

*Office of Environmental Management – Grand Junction*



Moab UMTRA Project  
Ground Water and Surface Water  
Monitoring 2011 Third Quarter

December 2011



U.S. Department  
of Energy

**Office of Environmental Management**

**Moab UMTRA Project  
Ground Water and Surface Water Monitoring  
2011 Third Quarter**

**Revision 0**

**December 2011**

**Moab UMTRA Project  
Ground Water and Surface Water Monitoring  
2011 Third Quarter**

---

Revision 0

---

**Review and Approval**

*KGP*

*12/15/11*

---

Kenneth G. Pill  
TAC Ground Water Manager

Date

*Joseph D. Ritchey*

*12/15/11*

---

Joseph D. Ritchey  
TAC Senior Program Manager

Date

In concurrence:

*Donald R. Metzler*

*12-15-11*

---

Donald R. Metzler  
Moab Federal Project Director

Date

## Revision History

<b>Revision No.</b>	<b>Date</b>	<b>Reason/Basis for Revision</b>
0	December 2011	Initial issue.

## Table of Contents

Section	Page
Acronyms and Abbreviations .....	v
<b>1.0 Introduction.....</b>	<b>1</b>
1.1 Purpose.....	1
1.2 Scope.....	1
<b>2.0 Summary of Sampling Events.....</b>	<b>3</b>
2.1 July 2011 CF4 and Surface Water Sampling Event.....	3
<b>3.0 Data Assessments .....</b>	<b>3</b>
3.1 July 2011 CF4 and Surface Water Sampling Event.....	3
3.1.1 Laboratory Performance Assessment .....	3
3.1.2 Minimums and Maximums Reports and Anomalous Data Review .....	7
<b>4.0 Results .....</b>	<b>8</b>
4.1 July 2011 CF4 and Surface Water Sampling Event.....	8
<b>5.0 Conclusions.....</b>	<b>12</b>
<b>6.0 References.....</b>	<b>13</b>

### Figures

Figure 1. Map of CF4 and Surface Water Sample Locations for the 2011 Third Quarter Sampling Event.....	2
Figure 2. CF4 Upgradient Observation Wells 0780 and 0782 Time Versus Ammonia Concentration Plot .....	9
Figure 3. CF4 Upgradient Observation Wells 0780 and 0782 Time Versus TDS Concentration Plot .....	9
Figure 4. CF4 Upgradient Observation Wells 0780 and 0782 Time Versus Uranium Concentration Plot .....	10
Figure 5. CF4 Downgradient Observation Wells 0784, 0786, and 0787 Time Versus Ammonia Concentration Plot.....	10
Figure 6. CF4 Downgradient Observation Wells 0784, 0786, and 0787 Time Versus TDS Concentration Plot .....	11
Figure 7. CF4 Downgradient Observation Wells 0784, 0786, and 0787 Time Versus Uranium Concentration Plot.....	11

### Tables

Table 1. July 2011 CF4 and Surface Water Sampling Analytes and Methods.....	3
Table 2. July 2011 CF4 and Surface Water Sampling Data Qualifiers .....	4
Table 3. July 2011 CF4 and Surface Water Sampling Reason Codes for Data Flags .....	4
Table 4. Anomalous Data Associated with the July 2011 CF4 and Surface Water Sampling Event.....	7
Table 5. July 2011 CF4 and Surface Water Sampling Locations Exceeding the 0.044 mg/L Uranium Ground Water Standard .....	8
Table 6. Summary of Surface Water Ammonia, TDS, and Uranium Concentrations, July 2011 .....	12
Table 7. July 2011 Surface Water Ammonia Concentrations and Comparisons to State of Utah and Federal Criteria .....	12

**Appendix**

Appendix A. July 2011 CF4 and Surface Water Sampling Event..... A-1  
Water Sampling Field Activities Verification  
Minimums and Maximums Report  
Water Quality Data  
Water Level Data  
Trip Report

## Acronyms and Abbreviations

°C	degrees Centigrade
AES	atomic emission spectroscopy
CCB	continuing calibration blank
CCV	continuing calibration verification
CF	Configuration
cfs	cubic feet per second
COC	chain of custody
DOE	U.S. Department of Energy
DUP	duplicate
EB	equipment blank
EDD	electronic data deliverable
EPA	Environmental Protection Agency
ft	feet
IA	interim action
ICB	initial calibration blank
ICP	inductively coupled plasma
ICSA	interference check sample A
ICSAB	interference check sample AB
ICV	initial calibration verification
IDL	instrument detection limit
LCS	laboratory control sample
MB	method blank
MDC	minimum detectable concentration
MDL	method detection limit or minimum detection limit
mg/L	milligrams per liter
MS	matrix spike or mass spectrometry
MSD	matrix spike duplicate
RIN	report identification number
RL	reporting limit
RS	replicate sample
SD	serial dilution
SDG	sample data group
TDS	total dissolved solids
TPU	total propagated uncertainty
UMTRA	Uranium Mill Tailings Remedial Action
USGS	U.S. Geological Survey

## 1.0 Introduction

### 1.1 Purpose

The purpose of this report is to summarize the results of the data validation process associated with ground water and surface water samples collected from the U.S. Department of Energy (DOE) Moab Uranium Mill Tailings Remedial Action (UMTRA) site during the third quarter of 2011. One sampling event was completed between July and September 2011, with samples collected from Configuration (CF) 4 observation wells 0780, 0782, 0784, 0786, 0787, and a variety of surface water locations. Sample locations are shown on Figure 1.

The rationale for the sampling was to monitor the ground water quality in the vicinity of CF4 after it was necessary to shut down the freshwater injection system because the well field was flooded during the spring runoff. Surface water samples were collected concurrently to determine if Colorado River water quality was influenced by flood water contacting the soils on site.

### 1.2 Scope

This document presents the Summary of Results, the Laboratory Performance Assessment, and the data (including a summary of the anomalous data generated by the validation process) for the third quarter of 2011. Sampling and analyses were conducted in accordance with the *Moab UMTRA Project Operations, Maintenance, and Performance Monitoring Plan for the Interim Action Ground Water Treatment System* (DOE-EM/GJTAC1973), and all data validation follows the criteria according to the *Moab UMTRA Project Surface Water/Ground Water Sampling and Analysis Plan* (DOE-EM/GJTAC1830) and the *Moab UMTRA Project Standard Practice for Validation of Laboratory Data* (DOE-EM/GJTAC1855). Water Sampling Field Activities Verification, the Minimums and Maximums Report, Water Quality Data, Water Level Data, and the trip report are provided in Appendix A. All Colorado River flow data discussed in this document were measured from the U.S. Geological Survey (USGS) Cisco gauging station number 09180500. River elevation data was collected from a staff gauge on site.

Minimums and Maximums Reports were generated (by the Sample Management System and used to query the SEEPro database) to determine if the applicable data are within a normal statistical range. Each new data set is compared to the historical data to determine if the new data fall outside the historical data range, 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.

