscopy, Inorganics, Isotopic Thorium, Isotopic Uranium, and Metals

Validator: Rachel Cowan

Review Date: September 9, 2010

This validation was performed according to the *Environmental Procedures Catalog*, “Standard Practice for Validation of Laboratory Data,” GT-9(P) (2006). The procedure was applied at Level 1, Data Deliverables Examination. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 4.

Table 4. Analytes and Methods RIN 1006049

Analyte	Line Item Code	Preparation Method	Analytical Method
Actinium-228	GAM-A-001	SOP739R9	SOP713R11
Aluminum	MET-A-019	SW-846 3005A	SW-846 6010B
Americium-241	GAM-A-001	SOP739R9	SOP713R11
Ammonia as N, NH ₃ -N	WCH-A-005	EPA 350.1	EPA 350.1
Antimony	MET-A-019	SW-846 3005A	SW-846 6010B
Antimony-125	GAM-A-001	SOP739R9	SOP713R11
Arsenic	MET-A-019	SW-846 3005A	SW-846 6010B
Barium	MET-A-019	SW-846 3005A	SW-846 6010B
Beryllium	MET-A-019	SW-846 3005A	SW-846 6010B
Cadmium	MET-A-019	SW-846 3005A	SW-846 6010B

Table 4. Analytes and Methods RIN 1006049 (continued)

Analyte	Line Item Code	Preparation Method	Analytical Method
Calcium	MET-A-019	SW-846 3005A	SW-846 6010B
Cerium-144	GAM-A-001	SOP739R9	SOP713R11
Cesium-134	GAM-A-001	SOP739R9	SOP713R11
Cesium-137	GAM-A-001	SOP739R9	SOP713R11
Chromium	MIS-A-039	SW-846 3005A	SW-846 6010B
Cobalt	MET-A-019	SW-846 3005A	SW-846 6010B
Cobalt-60	GAM-A-001	SOP739R9	SOP713R11
Copper	MET-A-019	SW-846 3005A	SW-846 6010B
Europium-152	GAM-A-001	SOP739R9	SOP713R11
Europium-154	GAM-A-001	SOP739R9	SOP713R11
Europium-155	GAM-A-001	SOP739R9	SOP713R11
Fluoride		SW-846 9056	SW-846 9056
Iron	MET-A-019	SW-846 3005A	SW-846 6010B
Lead	MET-A-019	SW-846 3005A	SW-846 6010B
Magnesium	MET-A-020	SW-846 3005A	SW-846 6010B
Manganese	G17	SW-846 3005A	SW-846 6010B
Mercury		SW-846 7470A	SW-846 7470A
Nickel	MET-A-019	SW-846 3005A	SW-846 6010B
Nitrate as N		SW-846 9056	SW-846 9056
Nitrite as N		SW-846 9056	SW-846 9056
Potassium	MET-A-019	SW-846 3005A	SW-846 6010B
Potassium-40	GAM-A-001	SOP739R9	SOP713R11
Promethium-144	GAM-A-001	SOP739R9	SOP713R11
Promethium-146	GAM-A-001	SOP739R9	SOP713R11
Ruthenium-106	GAM-A-001	SOP739R9	SOP713R11
Selenium	G14	SW-846 3005A	SW-846 6010B
Silver	MET-A-019	SW-846 3005A	SW-846 6010B
Sodium	MET-A-019	SW-846 3005A	SW-846 6010B
Thallium	MET-A-019	SW-846 3005A	SW-846 6010B
Thorium	MET-A-019	SW-846 3005A	SW-846 6020A
Isotopic Thorium		SOP776R11	SOP714R12
Vanadium	MET-A-019	SW-846 3005A	SW-846 6010B
Uranium	G1	SW-846 3005A	SW-846 6020A
Isotopic Uranium		SOP776R11	SOP714R12
Yttrium-80	GAM-A-001	SOP739R9	SOP713R11
Zinc	MET-A-019	SW-846 3005A	SW-846 6010B

Data Qualifier Summary

Analytical results were qualified as listed in Table 5. Refer to Table 6 for an explanation of the data qualifiers applied.

Table 5. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1006269-1 through -4	0548-F, 548-U, Excavation Seep-F, Excavation Seep-U	Nitrite as N	J	RS1
1006269-1 through -2	0548-F, 548-U	Aluminum, Cadmium, Calcium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Potassium 40, Selenium, Sodium, Thorium-232, Thorium-234, Uranium-234, Uranium- 235, Uranium-238, Vanadium, Zinc	J	B1
1006269-1 through -2	0548-F, 548-U	Aluminum, Cadmium, Calcium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc	J	MS1, RS1, SD1
1006269-3	Excavation Seep-F	Aluminum, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc	J	MS1, RS1
1006269-4	Excavation Seep-U	Aluminum, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Selenium, Sodium, Thorium, Vanadium, Zinc	J	MS1, RS1
1006269-1 through -4	0548-F, 548-U, Excavation Seep-F, Excavation Seep-U	Thorium	J	RS1

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

Table 6. Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Non-Detects)	Explanation
B1	J	NA	The blank frequency criteria were not met with respect to an EB.
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	U	SD sample frequency criteria were not met.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received a total of four samples for RIN 1006049 in one shipment of two coolers, which arrived on June 25, 2010 (UPS tracking numbers 1Z5W1Y510194246140 and 1Z5W1Y510192298157). 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.

Preservation and Holding Times

SDG 1006269 was received intact in two coolers with the temperatures inside both to be 1.6°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 certain sample bottles which had to have their pH adjusted immediately upon receipt to less than two. However, since this occurred less than 24 hours after collection and all samples were analyzed within the applicable holding times, nothing was qualified for this reason.

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. RS analysis consists of 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 SW-846 9056, Nitrite as N

The nitrite as N MS sample from SDG 1006269 selected for testing matrix-specific quality control had too high a nitrite concentration. As per procedure, the nitrite result was not flagged for MS1, but since the MSD failed and there was no nitrite field duplicate (a form of RS), the nitrite result was flagged for RS1.

Method SW-846 6010B, Aluminum, Cadmium, Calcium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc

There were no samples from SDG 1006269 selected for testing matrix-specific quality control samples for aluminum, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, and zinc. Therefore, there were no MSs for these elements, so all SDG 1006269 aluminum, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, and zinc results were flagged for MS1. There were no MSDs or field duplicates for these elements in SDG 1006269, so these results were also flagged for RS1.

LCS

An 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. All LCSs passed requirements, so there were no flags for this reason.