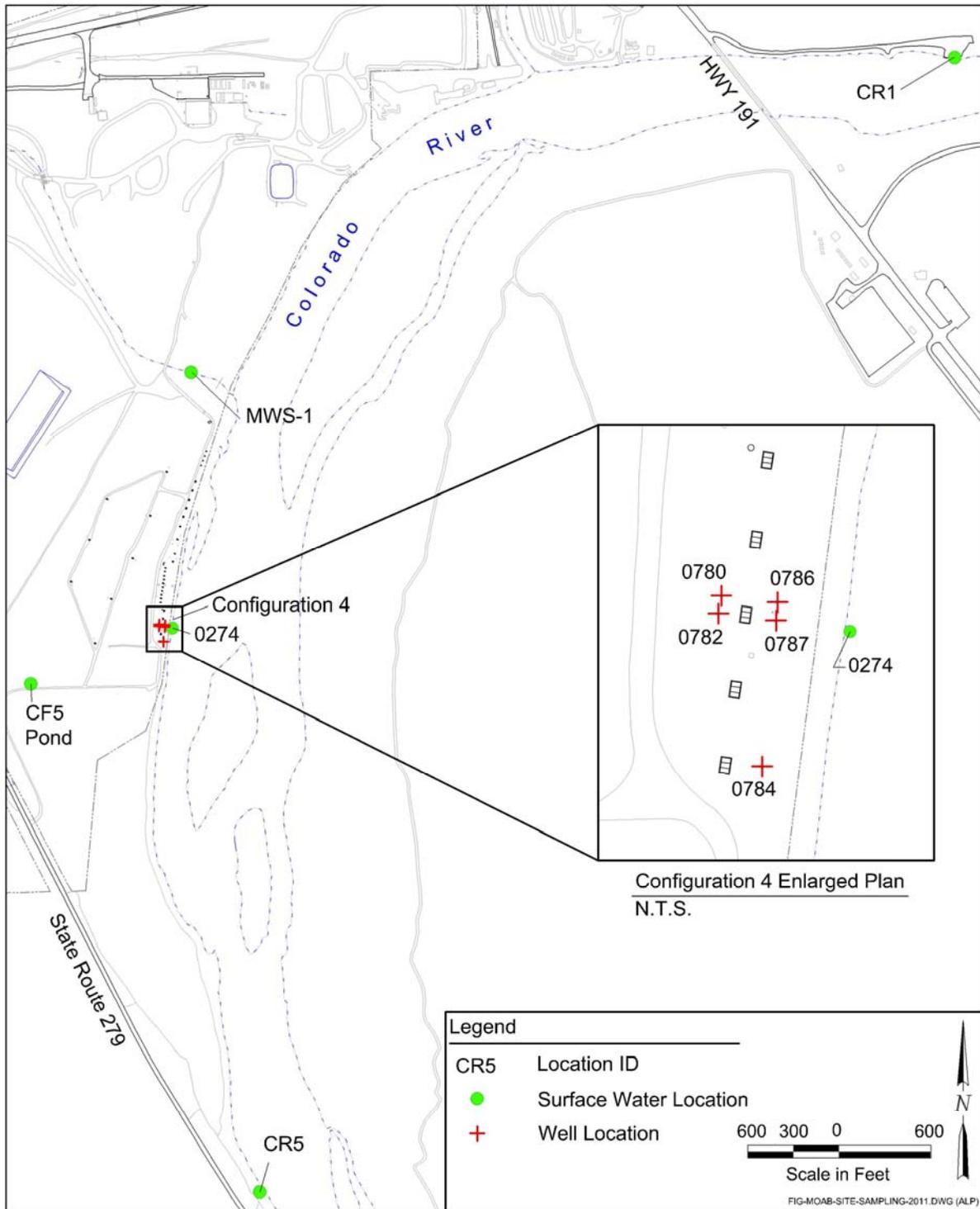


Figure 1. Map of CF4 and Surface Water Sample Locations for the 2011 Third Quarter Sampling Event

## 2.0 Summary of Sampling Events

### 2.1 July 2011 CF4 and Surface Water Sampling Event

Samples were collected from five CF4 observation wells and from various surface water locations between July 13 and 14, 2011. The CF4 samples were collected to monitor the water quality in the vicinity of the CF4 injection wells after the injection system was shut down on May 9 (because of the flood waters) to determine the impact of the high river flows. Surface water samples were collected concurrently to determine if flood waters coming into contact with the site had any impacts on the Colorado River quality. All samples were analyzed for selected metals, anions, ammonia, and total dissolved solids (TDS). Sample locations are shown on Figure 1.

## 3.0 Data Assessments

### 3.1 July 2011 CF4 and Surface Water Sampling Event

#### 3.1.1 Laboratory Performance Assessment

This validation was performed according to the *Standard Practice for Validation of Laboratory Data*. The procedure was applied at Level 1, Data Deliverables Examination. All analyses were successfully completed.

#### General Information and Validation Results

Report Identification Number (RIN): 1107060  
Laboratory: ALS Environmental  
Sample Data Group (SDG) Number: 1107177  
Analysis: Metals and Inorganics  
Validator: Rachel Cowan  
Review Date: August 12, 2011

The samples were prepared and analyzed using accepted procedures as shown in Table 1.

Table 1. July 2011 CF4 and Surface Water Sampling Analytes and Methods

Analyte	Preparation Method	Analytical Method
Ammonia	EPA 350.1	EPA 350.1
Bromide	SW-846 9056	SW-846 9056
Chloride	SW-846 9056	SW-846 9056
Fluoride	SW-846 9056	SW-846 9056
Mercury	EPA 7470A	EPA 7470A
Metals (Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc)	SW-846 6010B	EPA 6010B

Table 1. July 2011 CF4 and Surface Water Sampling Analytes and Methods (continued)

Analyte	Preparation Method	Analytical Method
Nitrate as N	SW-846 9056	SW-846 9056
Nitrite as N	SW-846 9056	SW-846 9056
Orthophosphate as P	SW-846 9056	SW-846 9056
Sulfate	SW-846 9056	SW-846 9056
TDS	EPA 160.1	EPA 160.1
Uranium (Total)	SW-846 3005A	EPA 6020A

Analytical results were qualified as listed in Table 2. Refer to Table 3 for an explanation of the data qualifiers applied.

Table 2. July 2011 CF4 and Surface Water Sampling Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1107177-2, -3	0548-N-12, 0548-S-1	Orthophosphate as P	J	MS-2
1107177-1	0274	Ammonia as N	J	P-1
1107177-1, -8 through -11	0274, CF5 Pond, CR1, CR5, MWS-1	Aluminum, Barium, Beryllium, Calcium, Chloride, Fluoride, Magnesium, Manganese, Mercury, Nitrate as N, Potassium, Selenium, Sulfate, Sodium, TDS, Vanadium, Uranium	J	P-1
All samples	All Locations	Sodium	J	SD-2

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

Table 3. July 2011 CF4 and Surface Water Sampling Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Nondetects)	Explanation
MS-2	J	U	The matrix spike result was less than 80 percent recovery.
P-1	J	U	Samples are received outside of the temperature criteria.
SD-2	J	NA	The serial dilution analysis percent difference from the original sample is greater than 10 percent.

### Sample Shipping/Receiving

ALS Environmental received a total of 11 samples for RIN 1107060 in one shipment of two coolers. SDG 1107177 of 11 samples arrived on July 15. The SDG was accompanied by a chain of custody (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 1107177 was received intact in two coolers, with the temperatures inside the coolers at 2.0 and 4.6 degrees Centigrade (°C). The second cooler, with samples 1107177-1 and -8 through -11, was not within temperature criteria, and the detectable results for all analytes from these samples were flagged “J” for reason P-1 (see Table 2). All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

### **Case Narratives**

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

### **Laboratory Instrument Calibration and Quantification**

Compliance requirements for satisfactory instrument calibration are established to ensure the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure the instrument continues to be capable of producing acceptable qualitative and quantitative data. Besides instrument calibration, initial calibration verification samples (ICVs) and continuing calibration verification samples (CCVs) are analyzed at a required frequency of one per 10 samples. Quantification evaluations allow validity assessment of very low-level results.

In addition to laboratory instrument calibration standards, radiochemical analyses have required quantification standards. All radiochemical results reported are to include the calculated two-sigma total propagated uncertainty (TPU) and minimum detectable concentration (MDC) as quantification standards. Radiochemical results are qualified with a “J” flag (estimated) when the result is greater than the MDC, but less than three times the MDC. Radiochemical results are qualified with a “U” flag (not detected) when the result is less than the TPU and/or the MDC. All instrument calibration requirements were met.

### **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 9056, Chloride, Orthophosphate as P, Sulfate**

The MS sample selected for testing matrix-specific quality control had too high a native concentration for chloride and sulfate. Following procedure, the chloride and sulfate results were not flagged for MS-1 or RS-1 because the field duplicate passed criteria. The orthophosphate MS failed, and the only orthophosphate result that was detectable was flagged “J” for MS-2.

### **Laboratory Control Sample**

Laboratory control samples (LCSs) provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. LCS results were acceptable for all analyses with the following exceptions.

LCSs were not reported for uranium. As a standard practice, ALS Environmental does not prepare LCSs for samples that were field-filtered and acidified and run directly on the instrument without any additional sample preparation. Per national environmental laboratory accreditation requirements provided by The NELAC Institute, an MS may be used in place of an LCS provided the acceptance criteria are as stringent. Therefore, no qualification was required due to of lack of LCS results because all of the MS results for uranium were acceptable. Refer to the Matrix Spike Analysis section for required qualification.

### **Method and Calibration Blanks**

Method 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 mass spectrometry (ICP-MS) SD data are evaluated when the concentration of the undiluted sample is greater than 100 times the reporting limit (RL). Inductively-coupled plasma atomic emission spectrometry (ICP-AES) SD data are evaluated when the concentration of the undiluted sample is greater than 50 times the RL. All evaluated SD data were acceptable with the following exceptions.

### **Method 6020A, Uranium**

The uranium SD sample result had a greater than 10 percent difference; however, the SD sample uranium result was less than 100 times the RL. No uranium results were flagged.

### **Method 6010B, Sodium**

The sodium SD sample result had a greater than 10 percent difference, so all sodium samples were flagged “J” for reason SD-2.

### **Equipment Blanks**

An equipment blank (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. Because all samples were collected using dedicated equipment, it was not necessary to collect any EBs.

### **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 July 29, 2011. The contents of the EDD files were manually examined to verify that the sample results accurately reflected the data contained and that all and only the requested data were delivered.

### 3.1.2 Minimums and Maximums Report and Anomalous Data Review

The Minimums and Maximums Report for this sampling event is located in Appendix A. Based on the results, there were 16 anomalous data points (from seven separate locations), as shown in Table 4.