Method and Calibration Blanks

MBs are analyzed to assess any contamination that may have occurred during sample preparation. ICBs and CCBs are analyzed to assess instrument contamination prior to and during sample analysis. Detected sample results associated with blanks results greater than the IDL (depending on method requirements) were “J”-qualified when the detections were less than five times the associated blank concentration. Non-detects were not qualified. All blanks passed these criteria.

Metals SD

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

Method SW-846 6010B, Aluminum, Cadmium, Calcium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Selenium, Sodium, Vanadium, Zinc

Since no SD samples were selected for aluminum, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, and zinc, 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 non-dedicated sampling equipment used to sample surface water. EBs are collected to document adequate decontamination of non-dedicated equipment. One EB should be prepared with each preparation batch.

Two of the samples were collected using non-dedicated equipment (locations 0548-U and 0548-F). There were no EBs collected and analyzed, so all results from all analytes from these locations that were not non-detectable were “J”-qualified for reason B1.

Completeness

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

EDD Files

The EDD files arrived on July 31, 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 June 2010 monthly sampling events.

Field Activities

All monitor wells were purged and sampled using the low-flow sampling method; this method was not used at extraction wells. One duplicate and one EB 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.

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), tables 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 reports 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 less or more than 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 five 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.

Any results that are considered anomalous based on the minimums and maximums report are listed below.

Loc. No.	Analyte	Type of Anomaly	Disposition
0410	ammonia	high	Less than 10 samples collected from this location analyzed for this analyte, still establishing range.
0548	ammonia	high	Water quality of evaporation pond impacted by tailings pore water transferred to pond.
0548	copper	high	Water quality of evaporation pond impacted by tailings pore water transferred to pond.
0548	selenium	high	Water quality of evaporation pond impacted by tailings pore water transferred to pond.
SMI-PW03	ammonia	high	Will continue sampling location, monitor analyte concentration changes.

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

An EB is a sample of analyte-free media collected from a rinse of non-dedicated sampling equipment used to sample surface water. EBs are collected to document adequate decontamination of non-dedicated equipment. One EB should be prepared with each preparation batch.

Eight extraction well water samples were collected using non-dedicated equipment. One EB was collected and analyzed for 15 samples, which met procedure. Ammonia and TDS results from the EB were non-detectable. However, the uranium EB result was above its IDL and was also greater than five times its IDL, although it was below the RL. All uranium results were manually checked. All uranium results were greater than five times the EB uranium concentration, so no uranium results needed to be qualified.

3.6 Conclusions

This report discusses the data validation for samples collected during two June 2010 sampling events. Even though 15 locations were sampled over only a 3-day period, it was necessary to assign two different RIN numbers because of the significantly different analytes requested for the laboratory analysis. In total, 19 samples were collected from the CF5 extraction wells, the PW03 cluster and well 0410 (which are located in the vicinity of the ongoing uranium plume delineation investigation), the evaporation pond, and the pore water seeping into the excavation (excavation seep).

The CF5 sampling indicated the ammonia, TDS, and uranium concentrations did not significantly change since these locations were first sampled in February 2010 despite the changes in the Colorado River stage. This response was expected due to the distance these extraction wells are located away from the river bank.

The sampling locations in the vicinity of the uranium plume delineation investigation indicated the analyte concentrations in general stayed within historical ranges. Well 410 was recently replaced (after the original well was damaged), and this sample collected in June 2010 represents the first time this new well has been sampled.

The sample collected from the water stored in the evaporation pond exhibited the impacts of pore water from the excavation being transferred into the pond. Significant increases in ammonia, copper, selenium, TDS, and uranium were observed since March 2010, at which time this transfer was initiated. A summary of the analytical results associated with this excavation seep sample are provided in Table 4. Sampling results of the excavation seep indicate the highest concentrations of contaminants on site.

Appendix A.
Water Sampling Field Activities Verification

Appendix A. Water Sampling Field Activities Verification (continued)

Sampling Event / RIN	June 2010 RINs 1006048 and 1009049	Date(s) of Water Sampling	June 22 - 24, 2010
Date(s) of Verification	September 8, 2010	Name of Verifier	Rachel Cowan

	Response (Yes, No, NA)	
1. Is the Sampling 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?	Yes	See Section 1.1 for specific details.
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?	No	There was no category specified for well 0815.
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?	Yes	
Was the flow rate less than 500 milliliters per minute?	Yes	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	NA	
8. Were the following conditions met when purging a Category II well: Was the flow rate less than 500 milliliters per minute? Was one pump/tubing volume removed prior to sampling?	Yes	
	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	There were a total of 19 samples collected, including one duplicate.
10. Were EBs taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	Yes	One EB was collected between these two RINs.

Appendix A. Water Sampling Field Activities Verification (continued)

Sampling Event / RIN	June 2010 RINs 1006048 and 1009049	Date(s) of Water Sampling	June 22 - 24, 2010
Date(s) of Verification	September 8, 2010	Name of Verifier	Rachel Cowan

	Response (Yes, No, NA)	Comments
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?	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

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: ALS Laboratory Group (Fort Collins, CO)

RIN: 1006048 and 1006049

Comparison: All Historical Data

Report Date: 9/13/2010

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	0410	06/23/2010	Ammonia Total as N	0.7			0.1			0.0125	B	FQ	6	2
MOA01	0410	06/23/2010	Total Dissolved Solids	2200			1880			1700		FQ	5	0
MOA01	0548	06/242010	Ammonia Total as N	3600			2000	J		230		J	46	0
MOA01	0548	06/242010	Copper	13	J		0.026	B		0.0044	U		10	6
MOA01	0548	06/242010	Selenium	0.77	J		0.35			0.0033			12	0
MOA01	SMI-PW03	06/23/2010	Ammonia Total as N	110			53			30			14	0
MOA01	SMI-PW03	06/23/2010	Total Dissolved Solids	9200			7640			5800			13	0
MOA01	SMI-PZ3D2	06/23/2010	Total Dissolved Solids	16000			19700	F		17000			7	0
MOA01	SMI-PZ3M	06/23/2010	Total Dissolved Solids	8400			7200			5260		F	7	0
MOA01	SMI-PZ3S	06/23/2010	Total Dissolved Solids	3200			3720			32			13	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 micrometer); 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 the 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 Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier; see case narrative.