Table 4. Anomalous Data Associated with the July 2011 CF4 and Surface Water Sampling Event

Location	Sample Date	Analyte	Concentration (mg/L)	Historical Minimum (mg/L)	Historical Maximum (mg/L)	Disposition
0274	07/13/2011	Ammonia	0.021	0.074	NA	Concentration may have been reduced in response to high river flows
0780	07/14/2011	Selenium	0.027	NA	0.0067	Concentration still below EPA Primary Drinking Water Standard of 0.05 mg/L
0782	07/14/2011	Copper	0.0012	0.014	NA	Concentration may have been reduced in response to high river flows
0782	07/14/2011	Selenium	0.02	NA	0.005	Concentration still below EPA Primary Drinking Water Standard of 0.05 mg/L
0786	07/14/2011	Selenium	0.11	NA	0.01	Continue monitoring for analyte
0787	07/14/2011	Selenium	0.022	NA	0.004	Concentration still below EPA Primary Drinking Water Standard of 0.05 mg/L
CR1	07/13/2011	Arsenic	0.0039	NA	0.002	Less than 10 samples collected for this analyte, still establishing range
CR1	07/13/2011	Manganese	0.00057	0.0024	NA	Concentration may have been reduced in response to high river flows
CR1	07/13/2011	Mercury	0.000016	0.0001	NA	Less than 10 samples collected for this analyte, still establishing range
CR1	07/13/2011	Nitrate	0.3	0.776	NA	Less than 10 samples collected for this analyte, still establishing range
CR1	07/13/2011	Thallium	0.0044	NA	0.00072	Less than 10 samples collected for this analyte, still establishing range

Table 4. Anomalous Data Associated With the July 2011 CF4 and Surface Water Sampling Event (continued)

Location	Sample Date	Analyte	Concentration (mg/L)	Historical Minimum (mg/L)	Historical Maximum (mg/L)	Disposition
CR5	07/13/2011	Arsenic	0.0068	NA	0.0014	Less than 10 samples collected for this analyte, still establishing range
CR5	07/13/2011	Manganese	0.00038	0.002	NA	Concentration may have been reduced in response to high river flows
CR5	07/13/2011	Mercury	0.000016	0.0001	NA	Less than 10 samples collected for this analyte, still establishing range
CR5	07/13/2011	Nitrate	0.31	0.829	NA	Less than 10 samples collected for this analyte, still establishing range
CR5	07/13/2011	Thallium	0.0062	NA	0.00071	Less than 10 samples collected for this analyte, still establishing range

mg/L = milligrams per liter

## 4.0 Results

No data were rejected (flagged as “R”) as a result of this validation process for the ground water and surface water samples collected during this July 2011 sampling event.

### 4.1 July 2011 CF4 and Surface Water Sampling Event

As previously mentioned, the samples collected from the CF4 observation wells and surface water locations were analyzed for various metals and inorganic compounds. Table 5 presents the CF4 locations (and associated concentration) that exceeded the 0.044 milligram per liter (mg/L) uranium ground water standard. The uranium standard is based on Table 1 in Title 40 Code of Federal Regulations Part 192, Subpart A, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings and Uranium In Situ Leaching Processing Facilities,” assuming uranium-234 and uranium-238 activities are in equilibrium.

Table 5. July 2011 CF4 and Surface Water Sampling Locations Exceeding the 0.044 mg/L Uranium Ground Water Standard

Well Number	Date	Location	Sample Depth (ft bgs)	Uranium Concentration (mg/L)
0780	7/14/2011	CF4 - Upgradient	28	0.3
0782	7/14/2011	CF4 - Upgradient	33	0.21
0784	7/14/2011	CF4 - Downgradient	18	0.31
0786	7/14/2011	CF4 - Downgradient	28	0.31
0787	7/14/2011	CF4 - Downgradient	18	0.33

ft bgs = feet below ground surface

Figures 2, 3, and 4 are the time versus ammonia, TDS, and uranium (respectively) concentration plots for CF4 upgradient observation wells 0780 and 0782. As Figures 3 and 4 exhibit, the operation of the freshwater injection system followed by the development of a freshwater lens from the sustained high river stage during the spring runoff significantly reduced the ammonia and TDS concentrations. Figure 4 shows there was a slight rebound in the uranium concentrations after the injection system was shut off, yet remained below 0.3 mg/L.

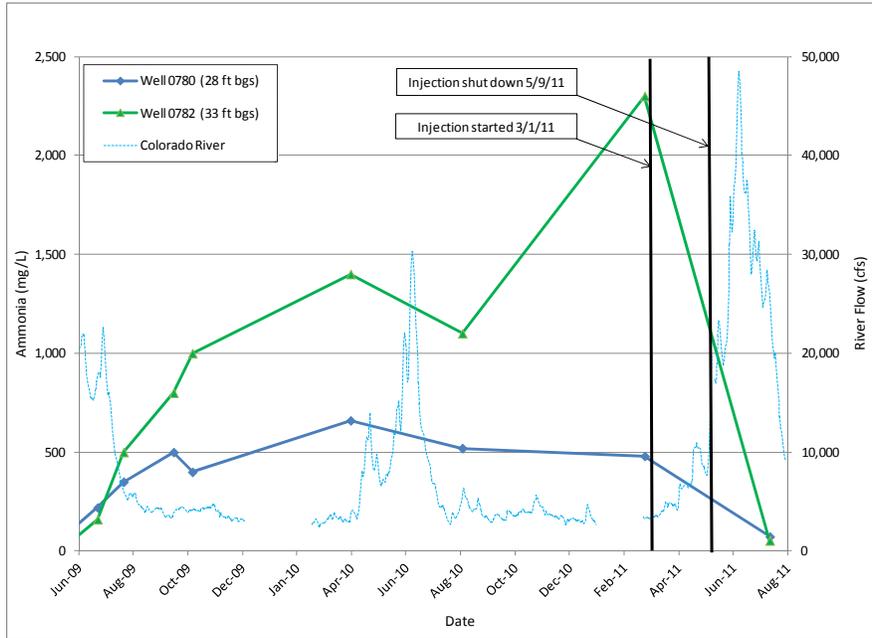


Figure 2. CF4 Upgradient Observation Wells 0780 and 0782 Time Versus Ammonia Concentration Plot

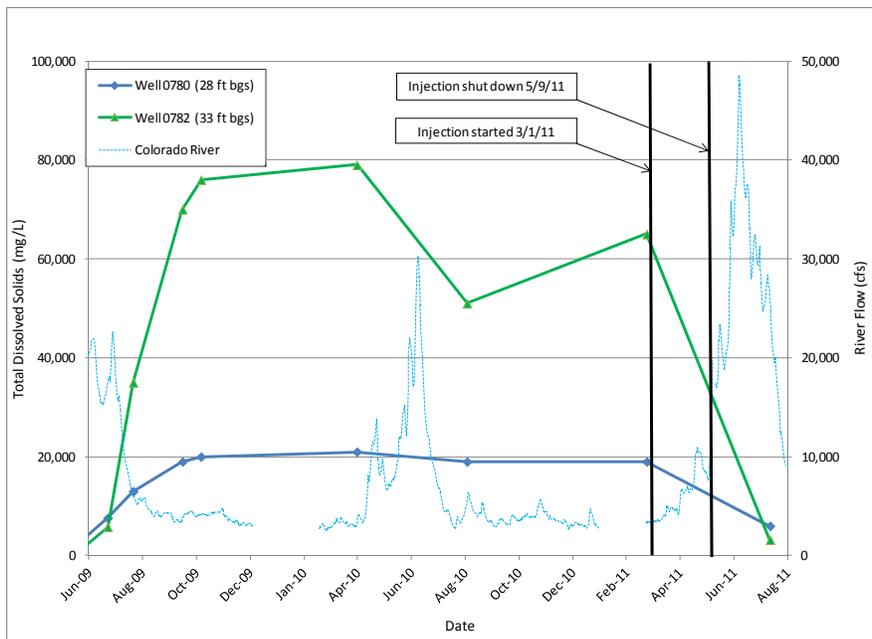


Figure 3. CF4 Upgradient Observation Wells 0780 and 0782 Time Versus TDS Concentration Plot