DATA QUALIFIERS:

- | | | | | | |
|---|--|---|---|---|------------------|
| F | Low-flow sampling method used. | G | Possible grout contamination, pH > 9. | J | Estimated value. |
| L | Less than 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 – RIN 1006048

Appendix C. Water Quality Data – RIN 1006048

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 9/2/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
								Lab	Data QA		
Ammonia Total as N	mg/L	0410	WL	06/23/2010	0001	22.5 - 22.5	0.7		0	0.1	
Ammonia Total as N	mg/L	0810	WL	06/22/2010	0001	25.5 - 25.5	400		0	20	
Ammonia Total as N	mg/L	0811	WL	06/22/2010	0001	23.5 - 23.5	410		0	20	
Ammonia Total as N	mg/L	0812	WL	06/22/2010	0001	29 - 29	500		0	20	
Ammonia Total as N	mg/L	0813	WL	06/22/2010	0001	29 - 29	530		0	20	
Ammonia Total as N	mg/L	0814	WL	06/22/2010	0001	28 - 28	270		0	20	
Ammonia Total as N	mg/L	0815	WL	06/22/2010	0001	25 - 25	350		0	20	
Ammonia Total as N	mg/L	0816	WL	06/22/2010	0001	36 - 36	310		0	20	
Ammonia Total as N	mg/L	0816	WL	06/22/2010	0002	36 - 36	320		0	20	
Ammonia Total as N	mg/L	SMI-PW02	WL	06/22/2010	0001	55 - 55	600		0	20	
Ammonia Total as N	mg/L	SMI-PW03	WL	06/23/2010	0001	60 - 60	110		0	5	
Ammonia Total as N	mg/L	SMI-PZ3D2	WL	06/23/2010	0001	78 - 78	420		0	20	
Ammonia Total as N	mg/L	SMI-PZ3M	WL	06/23/2010	0001	59 - 59	66		0	2	
Ammonia Total as N	mg/L	SMI-PZ3S	WL	06/23/2010	0001	25 - 25	3.1		0	0.1	
Dissolved Oxygen	mg/L	0410	WL	06/23/2010	0001	22.5 - 22.5	0.68		0		
Dissolved Oxygen	mg/L	0810	WL	06/22/2010	0001	25.5 - 25.5	0.21		0		
Dissolved Oxygen	mg/L	0811	WL	06/22/2010	0001	23.5 - 23.5	0.15		0		
Dissolved Oxygen	mg/L	0812	WL	06/22/2010	0001	29 - 29	0.16		0		
Dissolved Oxygen	mg/L	0813	WL	06/22/2010	0001	29 - 29	0.21		0		
Dissolved Oxygen	mg/L	0814	WL	06/22/2010	0001	28 - 28	0		0		
Dissolved Oxygen	mg/L	0815	WL	06/22/2010	0001	25 - 25	5.75		0		
Dissolved Oxygen	mg/L	0816	WL	06/22/2010	0001	36 - 36	0.4		0		
Dissolved Oxygen	mg/L	SMI-PW02	WL	06/22/2010	0001	55 - 55	2.48		0		
Dissolved Oxygen	mg/L	SMI-PW03	WL	06/23/2010	0001	60 - 60	3.39		0		
Dissolved Oxygen	mg/L	SMI-PZ3D2	WL	06/23/2010	0001	78 - 78	0.19		0		

Appendix C. Water Quality Data – RIN 1006048 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/2/2010

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	SMI-PZ3M	WL	06/23/2010	0001	59	-	59	0.48			#		
Dissolved Oxygen	mg/L	SMI-PZ3S	WL	06/23/2010	0001	25	-	25	0.12			#		
Oxidation Reduction Potential	mV	0410	WL	06/23/2010	0001	22.5	-	22.5	-77.1			#		
Oxidation Reduction Potential	mV	0810	WL	06/22/2010	0001	25.5	-	25.5	109.1			#		
Oxidation Reduction Potential	mV	0811	WL	06/22/2010	0001	23.5	-	23.5	116.1			#		
Oxidation Reduction Potential	mV	0812	WL	06/22/2010	0001	29	-	29	120.2			#		
Oxidation Reduction Potential	mV	0813	WL	06/22/2010	0001	29	-	29	105.8			#		
Oxidation Reduction Potential	mV	0814	WL	06/22/2010	0001	28	-	28	78.6			#		
Oxidation Reduction Potential	mV	0815	WL	06/22/2010	0001	25	-	25	130.9			#		
Oxidation Reduction Potential	mV	0816	WL	06/22/2010	0001	36	-	36	122.9			#		
Oxidation Reduction Potential	mV	SMI-PW02	WL	06/22/2010	0001	55	-	55	225.6			#		
Oxidation Reduction Potential	mV	SMI-PW03	WL	06/23/2010	0001	60	-	60	29			#		
Oxidation Reduction Potential	mV	SMI-PZ3D2	WL	06/23/2010	0001	78	-	78	92.9			#		
Oxidation Reduction Potential	mV	SMI-PZ3M	WL	06/23/2010	0001	59	-	59	5			#		
Oxidation Reduction Potential	mV	SMI-PZ3S	WL	06/23/2010	0001	25	-	25	-3.5			#		
pH	s.u.	0410	WL	06/23/2010	0001	22.5	-	22.5	7.38			#		
pH	s.u.	0810	WL	06/22/2010	0001	25.5	-	25.5	6.8			#		
pH	s.u.	0811	WL	06/22/2010	0001	23.5	-	23.5	6.68			#		
pH	s.u.	0812	WL	06/22/2010	0001	29	-	29	6.54			#		
pH	s.u.	0813	WL	06/22/2010	0001	29	-	29	6.71			#		
pH	s.u.	0814	WL	06/22/2010	0001	28	-	28	6.99			#		
pH	s.u.	0815	WL	06/22/2010	0001	25	-	25	7.01			#		
pH	s.u.	0816	WL	06/22/2010	0001	36	-	36	6.86			#		
pH	s.u.	SMI-PW02	WL	06/22/2010	0001	55	-	55	6.64			#		

Appendix C. Water Quality Data – RIN 1006048 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/2/2010

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.	SMI-PW03	WL	06/23/2010	0001	60	- 60	7.34			#	
pH	s.u.	SMI-PZ3D2	WL	06/23/2010	0001	78	- 78	7.1			#	
pH	s.u.	SMI-PZ3M	WL	06/23/2010	0001	59	- 59	7.34			#	
pH	s.u.	SMI-PZ3S	WL	06/23/2010	0001	25	- 25	8.15			#	
Specific Conductance	µmhos/cm	0410	WL	06/23/2010	0001	22.5	- 22.5	4346			#	
Specific Conductance	µmhos/cm	0810	WL	06/22/2010	0001	25.5	- 25.5	25546			#	
Specific Conductance	µmhos/cm	0811	WL	06/22/2010	0001	23.5	- 23.5	22527			#	
Specific Conductance	µmhos/cm	0812	WL	06/22/2010	0001	29	- 29	19333			#	
Specific Conductance	µmhos/cm	0813	WL	06/22/2010	0001	29	- 29	19104			#	
Specific Conductance	µmhos/cm	0814	WL	06/22/2010	0001	28	- 28	21655			#	
Specific Conductance	µmhos/cm	0815	WL	06/22/2010	0001	25	- 25	39937			#	
Specific Conductance	µmhos/cm	0816	WL	06/22/2010	0001	36	- 36	18511			#	
Specific Conductance	µmhos/cm	SMI-PW02	WL	06/22/2010	0001	55	- 55	52974			#	
Specific Conductance	µmhos/cm	SMI-PW03	WL	06/23/2010	0001	60	- 60	13955			#	
Specific Conductance	µmhos/cm	SMI-PZ3D2	WL	06/23/2010	0001	78	- 78	22617			#	
Specific Conductance	µmhos/cm	SMI-PZ3M	WL	06/23/2010	0001	59	- 59	13170			#	
Specific Conductance	µmhos/cm	SMI-PZ3S	WL	06/23/2010	0001	25	- 25	5670			#	
Temperature	C	0410	WL	06/23/2010	0001	22.5	- 22.5	19.19			#	
Temperature	C	0810	WL	06/22/2010	0001	25.5	- 25.5	19.78			#	
Temperature	C	0811	WL	06/22/2010	0001	23.5	- 23.5	19.68			#	
Temperature	C	0812	WL	06/22/2010	0001	29	- 29	18.3			#	
Temperature	C	0813	WL	06/22/2010	0001	29	- 29	18.62			#	
Temperature	C	0814	WL	06/22/2010	0001	28	- 28	21.63			#	
Temperature	C	0815	WL	06/22/2010	0001	25	- 25	17.98			#	

Appendix C. Water Quality Data – RIN 1006048 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/2/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data		QA			
Temperature	C	0816	WL	06/22/2010	0001	36	- 36	19.05		#		
Temperature	C	SMI-PW02	WL	06/22/2010	0001	55	- 55	16.48		#		
Temperature	C	SMI-PW03	WL	06/23/2010	0001	60	- 60	18.31		#		
Temperature	C	SMI-PZ3D2	WL	06/23/2010	0001	78	- 78	19.44		#		
Temperature	C	SMI-PZ3M	WL	06/23/2010	0001	59	- 59	18.36		#		
Temperature	C	SMI-PZ3S	WL	06/23/2010	0001	25	- 25	18.14		#		
Total Dissolved Solids	mg/L	0410	WL	06/23/2010	0001	22.5	- 22.5	2200		#	80	
Total Dissolved Solids	mg/L	0810	WL	06/22/2010	0001	25.5	- 25.5	20000		#	400	
Total Dissolved Solids	mg/L	0811	WL	06/22/2010	0001	23.5	- 23.5	17000		#	200	
Total Dissolved Solids	mg/L	0812	WL	06/22/2010	0001	29	- 29	15000		#	200	
Total Dissolved Solids	mg/L	0813	WL	06/22/2010	0001	29	- 29	14000		#	200	
Total Dissolved Solids	mg/L	0814	WL	06/22/2010	0001	28	- 28	16000		#	200	
Total Dissolved Solids	mg/L	0815	WL	06/22/2010	0001	25	- 25	30000		#	400	
Total Dissolved Solids	mg/L	0816	WL	06/22/2010	0001	36	- 36	14000		#	200	
Total Dissolved Solids	mg/L	0816	WL	06/22/2010	0002	36	- 36	14000		#	200	
Total Dissolved Solids	mg/L	SMI-PW02	WL	06/22/2010	0001	55	- 55	40000		#	400	
Total Dissolved Solids	mg/L	SMI-PW03	WL	06/23/2010	0001	60	- 60	9200		#	200	
Total Dissolved Solids	mg/L	SMI-PZ3D2	WL	06/23/2010	0001	78	- 78	16000		#	400	
Total Dissolved Solids	mg/L	SMI-PZ3M	WL	06/23/2010	0001	59	- 59	8400		#	200	
Total Dissolved Solids	mg/L	SMI-PZ3S	WL	06/23/2010	0001	25	- 25	3200		#	80	
Turbidity	NTU	0410	WL	06/23/2010	0001	22.5	- 22.5	53.6		#		
Turbidity	NTU	0810	WL	06/22/2010	0001	25.5	- 25.5	1.88		#		
Turbidity	NTU	0811	WL	06/22/2010	0001	23.5	- 23.5	0.59		#		
Turbidity	NTU	0812	WL	06/22/2010	0001	29	- 29	2.2		#		
Turbidity	NTU	0813	WL	06/22/2010	0001	29	- 29	3.05		#		

Appendix C. Water Quality Data – RIN 1006048 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/2/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data		QA			
Turbidity	NTU	0814	WL	06/22/2010	0001	28	- 28	6.75		#		
Turbidity	NTU	0816	WL	06/22/2010	0001	36	- 36	3.24		#		
Turbidity	NTU	SMI-PW02	WL	06/22/2010	0001	55	- 55	3.79		#		
Turbidity	NTU	SMI-PW03	WL	06/23/2010	0001	60	- 60	19.9		#		
Turbidity	NTU	SMI-PZ3D2	WL	06/23/2010	0001	78	- 78	7.32		#		
Turbidity	NTU	SMI-PZ3M	WL	06/23/2010	0001	59	- 59	3.08		#		
Turbidity	NTU	SMI-PZ3S	WL	06/23/2010	0001	25	- 25	5.03		#		
Uranium	mg/L	0410	WL	06/23/2010	0001	22.5	- 22.5	0.3		#	2.9E-005	
Uranium	mg/L	0810	WL	06/22/2010	0001	25.5	- 25.5	2.7		#	0.00058	
Uranium	mg/L	0811	WL	06/22/2010	0001	23.5	- 23.5	2.6		#	0.00058	
Uranium	mg/L	0812	WL	06/22/2010	0001	29	- 29	2.5		#	0.00058	
Uranium	mg/L	0813	WL	06/22/2010	0001	29	- 29	1.8		#	0.00058	
Uranium	mg/L	0814	WL	06/22/2010	0001	28	- 28	2.3		#	0.00058	
Uranium	mg/L	0815	WL	06/22/2010	0001	25	- 25	3.1		#	0.00058	
Uranium	mg/L	0816	WL	06/22/2010	0001	36	- 36	1.9		#	0.00058	
Uranium	mg/L	0816	WL	06/22/2010	0002	36	- 36	1.9		#	0.00058	
Uranium	mg/L	SMI-PW02	WL	06/22/2010	0001	55	- 55	2.6		#	0.00058	
Uranium	mg/L	SMI-PW03	WL	06/23/2010	0001	60	- 60	2.4		#	0.00058	
Uranium	mg/L	SMI-PZ3D2	WL	06/23/2010	0001	78	- 78	1.4		#	0.00058	
Uranium	mg/L	SMI-PZ3M	WL	06/23/2010	0001	59	- 59	1.2		#	0.00058	
Uranium	mg/L	SMI-PZ3S	WL	06/23/2010	0001	25	- 25	1.2		#	0.00058	