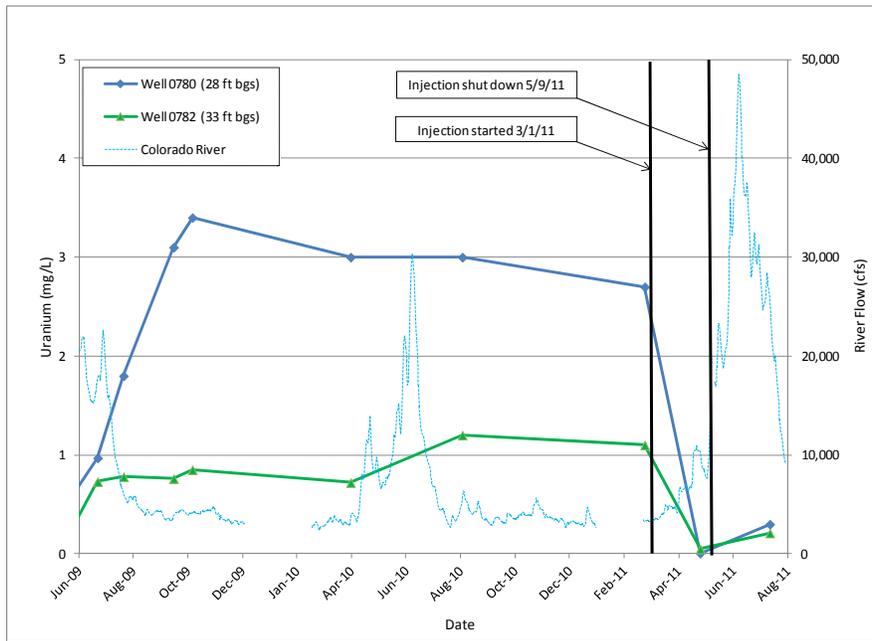


Figure 4. CF4 Upgradient Observation Wells 0780 and 0782 Time Versus Uranium Concentration Plot

Figures 5, 6, and 7 are similar plots for downgradient wells 0784, 0786, and 0787. These downgradient locations are all approximately 30 feet (ft) from the line of injection wells. Ammonia and TDS concentrations significantly decreased in response to the freshwater injection and high river stage. The uranium concentration trend was similar to that exhibited by the upgradient observation wells. It is likely there was a similar rebound in the ammonia and TDS concentrations, but these analytes were not sampled for in late April 2011.

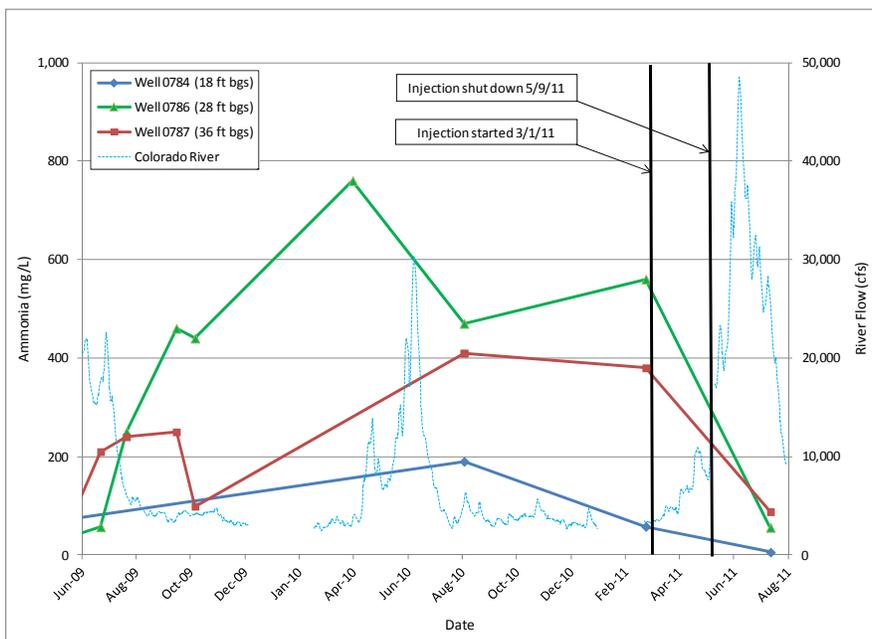


Figure 5. CF4 Downgradient Observation Wells 0784, 0786, and 0787 Time Versus Ammonia Concentration Plot

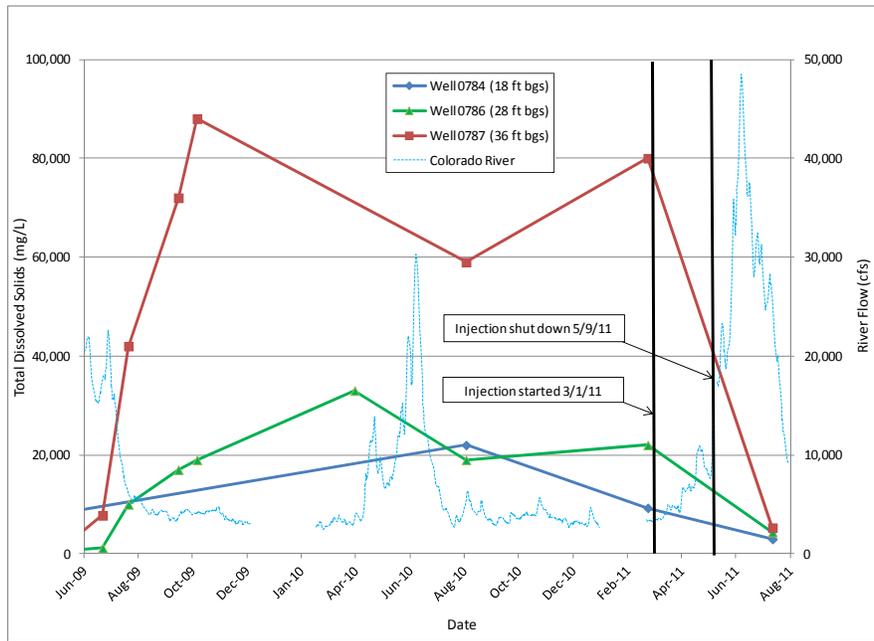


Figure 6. CF4 Downgradient Observation Wells 0784, 0786, and 0787 Time Versus TDS Concentration Plot

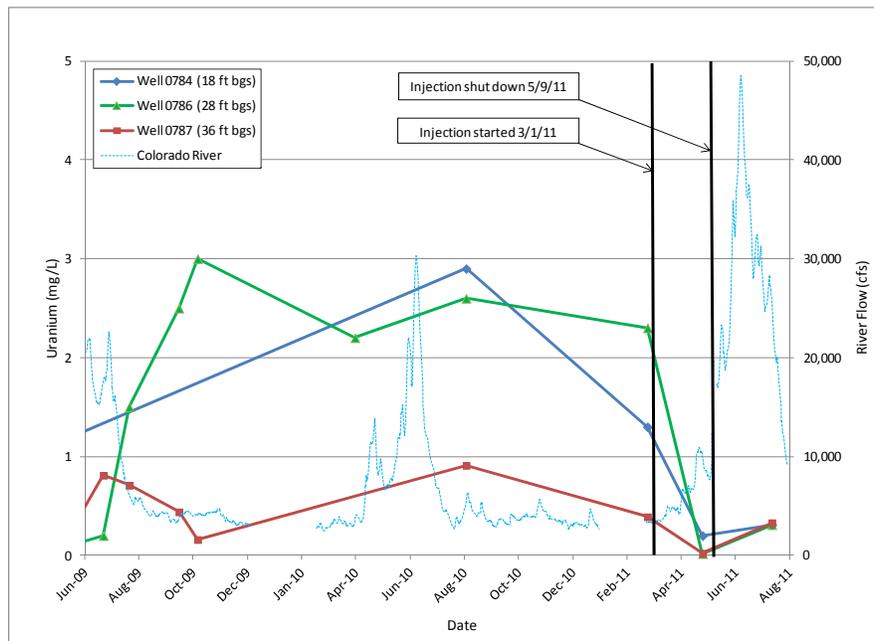


Figure 7. CF4 Downgradient Observation Wells 0784, 0786, and 0787 Time Versus Uranium Concentration Plot

Table 6 summarizes the ammonia, TDS, and uranium concentrations for the surface water samples collected in July 2011. As the results indicate, the concentrations measured in the samples collected from the upstream and downstream locations are similar. In addition, the concentrations measured in the samples collected from the on-site locations are not significantly different compared to the upstream and downstream concentrations.

Table 6. Summary of Surface Water Ammonia, TDS, and Uranium Concentrations, July 2011

Sample Number	Relative Location	Ammonia (mg/L)	TDS (mg/L)	U (mg/L)
CR1	Upstream of Site	<0.1	270	0.0016
MWS-1	On Site – Off Moab Wash	<0.1	280	0.0018
0274	On Site – Off CF4	0.021	260	0.0016
CF5 Pond	On Site – Off CF5	<0.1	300	0.011
CR5	Downstream of Site	<0.1	290	0.0018

As shown in Table 7, the ammonia concentrations in all surface water samples collected during the June 2010 sampling event did not exceed the acute or chronic criteria.