BLS = 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

Appendix C. Water Quality Data – RIN 1006048 (continued)

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 Quality Data – RIN 1006049

Appendix D. Water Quality Data – RIN 1006049

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
										Lab	Data		
Actinium-228	pCi/L	0548	TS	06/24/2010	0001	0	-	0	21	U	#	21	11
Actinium-228	pCi/L	0548	TS	06/24/2010	N001	0	-	0	46	U	#	46	27
Actinium-228	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	28	U	#	28	15
Actinium-228	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	38	U	#	38	20
Aluminum	mg/L	0548	TS	06/24/2010	0001	0	-	0	100		J #	0.76	
Aluminum	mg/L	0548	TS	06/24/2010	N001	0	-	0	100		J #	0.76	
Aluminum	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	1300		J #	0.76	
Aluminum	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	1000		J #	0.76	
Americium-241	pCi/L	0548	TS	06/24/2010	0001	0	-	0	38	U	#	38	23
Americium-241	pCi/L	0548	TS	06/24/2010	N001	0	-	0	57	U	#	57	34
Americium-241	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	64	U	#	64	38
Americium-241	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	30	U	#	30	18
Ammonia Total as N	mg/L	0548	TS	06/24/2010	0001	0	-	0	3600		#	100	
Ammonia Total as N	mg/L	0548	TS	06/24/2010	N001	0	-	0	3500		#	100	
Ammonia Total as N	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	12000		#	500	
Ammonia Total as N	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	15000		#	500	
Antimony	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.15	U	#	0.15	
Antimony	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.15	U	#	0.15	
Antimony	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	0.15	U	#	0.15	
Antimony	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	0.15	U	#	0.15	
Antimony-125	pCi/L	0548	TS	06/24/2010	0001	0	-	0	9.7	U	#	9.7	5.7

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range			Result	Lab	Qualifiers		Detection Limit	Uncertainty
				Date	ID	(Ft BLS)	Data	QA						
Antimony-125	pCi/L	0548	TS	06/24/2010	N001	0	-	0	16.7	U	#	16.7	9.9	
Antimony-125	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	19.5	TI	#	14.5	9.8	
Antimony-125	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	28.7	TI	#	13.7	9.9	
Arsenic	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.2	U	#	0.2		
Arsenic	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.2	U	#	0.2		
Arsenic	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	0.2	U	#	0.2		
Arsenic	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	0.2	U	#	0.2		
Barium	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.0093	U	#	0.0093		
Barium	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.0093	U	#	0.0093		
Barium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	0.0093	U	#	0.0093		
Barium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	0.0093	U	#	0.0093		
Beryllium	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.0088	U	#	0.0088		
Beryllium	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.0088	U	#	0.0088		
Beryllium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	0.085	B	#	0.0088		
Beryllium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	0.089	B	#	0.0088		
Cadmium	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.49		J #	0.016		
Cadmium	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.47		J #	0.016		
Cadmium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	2.4		J #	0.016		
Cadmium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	2.5		J #	0.016		
Calcium	mg/L	0548	TS	06/24/2010	0001	0	-	0	510		J #	0.6		
Calcium	mg/L	0548	TS	06/24/2010	N001	0	-	0	510		J #	0.6		
Calcium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	460		J #	0.6		
Calcium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	560		J #	0.6		
Cerium-144	pCi/L	0548	TS	06/24/2010	0001	0	-	0	28	U	#	28	17	

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range			Result	Lab	Qualifiers		Detection Limit	Uncertainty
				Date	ID	(Ft BLS)	Data	QA						
Cerium-144	pCi/L	0548	TS	06/24/2010	N001	0	-	0	36	U	#	36	21	
Cerium-144	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	43	U	#	43	25	
Cerium-144	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	52	U	#	52	31	
Cesium-134	pCi/L	0548	TS	06/24/2010	0001	0	-	0	4.5	U	#	4.5	2.7	
Cesium-134	pCi/L	0548	TS	06/24/2010	N001	0	-	0	7.3	U	#	7.3	4.2	
Cesium-134	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	7.7	U	#	7.7	4.4	
Cesium-134	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	6.7	U	#	6.7	3.8	
Cesium-137	pCi/L	0548	TS	06/24/2010	0001	0	-	0	4.1	U	#	4.1	2.4	
Cesium-137	pCi/L	0548	TS	06/24/2010	N001	0	-	0	6.8	U	#	6.8	3.9	
Cesium-137	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	7.6	U	#	7.6	4.5	
Cesium-137	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	6.8	U	#	6.8	4	
Chromium	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.026	U	#	0.026		
Chromium	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.026	U	#	0.026		
Chromium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	2		J	#	0.026	
Chromium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	1.8		J	#	0.026	
Cobalt	mg/L	0548	TS	06/24/2010	0001	0	-	0	2.7		J	#	0.022	
Cobalt	mg/L	0548	TS	06/24/2010	N001	0	-	0	2.6		J	#	0.022	
Cobalt	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	15		J	#	0.022	
Cobalt	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	15		J	#	0.022	
Cobalt-60	pCi/L	0548	TS	06/24/2010	0001	0	-	0	4.1	U	#	4.1	2.5	
Cobalt-60	pCi/L	0548	TS	06/24/2010	N001	0	-	0	7.4	U	#	7.4	4.4	
Cobalt-60	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	8.6	U	#	8.6	5.1	
Cobalt-60	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	7.5	U	#	7.5	4.4	
Copper	mg/L	0548	TS	06/24/2010	0001	0	-	0	13		J	#	0.048	

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
										Lab	Data		
Copper	mg/L	0548	TS	06/24/2010	N001	0	-	0	12	J	#	0.048	
Copper	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	86	J	#	0.048	
Copper	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	88	J	#	0.048	
Dissolved Oxygen	mg/L	0548	TS	06/24/2010	0001	0	-	0	4.79		#		
Dissolved Oxygen	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	1.79		#		
Europium-152	pCi/L	0548	TS	06/24/2010	0001	0	-	0	23	U	#	23	13
Europium-152	pCi/L	0548	TS	06/24/2010	N001	0	-	0	35	U	#	35	20
Europium-152	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	37	U	#	37	22
Europium-152	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	18.9	U	#	18.9	10
Europium-154	pCi/L	0548	TS	06/24/2010	0001	0	-	0	38	U	#	38	21
Europium-154	pCi/L	0548	TS	06/24/2010	N001	0	-	0	50	U	#	50	28
Europium-154	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	66	U	#	66	37
Europium-154	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	66	U	#	66	36
Europium-155	pCi/L	0548	TS	06/24/2010	0001	0	-	0	15.5	U	#	15.5	9.4
Europium-155	pCi/L	0548	TS	06/24/2010	N001	0	-	0	21	U	#	21	13
Europium-155	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	25	U	#	25	15
Europium-155	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	25	U	#	25	15
Fluoride	mg/L	0548	TS	06/24/2010	0001	0	-	0	28		#	5	
Fluoride	mg/L	0548	TS	06/24/2010	N001	0	-	0	29		#	5	
Fluoride	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	84		#	5	
Fluoride	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	84		#	5	
Iron	mg/L	0548	TS	06/24/2010	0001	0	-	0	120	J	#	0.25	
Iron	mg/L	0548	TS	06/24/2010	N001	0	-	0	140	J	#	0.25	
Iron	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	2500	J	#	0.25	

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers		Detection Limit	Uncertainty
											Data	QA		
Iron	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	2600		J	#	0.25	
Lead	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.064	U		#	0.064	
Lead	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.064	U		#	0.064	
Lead	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	0.064	U		#	0.064	
Lead	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	0.068	B	J	#	0.064	
Lead-212	pCi/L	0548	TS	06/24/2010	0001	0	-	0	13.2	U		#	13.2	8
Lead-212	pCi/L	0548	TS	06/24/2010	N001	0	-	0	12.6	U		#	12.6	7.6
Lead-212	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	17	U		#	17	11
Lead-212	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	37			#	16	11
Magnesium	mg/L	0548	TS	06/24/2010	0001	0	-	0	2400		J	#	0.65	
Magnesium	mg/L	0548	TS	06/24/2010	N001	0	-	0	2300		J	#	0.65	
Magnesium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	9700		J	#	0.65	
Magnesium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	10000		J	#	0.65	
Manganese	mg/L	0548	TS	06/24/2010	0001	0	-	0	65		J	#	0.0057	
Manganese	mg/L	0548	TS	06/24/2010	N001	0	-	0	62		J	#	0.0057	
Manganese	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	300		J	#	0.0057	
Manganese	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	310		J	#	0.0057	
Mercury	mg/L	0548	TS	06/24/2010	0001	0	-	0	9.7E-006	U		#	9.7E-006	
Mercury	mg/L	0548	TS	06/24/2010	N001	0	-	0	9.7E-006	U		#	9.7E-006	
Mercury	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	9.7E-006	U		#	9.7E-006	
Mercury	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	9.7E-006	U		#	9.7E-006	
Nickel	mg/L	0548	TS	06/24/2010	0001	0	-	0	2.4		J	#	0.047	
Nickel	mg/L	0548	TS	06/24/2010	N001	0	-	0	2.3		J	#	0.047	
Nickel	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	11		J	#	0.047	

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers		Detection Limit	Uncertainty
											Data	QA		
Nickel	mg/L	Excavation Seep	SL	06/24/2010	N001	0	-	0	10		J	#	0.047	
Nitrate as NO3	mg/L	Excavation Seep	SL	06/24/2010	0001	0	-	0	970			#	10	
Nitrite as Nitrogen	mg/L	Excavation Seep	SL	06/24/2010	0001	0	-	0	5	U		#	5	
Oxidation Reduction Potential	mV	0548	TS	06/24/2010	0001	0	-	0	259.9			#		
Oxidation Reduction Potential	mV	Excavation Seep	SL	06/24/2010	0001	0	-	0	316.9			#		
pH	s.u.	0548	TS	06/24/2010	0001	0	-	0	4.44			#		
pH	s.u.	Excavation Seep	SL	06/24/2010	0001	0	-	0	3.24			#		
Potassium	mg/L	0548	TS	06/24/2010	0001	0	-	0	550		J	#	5.4	
Potassium	mg/L	0548	TS	06/24/2010	N001	0	-	0	530		J	#	5.4	
Potassium	mg/L	Excavation Seep	SL	06/24/2010	0001	0	-	0	1000		J	#	5.4	
Potassium	mg/L	Excavation Seep	SL	06/24/2010	N001	0	-	0	1100		J	#	5.4	
Potassium-40	pCi/L	0548	TS	06/24/2010	0001	0	-	0	414		J	#	87	78
Potassium-40	pCi/L	0548	TS	06/24/2010	N001	0	-	0	335		J	#	129	97
Potassium-40	pCi/L	Excavation Seep	SL	06/24/2010	0001	0	-	0	580			#	170	140
Potassium-40	pCi/L	Excavation Seep	SL	06/24/2010	N001	0	-	0	670			#	140	130
Promethium-144	pCi/L	0548	TS	06/24/2010	0001	0	-	0	7	U		#	7	4.2
Promethium-144	pCi/L	0548	TS	06/24/2010	N001	0	-	0	6.6	U		#	6.6	3.9
Promethium-144	pCi/L	Excavation Seep	SL	06/24/2010	0001	0	-	0	8.4	U		#	8.4	4.9
Promethium-144	pCi/L	Excavation Seep	SL	06/24/2010	N001	0	-	0	7.1	TI		#	6.9	4.4
Promethium-146	pCi/L	0548	TS	06/24/2010	0001	0	-	0	4.7	U		#	4.7	2.8
Promethium-146	pCi/L	0548	TS	06/24/2010	N001	0	-	0	7.8	U		#	7.8	4.5
Promethium-146	pCi/L	Excavation Seep	SL	06/24/2010	0001	0	-	0	7.8	U		#	7.8	4.6
Promethium-146	pCi/L	Excavation Seep	SL	06/24/2010	N001	0	-	0	7.9	U		#	7.9	4.7
Ruthenium-106	pCi/L	0548	TS	06/24/2010	0001	0	-	0	41	U		#	41	24