Table 7. July 2011 Surface Water Ammonia Concentrations and Comparisons to State of Utah and Federal Criteria

Loc	Date	Temp (°C)	pH	Ammonia (mg/L)	State/Federal AWQC-Acute Total as N (mg/L) <sup>1</sup>	State/Federal AWQC-Chronic Total as N (mg/L) <sup>2</sup>
0274	7/13/11	20.6	7.75	0.021	8.11	2.23
CF5-Pond	7/13/11	29.2	8.70	0.1	1.47	0.287
CR1	7/13/11	18.3	7.63	0.1	11.4	3.18
CR5	7/13/11	18.6	7.96	0.1	5.62	1.94
MWS-1	7/13/11	20.0	7.53	0.1	13.3	3.06

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

## 5.0 Conclusions

The rationale for the July 2011 sampling was to monitor the water quality in the vicinity of the CF4 injection wells after the injection system was shut down on May 9 (because of the flood waters) and to determine the impact of the high river flows. Surface water samples were collected at the same time to determine if flood waters coming into contact with the site had any impacts on the Colorado River water quality.

The following conclusions can be made from this sampling event.

- Ground water samples from five of the CF4 observation wells had uranium concentrations above the 0.044 mg/L ground water standard. However, the concentrations were well below pre-freshwater injection levels.
- There was no impact on the water quality of the Colorado River as a result of the surface water that flowed onto the site during the spring runoff flooding event.

## 6.0 References

40 CFR 192A (Code of Federal Regulations), “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings and Uranium In Situ Leaching Processing Facilities.”

DOE (U.S. Department of Energy), *Moab UMTRA Project Operations, Maintenance, and Performance Monitoring Plan for the Interim Action Ground Water Treatment System* (DOE-EM/GJTAC1973), June 2011.

DOE (U.S. Department of Energy), *Moab UMTRA Project Surface Water/Ground Water Sampling and Analysis Plan* (DOE-EM/GJTAC1830), November 2009.

DOE (U.S. Department of Energy), *Moab UMTRA Project Standard Practice for Validation of Laboratory Data* (DOE-EM/GJTAC1855), September 2011.

UAC (Utah Administrative Code) Rule R317.2, “Standards of Quality for Waters of the State.”

**Appendix A.**

**July 2011 CF4 and Surface Water Sampling Event**

**Water Sampling Field Activities Verification**

**Minimums and Maximums Report**

**Water Quality Data**

**Water Level Data**

**Trip Report**

## Water Sampling Field Activities Verification

<b>Sampling Event/RIN</b>	July 2011 CF4 and Surface Water Sampling/RIN 1107060	<b>Date(s) of Water Sampling</b>	July 13-14, 2011
<b>Date(s) of Verification</b>	August 11, 2011	<b>Name of Verifier</b>	Rachel Cowan
	<b>Response (Yes, No, NA)</b>	<b>Comments</b>	
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?	NA		
3. Was a pretrip calibration conducted as specified in the aforementioned documents?	Yes		
4. Was an operational check of the field equipment conducted twice daily?	Yes		
Did the operational checks meet criteria?	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?	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?	Yes		
8. Were the following conditions met when purging a Category II well: Was the flow rate less than 500 milliliters per minute?	Yes		
Was one pump/tubing volume removed prior to sampling?	Yes		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	One duplicate was collected for 11 samples.	
10. Were EBs taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	All samples were collected on dedicated equipment.	
11. Were trip blanks prepared and included with each shipment of volatile organic compound samples?	NA		

## Water Sampling Field Activities Verification (continued)

Sampling Event/RIN	July 2011 CF4 and Surface Water Sampling/RIN 1107060	Date(s) of Water Sampling	July 13-14, 2011
Date(s) of Verification	August 11, 2011	Name of Verifier	Rachel Cowan
		Response (Yes, No, NA)	Comments
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	

# Minimums and Maximums Report

July 2011 CF4 and Surface Water Sampling Event  
 Data Validation Minimums and Maximums Report - No Field Parameters  
 Laboratory: ALS  
 RIN: 1107060  
 Comparison: All Historical Data  
 Report Date: 8/31/2011

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	0274	07/13/2011	Ammonia Total as N	0.021	J J		690			0.074	J U		25	5
MOA01	0274	07/13/2011	Chloride	20		J	940			36		UJ	17	1
MOA01	0274	07/13/2011	Sulfate	85		J	1300			110			17	0
MOA01	0274	07/13/2011	Total Dissolved Solids	260		J	23000			330			22	0
MOA01	0274	07/13/2011	Uranium	0.0016	E	J	2.8			0.0023		J	22	1
MOA01	0780	07/14/2011	Ammonia Total as N	73			890		F	77			34	0
MOA01	0780	07/14/2011	Selenium	0.027			0.0067		F	0.0012		F	12	0
MOA01	0782	07/14/2011	Ammonia Total as N	53			2300			63			34	0
MOA01	0782	07/14/2011	Copper	0.0012	B		0.12	B		0.014	U	F	11	6
MOA01	0782	07/14/2011	Selenium	0.02			0.005		F	0.0018		J	11	1
MOA01	0786	07/14/2011	Selenium	0.11			0.01		F	0.0005			11	0
MOA01	0787	07/14/2011	Selenium	0.022			0.004		F	0.00057		F	13	0
MOA01	CR1	07/13/2011	Arsenic	0.0039	U		0.002			0.00052	B		7	3
MOA01	CR1	07/13/2011	Calcium	44		J	141			46.3			10	0
MOA01	CR1	07/13/2011	Iron	0.0065	B		4.17			0.0075	B		7	3
MOA01	CR1	07/13/2011	Magnesium	10		J	41.7			12.9			10	1
MOA01	CR1	07/13/2011	Manganese	0.00057	B	J	0.076			0.0024	B	J	24	7
MOA01	CR1	07/13/2011	Mercury	0.000016	B	J	0.0002	U		0.0001	U		7	7
MOA01	CR1	07/13/2011	Nitrate as NO3	0.3		J	5.51			0.776	B		6	0

# Minimums and Maximums Report

## July 2011 CF4 and Surface Water Sampling Event Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: ALS

RIN: 1107060

Comparison: All Historical Data

Report Date: 8/31/2011

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	CR1	07/13/2011	Sodium	24	J	125		30.5			11	0	
MOA01	CR1	07/13/2011	Thallium	0.0044	B	0.00072	B U	0.0001	U		5	5	
MOA01	CR5	07/13/2011	Arsenic	0.0068	B	0.0014	B	0.00057	B		5	3	
MOA01	CR5	07/13/2011	Arsenic	0.0047	B	0.0014	B	0.00057	B		5	3	
MOA01	CR5	07/13/2011	Calcium	44		142		45.4			11	0	
MOA01	CR5	07/13/2011	Calcium	45	J	142		45.4			11	0	
MOA01	CR5	07/13/2011	Iron	0.0049	U	3.8		0.0051	B		7	3	
MOA01	CR5	07/13/2011	Magnesium	10		43.1		12.6			11	0	
MOA01	CR5	07/13/2011	Magnesium	10	J	43.1		12.6			11	0	
MOA01	CR5	07/13/2011	Manganese	0.00011	U	0.11		0.002	B J		25	7	
MOA01	CR5	07/13/2011	Manganese	0.00038	B	0.11		0.002	B J		25	7	
MOA01	CR5	07/13/2011	Mercury	0.000015	B	0.0002	U	0.0001	U		5	5	
MOA01	CR5	07/13/2011	Mercury	0.000016	B J	0.0002	U	0.0001	U		5	5	
MOA01	CR5	07/13/2011	Nitrate as NO3	0.31	J	5.53		0.829	B		6	0	
MOA01	CR5	07/13/2011	Nitrate as NO3	0.31		5.53		0.829	B		6	0	
MOA01	CR5	07/13/2011	Selenium	0.01		0.0076		0.0013	J		14	0	
MOA01	CR5	07/13/2011	Sodium	25	J	150		29.9			12	1	
MOA01	CR5	07/13/2011	Thallium	0.0062	B	0.00071	B U	0.0001	U		5	5	
MOA01	CR5	07/13/2011	Vanadium	0.00053	U	0.003	B	0.00065	B		8	2	

# Minimums and Maximums Report

Analyte concentrations presented in blue text represent the historical minimum or maximum 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.                        |   |                  |