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
				Date	ID	(Ft BLS)	Lab	Data		QA				
Ruthenium-106	pCi/L	0548	TS	06/24/2010	N001	0	-	0	59	U	#	59	35	
Ruthenium-106	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	79	U	#	79	45	
Ruthenium-106	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	65	U	#	65	38	
Selenium	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.77		J #	0.13		
Selenium	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.56		J #	0.13		
Selenium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	3.8		J #	0.13		
Selenium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	4		J #	0.13		
Silver	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.054	U	#	0.054		
Silver	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.054	U	#	0.054		
Silver	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	0.054	U	#	0.054		
Silver	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	0.054	U	#	0.054		
Sodium	mg/L	0548	TS	06/24/2010	0001	0	-	0	14000		J #	1.6		
Sodium	mg/L	0548	TS	06/24/2010	N001	0	-	0	14000		J #	1.6		
Sodium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	18000		J #	3.3		
Sodium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	18000		J #	3.3		
Specific Conductance	µmhos /cm	0548	TS	06/24/2010	0001	0	-	0	71942		#			
Specific Conductance	µmhos /cm	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	113346		#			
Temperature	C	0548	TS	06/24/2010	0001	0	-	0	24.37		#			
Temperature	C	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	21.49		#			
Thallium	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.18	U	#	0.18		
Thallium	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.18	U	#	0.18		
Thallium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	0.31	B	J #	0.18		
Thallium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	0.18	U	#	0.18		
Thorium-228	pCi/L	0548	TS	06/24/2010	0001	0	-	0	5.1	U,M	#	5.1	2.7	

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Date	ID					Lab	Data	QA		
Thorium-228	pCi/L	0548	TS	06/24/2010	N001	0	-	0	7.6	U,M	#		7.6	3.5
Thorium-228	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	23	U,M	#		23	13
Thorium-228	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	30	U,M	#		30	18
Thorium-230	pCi/L	0548	TS	06/24/2010	0001	0	-	0	3030	M3	#		10	480
Thorium-230	pCi/L	0548	TS	06/24/2010	N001	0	-	0	1970	M3	#		10	320
Thorium-230	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	152000	M3	#		0	24000
Thorium-230	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	151000	M3	#		0	24000
Thorium-232	pCi/L	0548	TS	06/24/2010	0001	0	-	0	0.89		J	#	0.024	
Thorium-232	pCi/L	0548	TS	06/24/2010	0001	0	-	0	5.8	M3	#		1.9	2.8
Thorium-232	pCi/L	0548	TS	06/24/2010	N001	0	-	0	2.3	U,M	#		2.3	1.3
Thorium-232	pCi/L	0548	TS	06/24/2010	N001	0	-	0	2.5		J	#	0.024	
Thorium-232	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	192		J	#	0.47	
Thorium-232	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	225	M3	#		6	48
Thorium-232	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	172		J	#	0.47	
Thorium-232	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	231	M3	#		8	50
Thorium-234	pCi/L	0548	TS	06/24/2010	0001	0	-	0	630	LT	J	#	130	110
Thorium-234	pCi/L	0548	TS	06/24/2010	N001	0	-	0	600	LT	J	#	160	120
Thorium-234	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	1930		#		200	270
Thorium-234	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	2010		#		190	260
Uranium	mg/L	0548	TS	06/24/2010	0001	0	-	0	3.5	B	#		0.86	
Uranium	mg/L	0548	TS	06/24/2010	N001	0	-	0	3.3	B	#		0.86	
Uranium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	5.6	B	#		0.86	
Uranium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	5.3	B	#		0.86	
Uranium-234	pCi/L	0548	TS	06/24/2010	0001	0	-	0	1680	M3	J	#	0	260
Uranium-234	pCi/L	0548	TS	06/24/2010	N001	0	-	0	2990	M3	J	#	0	490

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers		Detection Limit	Uncertainty
											Data	QA		
Uranium-234	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	2500	M3	#	0	390	
Uranium-234	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	2270	M3	#	0	350	
Uranium-235	pCi/L	0548	TS	06/24/2010	0001	0	-	0	74	M3	#	1	13	
Uranium-235	pCi/L	0548	TS	06/24/2010	0001	0	-	0	93	LT	J	#	34	19
Uranium-235	pCi/L	0548	TS	06/24/2010	N001	0	-	0	98	LT	J	#	33	22
Uranium-235	pCi/L	0548	TS	06/24/2010	N001	0	-	0	139	M3	#	1	25	
Uranium-235	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	129	M3	#	3	24	
Uranium-235	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	508		#	50	67	
Uranium-235	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	125	M3	#	1	24	
Uranium-235	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	689		#	58	88	
Uranium-238	pCi/L	0548	TS	06/24/2010	0001	0	-	0	1640	M3	J	#	0	260
Uranium-238	pCi/L	0548	TS	06/24/2010	N001	0	-	0	2990	M3	J	#	0	490
Uranium-238	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	2550	M3	#	0	400	
Uranium-238	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	2350	M3	#	0	370	
Vanadium	mg/L	0548	TS	06/24/2010	0001	0	-	0	0.027	U	#	0.027		
Vanadium	mg/L	0548	TS	06/24/2010	N001	0	-	0	0.027	U	J	#	0.027	
Vanadium	mg/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	44		J	#	0.027	
Vanadium	mg/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	46		J	#	0.027	
Yttrium-88	pCi/L	0548	TS	06/24/2010	0001	0	-	0	6.9	U	#	6.9	4.1	
Yttrium-88	pCi/L	0548	TS	06/24/2010	N001	0	-	0	12.4	U	#	12.4	7.4	
Yttrium-88	pCi/L	Excava- tion Seep	SL	06/24/2010	0001	0	-	0	8.3	U	#	8.3	5.1	
Yttrium-88	pCi/L	Excava- tion Seep	SL	06/24/2010	N001	0	-	0	7.7	U	#	7.7	4.9	
Zinc	mg/L	0548	TS	06/24/2010	0001	0	-	0	12		J	#	0.036	
Zinc	mg/L	0548	TS	06/24/2010	N001	0	-	0	12		J	#	0.036	

Appendix D. Water Quality Data – RIN 1006049 (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 9/13/2010

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
								Lab	Data QA		
Zinc	mg/L	Excavation Seep	SL	06/24/2010	0001	0 - 0	70	J	#	0.036	
Zinc	mg/L	Excavation Seep	SL	06/24/2010	N001	0 - 0	68	J	#	0.036	

BLS = 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 E.
Water Level Data

Appendix E. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site
REPORT DATE: 9/13/2010

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0410	O	3979.11	06/23/2010		22.22	3956.89	
0810		3961.88	06/22/2010		5.45	3956.43	
0811		3962.82	06/22/2010		6.12	3956.7	
0812		3961.41	06/22/2010		4.44	3956.97	
0813		3963.44	06/22/2010		6.22	3957.22	
0814		3960.98	06/22/2010		4.00	3956.98	
0816		3961.87	06/22/2010		4.69	3957.18	
SMI-PW02	O	3967.48	06/22/2010		14.51	3952.97	
SMI-PW03	O	3975.04	06/23/2010		16.65	3958.39	
SMI-PZ3D2	O	3975.13	06/23/2010		17.11	3958.02	
SMI-PZ3M	O	3975.23	06/23/2010		16.88	3958.35	
SMI-PZ3S	O	3975.03	06/23/2010		16.63	3958.40	

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

**Appendix F.
Blanks Report**

Appendix F. Blanks Report

BLANKS REPORT

LAB: ALS Laboratory Group (Fort Collins, CO)

RIN: 1006048

Report Date: 9/13/2010

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab Data	Detection Limit	Uncertainty	Sample Type
Ammonia Total as N	MOA01	2001	06/22/2010	0001	mg/L	0.1	U	0.1		E
Total Dissolved Solids	MOA01	2001	06/22/2010	0001	mg/L	20	U	20		E
Uranium	MOA01	2001	06/22/2010	0001	mg/L	0.1	B	0.029		E

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

SAMPLE TYPES:

- E Equipment Blank.

Attachment 1.
IA Well Field Monthly Sampling Trip Report
RIN 1006048

**Attachment 1. IA Well Field Monthly Sampling Trip Report
RIN 1006048**



DATE: July 06, 2010
TO: K. Pill
FROM: James Ritchey
SUBJECT: June 2010 IA Well Field Monthly Sampling Trip Report
Site: Moab, Utah

Date of Sampling Event: June 22 - 23, 2010

Team Members: Elizabeth Glowiak, Tyler Meadows, James Ritchey

RIN Number Assigned: All samples were assigned to RIN 1006048.

Sample Shipment: All samples were shipped in one cooler overnight UPS to ALS Laboratory Group from Moab, Utah, on June 24, 2010 (Tracking Nos. 0192994136).

June 2010 CF5 Sampling

Number of Locations Sampled: Eight extraction wells (0810, 0811, 0812, 0813, 0814, 0815, 0816, and SMI-PW02) were sampled. Observation wells (SMI-PZ3S, SMI-PZ3M, SMI-PZ3D2, and SMI-PW03) were added to provide data concerning the uranium plume. Well 0410 was sampled because it had been damaged and replaced. Including one duplicate and one EB, a total of 15 samples were collected during the June 2010 monthly sampling event.

Locations Not Sampled: None.

Field Variance: None.

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2000	0816-M	Duplicate from 36 ft bgs	Ground Water	JUN 107
2001	NA	Equipment Blank	DI Water	JUN 108

DI = deionized; ID = identification

Attachment 1. IA Well Field Monthly Sampling Trip Report RIN 1006048 (continued)

Location-specific Information – Extraction Wells: Wells 0815 and were SMI-PW02 were sampled using dedicated submersible pumps. All other extraction wells were sampled using micropurge techniques with a peristaltic pump and non-dedicated downhole and pump-head tubing. Sample depths and water levels for each observation well are listed below.

Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0810-M	6/22/2010	11:45	5.45	25.5
0811-M	6/22/2010	11:22	6.12	23.5
0812-M	6/22/2010	11:00	4.44	29
0813-M	6/22/2010	10:22	6.22	29
0814-M	6/22/2010	14:15	4.00	28
0815	6/22/2010	15:29	UA	25
0816-M	6/22/2010	14:46	4.69	36
SMI-PW02	6/22/2010	13:58	14.51	55

btoc = below top of casing; UA = unavailable

Location-specific Information – Monitoring Wells: All monitoring wells were sampled using micropurge techniques with a peristaltic pump and dedicated downhole and pump-head tubing. Sample depths and water levels for each observation well are listed below.

Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0410	6/23/2010	08:30	22.22	22.5
SMI-PZ3S	6/23/2010	09:19	16.63	25
SMI-PZ3M	6/23/2010	09:00	16.88	59
SMI-PZ3D2	6/23/2010	10:27	17.11	78
SMI-PW03	6/23/2010	10:48	16.65	60

btoc = below top of casing

Site Issues: The mean daily Colorado River flows during this monthly sampling event, according to the USGS Cisco gauging station (station number 09180500), are provided below.

Date	Daily Mean Flow (cfs)
06/22/2010	11,600
06/23/2010	10,900

Equipment Issues: None.

Corrective Action Required/Taken: None.

Attachment 2.
Excavation Seep and Evaporation Pond Sampling Trip Report
RIN 1006049

**Attachment 2. Excavation Seep and Evaporation Pond Sampling Trip Report
RIN 1006049**



DATE: August 11, 2010

TO: K. Pill

FROM: James Ritchey

SUBJECT: June 2010 Excavation Seep and Evaporation Pond Industrial Hygiene and Safety Sampling Trip Report

Site: Moab, Utah

Date of Sampling Event: June 24, 2010

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

RIN Number Assigned: All samples were assigned to RIN 1006049.

Sample Shipment: All samples were shipped in two coolers overnight UPS to ALS Laboratory Group from Moab, Utah, on June 24, 2010 (Tracking Nos. 0194246940 and 0192298157).

June 2010 Excavation Seep and Evaporation Pond Sampling

Number of Locations Sampled: The evaporation pond (0548) and the excavation seep were sampled. Two separate samples (one filtered and one unfiltered) were submitted for each location. No quality-control samples were collected. A total of four samples were submitted.

Locations Not Sampled: None.

Field Variance: None.

Quality-control Sample Cross Reference: None.

Location-specific Information – Surface Water Locations: All surface water locations were sampled by grab method. Location 0548 was collected using a non-dedicated bucket to ensure worker safety. The excavation seep was collected with a dedicated cup from the edge of the pool. Sample information is provided below.

Name	Date	Time	Sample Depth	Ticket #
0548-F	06/24/2010	10:30	At Surface	JUN 200
0548-U	06/24/2010	10:30	At Surface	JUN 201
Excavation Seep-F	06/24/2010	10:50	At Surface	JUN 202
Excavation Seep-U	06/24/2010	10:50	At Surface	JUN 204

Attachment 2. Excavation Seep and Evaporation Pond Sampling Trip Report RIN 1006049 (continued)

Water Parameters: Parameter readings were collected at each location at the time of sampling.

Name	Temp (°C)	Conductivity (µmhos/cm)	DO (mg/L)	pH	ORP (mV)
0548	24.37	71,942	4.79	4.44	259.9
Excavation Seep	21.49	113,346	1.79	3.24	316.9

DO = dissolved oxygen; µmhos/cm = micromhos per centimeter; mV = millivolt

Site Issues: The mean daily Colorado River flows during this monthly sampling event, according to the USGS Cisco gauging station (station number 09180500), are provided below.

Date	Daily Mean Flow (cfs)
06/24/2010	10,200

Equipment Issues: None.

Corrective Action Required/Taken: None.