## Water Quality Data

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Aluminum	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.088	B	J	#	0.015	
Aluminum	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.063	B		#	0.015	
Aluminum	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.06	B		#	0.015	
Aluminum	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.069	B		#	0.015	
Aluminum	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.067	B		#	0.015	
Aluminum	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.066	B		#	0.015	
Aluminum	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.015	B	J	#	0.015	
Aluminum	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.015	U		#	0.015	
Aluminum	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.015	U		#	0.015	
Aluminum	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.015	U		#	0.015	
Aluminum	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.015	U		#	0.015	
Ammonia Total as N	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.021	J	J	#	0.1	
Ammonia Total as N	mg/L	0780	WL	07/14/2011	0001	28	-	28	73			#	2	
Ammonia Total as N	mg/L	0782	WL	07/14/2011	0001	33	-	33	53			#	2	
Ammonia Total as N	mg/L	0784	WL	07/14/2011	0001	18	-	18	5.8			#	0.2	
Ammonia Total as N	mg/L	0786	WL	07/14/2011	0001	28	-	28	56			#	2	
Ammonia Total as N	mg/L	0787	WL	07/14/2011	0001	36	-	36	88			#	2	
Ammonia Total as N	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.1	U		#	0.1	
Ammonia Total as N	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.1	U		#	0.1	
Ammonia Total as N	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.1	U		#	0.1	
Ammonia Total as N	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.1	U		#	0.1	
Ammonia Total as N	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.1	U		#	0.1	
Antimony	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.003	U		#	0.003	
Antimony	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.003	U		#	0.003	
Antimony	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.003	U		#	0.003	
Antimony	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.003	U		#	0.003	

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers		Detection Limit	Uncertainty
											Data	QA		
Antimony	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.003	B		#	0.003	
Antimony	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.003	U		#	0.003	
Antimony	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.003	U		#	0.003	
Antimony	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.003	U		#	0.003	
Antimony	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.003	U		#	0.003	
Antimony	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.003	U		#	0.003	
Antimony	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.003	U		#	0.003	
Arsenic	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.0051	B		#	0.0039	
Arsenic	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.0039	U		#	0.0039	
Arsenic	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.0039	U		#	0.0039	
Arsenic	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0039	U		#	0.0039	
Arsenic	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0039	U		#	0.0039	
Arsenic	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0046	B		#	0.0039	
Arsenic	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0042	B		#	0.0039	
Arsenic	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0039	U		#	0.0039	
Arsenic	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.0047	B		#	0.0039	
Arsenic	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.0068	B		#	0.0039	
Arsenic	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0039	U		#	0.0039	
Barium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.051	B	J	#	0.00019	
Barium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.04	B		#	0.00019	
Barium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.045	B		#	0.00019	
Barium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.1			#	0.00019	
Barium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.067	B		#	0.00019	
Barium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.049	B		#	0.00019	
Barium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.061	B	J	#	0.00019	
Barium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.057	B	J	#	0.00019	
Barium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.058	B	J	#	0.00019	
Barium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.059	B		#	0.00019	

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Barium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.051	B	J	#	0.00019	
Beryllium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.00018	B	J	#	0.00018	
Beryllium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.00025	B		#	0.00018	
Beryllium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.00023	B		#	0.00018	
Beryllium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.00033	B		#	0.00018	
Beryllium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.00031	B		#	0.00018	
Beryllium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0002	B		#	0.00018	
Beryllium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.00018	U		#	0.00018	
Beryllium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.00018	U		#	0.00018	
Beryllium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00018	U		#	0.00018	
Beryllium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00018	U		#	0.00018	
Beryllium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.00018	U		#	0.00018	
Bromide	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.2	U		#	0.2	
Bromide	mg/L	0780	WL	07/14/2011	0001	28	-	28	2	U		#	2	
Bromide	mg/L	0782	WL	07/14/2011	0001	33	-	33	1	U		#	1	
Bromide	mg/L	0784	WL	07/14/2011	0001	18	-	18	1	U		#	1	
Bromide	mg/L	0786	WL	07/14/2011	0001	28	-	28	1	U		#	1	
Bromide	mg/L	0787	WL	07/14/2011	0001	36	-	36	2	U		#	2	
Bromide	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.2	U		#	0.2	
Bromide	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.2	U		#	0.2	
Bromide	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.2	U		#	0.2	
Bromide	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.2	U		#	0.2	
Bromide	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.2	U		#	0.2	
Cadmium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.00033	U		#	0.00033	
Cadmium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.00033	U		#	0.00033	
Cadmium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.00033	U		#	0.00033	
Cadmium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.00033	U		#	0.00033	
Cadmium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.00033	U		#	0.00033	

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Cadmium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.00033	U	#	0.00033		
Cadmium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.00033	U	#	0.00033		
Cadmium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.00033	U	#	0.00033		
Cadmium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00033	U	#	0.00033		
Cadmium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00033	U	#	0.00033		
Cadmium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.00033	U	#	0.00033		
Calcium	mg/L	0274	SL	07/13/2011	0001	0	-	0	45		#	0.012		
Calcium	mg/L	0780	WL	07/14/2011	0001	28	-	28	290		#	0.012		
Calcium	mg/L	0782	WL	07/14/2011	0001	33	-	33	150		#	0.012		
Calcium	mg/L	0784	WL	07/14/2011	0001	18	-	18	300		#	0.012		
Calcium	mg/L	0786	WL	07/14/2011	0001	28	-	28	260		#	0.012		
Calcium	mg/L	0787	WL	07/14/2011	0001	36	-	36	150		#	0.012		
Calcium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	44	J	#	0.012		
Calcium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	44	J	#	0.012		
Calcium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	45	J	#	0.012		
Calcium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	44		#	0.012		
Calcium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	43	J	#	0.012		
Chloride	mg/L	0274	SL	07/13/2011	0001	0	-	0	20	J	#	0.2		
Chloride	mg/L	0780	WL	07/14/2011	0001	28	-	28	1800		#	20		
Chloride	mg/L	0782	WL	07/14/2011	0001	33	-	33	880		#	10		
Chloride	mg/L	0784	WL	07/14/2011	0001	18	-	18	460		#	10		
Chloride	mg/L	0786	WL	07/14/2011	0001	28	-	28	940		#	20		
Chloride	mg/L	0787	WL	07/14/2011	0001	36	-	36	1800		#	20		
Chloride	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	28	J	#	0.4		
Chloride	mg/L	CR1	SL	07/13/2011	0001	0	-	0	20	J	#	0.2		
Chloride	mg/L	CR5	SL	07/13/2011	0001	0	-	0	21	J	#	0.4		
Chloride	mg/L	CR5	SL	07/13/2011	0002	0	-	0	20		#	0.2		
Chloride	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	20	J	#	0.2		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
										Lab	Data	QA		
Chromium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.00051	U	#	0.00051		
Chromium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.00051	U	#	0.00051		
Chromium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.00051	U	#	0.00051		
Chromium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.00051	U	#	0.00051		
Chromium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.00051	U	#	0.00051		
Chromium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.00051	U	#	0.00051		
Chromium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.00051	U	#	0.00051		
Chromium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.00051	U	#	0.00051		
Chromium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00051	U	#	0.00051		
Chromium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00051	U	#	0.00051		
Chromium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.00051	U	#	0.00051		
Cobalt	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.00047	B	#	0.00045		
Cobalt	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.00049	B	#	0.00045		
Cobalt	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.00045	U	#	0.00045		
Cobalt	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.001	B	#	0.00045		
Cobalt	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0017	B	#	0.00045		
Cobalt	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0011	B	#	0.00045		
Cobalt	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.00097	B	#	0.00045		
Cobalt	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.00057	B	#	0.00045		
Cobalt	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00045	U	#	0.00045		
Cobalt	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00045	U	#	0.00045		
Cobalt	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.00045	U	#	0.00045		
Copper	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.00097	U	#	0.00097		
Copper	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.00097	U	#	0.00097		
Copper	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.0012	B	#	0.00097		
Copper	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.00097	U	#	0.00097		
Copper	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0044	B	#	0.00097		
Copper	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0036	B	#	0.00097		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers		Detection Limit	Uncertainty
											Data	QA		
Copper	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.002	B	#	0.00097		
Copper	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0011	B	#	0.00097		
Copper	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00097	U	#	0.00097		
Copper	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00097	U	#	0.00097		
Copper	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.00097	U	#	0.00097		
Dissolved Oxygen	mg/L	0274	SL	07/13/2011	0001	0	-	0	7.9		#			
Dissolved Oxygen	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.73		#			
Dissolved Oxygen	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.57		#			
Dissolved Oxygen	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.57		#			
Dissolved Oxygen	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.62		#			
Dissolved Oxygen	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.6		#			
Dissolved Oxygen	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	8.16		#			
Dissolved Oxygen	mg/L	CR1	SL	07/13/2011	0001	0	-	0	8.04		#			
Dissolved Oxygen	mg/L	CR5	SL	07/13/2011	0001	0	-	0	8.09		#			
Dissolved Oxygen	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	8.05		#			
Fluoride	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.2		J	#	0.1	
Fluoride	mg/L	0780	WL	07/14/2011	0001	28	-	28	1	U	#		1	
Fluoride	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.5	U	#		0.5	
Fluoride	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.83		#		0.5	
Fluoride	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.5	U	#		0.5	
Fluoride	mg/L	0787	WL	07/14/2011	0001	36	-	36	1	U	#		1	
Fluoride	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.22		J	#	0.1	
Fluoride	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.2		J	#	0.1	
Fluoride	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.2		J	#	0.1	
Fluoride	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.21		#		0.1	
Fluoride	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.2		J	#	0.1	
Iron	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.033	B	#		0.0049	
Iron	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.0049	U	#		0.0049	

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
										Lab	Data	QA		
Iron	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.0078	B	#	0.0049		
Iron	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0049	U	#	0.0049		
Iron	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0049	U	#	0.0049		
Iron	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0049	U	#	0.0049		
Iron	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0049	U	#	0.0049		
Iron	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0065	B	#	0.0049		
Iron	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.0049	U	#	0.0049		
Iron	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.011	B	#	0.0049		
Iron	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0049	U	#	0.0049		
Lead	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.0013	U	#	0.0013		
Lead	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.0013	U	#	0.0013		
Lead	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.0013	U	#	0.0013		
Lead	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0013	U	#	0.0013		
Lead	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0013	U	#	0.0013		
Lead	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0013	U	#	0.0013		
Lead	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0013	U	#	0.0013		
Lead	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0013	U	#	0.0013		
Lead	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.0013	U	#	0.0013		
Lead	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.0013	U	#	0.0013		
Lead	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0013	U	#	0.0013		
Magnesium	mg/L	0274	SL	07/13/2011	0001	0	-	0	10		J	#	0.013	
Magnesium	mg/L	0780	WL	07/14/2011	0001	28	-	28	160		#	0.013		
Magnesium	mg/L	0782	WL	07/14/2011	0001	33	-	33	82		#	0.013		
Magnesium	mg/L	0784	WL	07/14/2011	0001	18	-	18	94		#	0.013		
Magnesium	mg/L	0786	WL	07/14/2011	0001	28	-	28	160		#	0.013		
Magnesium	mg/L	0787	WL	07/14/2011	0001	36	-	36	110		#	0.013		
Magnesium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	12		J	#	0.013	
Magnesium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	10		J	#	0.013	

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Magnesium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	10	J	#	0.013		
Magnesium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	10		#	0.013		
Magnesium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	10	J	#	0.013		
Manganese	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.0031	B	J	#	0.00011	
Manganese	mg/L	0780	WL	07/14/2011	0001	28	-	28	1.1		#	0.00011		
Manganese	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.79		#	0.00011		
Manganese	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.51		#	0.00011		
Manganese	mg/L	0786	WL	07/14/2011	0001	28	-	28	1.3		#	0.00011		
Manganese	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.97		#	0.00011		
Manganese	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0069	B	J	#	0.00011	
Manganese	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.00057	B	J	#	0.00011	
Manganese	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00011	U	#	0.00011		
Manganese	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00038	B	#	0.00011		
Manganese	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0038	B	J	#	0.00011	
Mercury	mg/L	0274	SL	07/13/2011	0001	0	-	0	1.7E-005	B	J	#	9.7E-006	
Mercury	mg/L	0780	WL	07/14/2011	0001	28	-	28	1.E-005	B	#	9.7E-006		
Mercury	mg/L	0782	WL	07/14/2011	0001	33	-	33	1.3E-005	B	#	9.7E-006		
Mercury	mg/L	0784	WL	07/14/2011	0001	18	-	18	1.5E-005	B	#	9.7E-006		
Mercury	mg/L	0786	WL	07/14/2011	0001	28	-	28	1.4E-005	B	#	9.7E-006		
Mercury	mg/L	0787	WL	07/14/2011	0001	36	-	36	1.5E-005	B	#	9.7E-006		
Mercury	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	1.6E-005	B	J	#	9.7E-006	
Mercury	mg/L	CR1	SL	07/13/2011	0001	0	-	0	1.6E-005	B	J	#	9.7E-006	
Mercury	mg/L	CR5	SL	07/13/2011	0001	0	-	0	1.6E-005	B	J	#	9.7E-006	
Mercury	mg/L	CR5	SL	07/13/2011	0002	0	-	0	1.5E-005	B	#	9.7E-006		
Mercury	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	1.6E-005	B	J	#	9.7E-006	
Nickel	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.00093	U	#	0.00093		
Nickel	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.0031	B	#	0.00093		
Nickel	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.0017	B	#	0.00093		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Nickel	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0013	B	#	0.00093		
Nickel	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0032	B	#	0.00093		
Nickel	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.00093	U	#	0.00093		
Nickel	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.00093	U	#	0.00093		
Nickel	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.00093	U	#	0.00093		
Nickel	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00093	U	#	0.00093		
Nickel	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00093	U	#	0.00093		
Nickel	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.00093	U	#	0.00093		
Nitrate as NO3	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.29		J #	0.2		
Nitrate as NO3	mg/L	0780	WL	07/14/2011	0001	28	-	28	32		#	2		
Nitrate as NO3	mg/L	0782	WL	07/14/2011	0001	33	-	33	6.4		#	1		
Nitrate as NO3	mg/L	0784	WL	07/14/2011	0001	18	-	18	39		#	1		
Nitrate as NO3	mg/L	0786	WL	07/14/2011	0001	28	-	28	77		#	1		
Nitrate as NO3	mg/L	0787	WL	07/14/2011	0001	36	-	36	4.4		#	2		
Nitrate as NO3	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.56		J #	0.2		
Nitrate as NO3	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.3		J #	0.2		
Nitrate as NO3	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.31		J #	0.2		
Nitrate as NO3	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.31		#	0.2		
Nitrate as NO3	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.29		J #	0.2		
Nitrite as Nitrogen	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.1	U	#	0.1		
Nitrite as Nitrogen	mg/L	0780	WL	07/14/2011	0001	28	-	28	1	U	#	1		
Nitrite as Nitrogen	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.5	U	#	0.5		
Nitrite as Nitrogen	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.5	U	#	0.5		
Nitrite as Nitrogen	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.5	U	#	0.5		
Nitrite as Nitrogen	mg/L	0787	WL	07/14/2011	0001	36	-	36	1	U	#	1		
Nitrite as Nitrogen	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.1	U	#	0.1		
Nitrite as Nitrogen	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.1	U	#	0.1		
Nitrite as Nitrogen	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.1	U	#	0.1		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
										Lab	Data	QA		
Nitrite as Nitrogen	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.1	U		#	0.1	
Nitrite as Nitrogen	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.1	U		#	0.1	
Orthophosphate as Phosphorus	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.5	UN		#	0.5	
Orthophosphate as Phosphorus	mg/L	0780	WL	07/14/2011	0001	28	-	28	8		J	#	5	
Orthophosphate as Phosphorus	mg/L	0782	WL	07/14/2011	0001	33	-	33	2.8		J	#	2.5	
Orthophosphate as Phosphorus	mg/L	0784	WL	07/14/2011	0001	18	-	18	2.5	U		#	2.5	
Orthophosphate as Phosphorus	mg/L	0786	WL	07/14/2011	0001	28	-	28	2.5	U		#	2.5	
Orthophosphate as Phosphorus	mg/L	0787	WL	07/14/2011	0001	36	-	36	5	U		#	5	
Orthophosphate as Phosphorus	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.5	U		#	0.5	
Orthophosphate as Phosphorus	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.5	U		#	0.5	
Orthophosphate as Phosphorus	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.5	U		#	0.5	
Orthophosphate as Phosphorus	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.5	U		#	0.5	
Orthophosphate as Phosphorus	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.5	U		#	0.5	
Oxidation Reduction Potential	mV	0274	SL	07/13/2011	0001	0	-	0	141			#		
Oxidation Reduction Potential	mV	0780	WL	07/14/2011	0001	28	-	28	113			#		
Oxidation Reduction Potential	mV	0782	WL	07/14/2011	0001	33	-	33	81			#		
Oxidation Reduction Potential	mV	0784	WL	07/14/2011	0001	18	-	18	123			#		
Oxidation Reduction Potential	mV	0786	WL	07/14/2011	0001	28	-	28	135			#		
Oxidation Reduction Potential	mV	0787	WL	07/14/2011	0001	36	-	36	124			#		
Oxidation Reduction Potential	mV	CF5-Pond	SL	07/13/2011	0001	0	-	0	110			#		
Oxidation Reduction Potential	mV	CR1	SL	07/13/2011	0001	0	-	0	79			#		
Oxidation Reduction Potential	mV	CR5	SL	07/13/2011	0001	0	-	0	84			#		
Oxidation Reduction Potential	mV	MWS-1	SL	07/13/2011	0001	0	-	0	162			#		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

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.	0274	SL	07/13/2011	0001	0	-	0	7.75			#		
pH	s.u.	0780	WL	07/14/2011	0001	28	-	28	7.26			#		
pH	s.u.	0782	WL	07/14/2011	0001	33	-	33	7.5			#		
pH	s.u.	0784	WL	07/14/2011	0001	18	-	18	7.25			#		
pH	s.u.	0786	WL	07/14/2011	0001	28	-	28	7.2			#		
pH	s.u.	0787	WL	07/14/2011	0001	36	-	36	7.47			#		
pH	s.u.	CF5-Pond	SL	07/13/2011	0001	0	-	0	8.7			#		
pH	s.u.	CR1	SL	07/13/2011	0001	0	-	0	7.63			#		
pH	s.u.	CR5	SL	07/13/2011	0001	0	-	0	7.96			#		
pH	s.u.	MWS-1	SL	07/13/2011	0001	0	-	0	7.53			#		
Potassium	mg/L	0274	SL	07/13/2011	0001	0	-	0	2.2	J		#	0.11	
Potassium	mg/L	0780	WL	07/14/2011	0001	28	-	28	73			#	0.11	
Potassium	mg/L	0782	WL	07/14/2011	0001	33	-	33	48			#	0.11	
Potassium	mg/L	0784	WL	07/14/2011	0001	18	-	18	37			#	0.11	
Potassium	mg/L	0786	WL	07/14/2011	0001	28	-	28	61			#	0.11	
Potassium	mg/L	0787	WL	07/14/2011	0001	36	-	36	88			#	0.11	
Potassium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	2.9	J		#	0.11	
Potassium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	2.4	J		#	0.11	
Potassium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	2.5	J		#	0.11	
Potassium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	2.5			#	0.11	
Potassium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	2.2	J		#	0.11	
Selenium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.01	J		#	0.0027	
Selenium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.027			#	0.0027	
Selenium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.02			#	0.0027	
Selenium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.1			#	0.0027	
Selenium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.11			#	0.0027	
Selenium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.022			#	0.0027	
Selenium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.008	J		#	0.0027	

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
										Lab	Data	QA		
Selenium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0069		J	#	0.0027	
Selenium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.007		J	#	0.0027	
Selenium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.01			#	0.0027	
Selenium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0083		J	#	0.0027	
Silver	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.0011	U		#	0.0011	
Silver	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.0011	U		#	0.0011	
Silver	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.0011	U		#	0.0011	
Silver	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0011	U		#	0.0011	
Silver	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0011	U		#	0.0011	
Silver	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0011	U		#	0.0011	
Silver	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0011	U		#	0.0011	
Silver	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0011	U		#	0.0011	
Silver	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.0011	U		#	0.0011	
Silver	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.0011	U		#	0.0011	
Silver	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0011	U		#	0.0011	
Sodium	mg/L	0274	SL	07/13/2011	0001	0	-	0	22	E	J	#	0.0066	
Sodium	mg/L	0780	WL	07/14/2011	0001	28	-	28	2100		J	#	0.66	
Sodium	mg/L	0782	WL	07/14/2011	0001	33	-	33	1200		J	#	0.066	
Sodium	mg/L	0784	WL	07/14/2011	0001	18	-	18	750		J	#	0.066	
Sodium	mg/L	0786	WL	07/14/2011	0001	28	-	28	1400		J	#	0.066	
Sodium	mg/L	0787	WL	07/14/2011	0001	36	-	36	2200		J	#	0.66	
Sodium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	30		J	#	0.0066	
Sodium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	24		J	#	0.0066	
Sodium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	25		J	#	0.0066	
Sodium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	25		J	#	0.0066	
Sodium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	22		J	#	0.0066	
Specific Conductance	µmhos/cm	0274	SL	07/13/2011	0001	0	-	0	549			#		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

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	0780	WL	07/14/2011	0001	28	-	28	9164			#		
Specific Conductance	µmhos/cm	0782	WL	07/14/2011	0001	33	-	33	5321			#		
Specific Conductance	µmhos/cm	0784	WL	07/14/2011	0001	18	-	18	4256			#		
Specific Conductance	µmhos/cm	0786	WL	07/14/2011	0001	28	-	28	6571			#		
Specific Conductance	µmhos/cm	0787	WL	07/14/2011	0001	36	-	36	8703			#		
Specific Conductance	µmhos/cm	CF5-Pond	SL	07/13/2011	0001	0	-	0	577			#		
Specific Conductance	µmhos/cm	CR1	SL	07/13/2011	0001	0	-	0	533			#		
Specific Conductance	µmhos/cm	CR5	SL	07/13/2011	0001	0	-	0	567			#		
Specific Conductance	µmhos/cm	MWS-1	SL	07/13/2011	0001	0	-	0	564			#		
Sulfate	mg/L	0274	SL	07/13/2011	0001	0	-	0	85		J	#	0.5	
Sulfate	mg/L	0780	WL	07/14/2011	0001	28	-	28	1900			#	50	
Sulfate	mg/L	0782	WL	07/14/2011	0001	33	-	33	1000			#	25	
Sulfate	mg/L	0784	WL	07/14/2011	0001	18	-	18	1100			#	25	
Sulfate	mg/L	0786	WL	07/14/2011	0001	28	-	28	1400			#	50	
Sulfate	mg/L	0787	WL	07/14/2011	0001	36	-	36	1400			#	50	
Sulfate	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	91		J	#	0.5	
Sulfate	mg/L	CR1	SL	07/13/2011	0001	0	-	0	89		J	#	0.5	
Sulfate	mg/L	CR5	SL	07/13/2011	0001	0	-	0	91		J	#	0.5	
Sulfate	mg/L	CR5	SL	07/13/2011	0002	0	-	0	91			#	0.5	
Sulfate	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	87		J	#	0.5	
Temperature	C	0274	SL	07/13/2011	0001	0	-	0	20.64			#		
Temperature	C	0780	WL	07/14/2011	0001	28	-	28	14.83			#		
Temperature	C	0782	WL	07/14/2011	0001	33	-	33	15.47			#		
Temperature	C	0784	WL	07/14/2011	0001	18	-	18	15.11			#		
Temperature	C	0786	WL	07/14/2011	0001	28	-	28	14.54			#		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Temperature	C	0787	WL	07/14/2011	0001	36	-	36	15.33			#		
Temperature	C	CF5-Pond	SL	07/13/2011	0001	0	-	0	29.16			#		
Temperature	C	CR1	SL	07/13/2011	0001	0	-	0	18.3			#		
Temperature	C	CR5	SL	07/13/2011	0001	0	-	0	18.57			#		
Temperature	C	MWS-1	SL	07/13/2011	0001	0	-	0	19.96			#		
Thallium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.0046	B		#	0.0035	
Thallium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.0035	U		#	0.0035	
Thallium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.0035	U		#	0.0035	
Thallium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0035	U		#	0.0035	
Thallium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.0035	U		#	0.0035	
Thallium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.0035	U		#	0.0035	
Thallium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0035	U		#	0.0035	
Thallium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0044	B		#	0.0035	
Thallium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.0062	B		#	0.0035	
Thallium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.0035	U		#	0.0035	
Thallium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0035	U		#	0.0035	
Total Dissolved Solids	mg/L	0274	SL	07/13/2011	0001	0	-	0	260		J	#	20	
Total Dissolved Solids	mg/L	0780	WL	07/14/2011	0001	28	-	28	6000			#	200	
Total Dissolved Solids	mg/L	0782	WL	07/14/2011	0001	33	-	33	3200			#	80	
Total Dissolved Solids	mg/L	0784	WL	07/14/2011	0001	18	-	18	3000			#	80	
Total Dissolved Solids	mg/L	0786	WL	07/14/2011	0001	28	-	28	4400			#	200	
Total Dissolved Solids	mg/L	0787	WL	07/14/2011	0001	36	-	36	5300			#	200	
Total Dissolved Solids	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	300		J	#	20	
Total Dissolved Solids	mg/L	CR1	SL	07/13/2011	0001	0	-	0	270		J	#	20	
Total Dissolved Solids	mg/L	CR5	SL	07/13/2011	0001	0	-	0	270		J	#	20	
Total Dissolved Solids	mg/L	CR5	SL	07/13/2011	0002	0	-	0	290			#	20	
Total Dissolved Solids	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	280		J	#	20	
Turbidity	NTU	0780	WL	07/14/2011	0001	28	-	28	7.03			#		

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA						
Turbidity	NTU	0782	WL	07/14/2011	0001	33	-	33	9.52			#		
Turbidity	NTU	0784	WL	07/14/2011	0001	18	-	18	5.2			#		
Turbidity	NTU	0786	WL	07/14/2011	0001	28	-	28	6.85			#		
Turbidity	NTU	0787	WL	07/14/2011	0001	36	-	36	3.56			#		
Turbidity	NTU	CF5-Pond	SL	07/13/2011	0001	0	-	0	435			#		
Turbidity	NTU	MWS-1	SL	07/13/2011	0001	0	-	0	862			#		
Uranium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.0016	E	J	#	2.9E-005	
Uranium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.3			#	0.00015	
Uranium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.21			#	0.00015	
Uranium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.31			#	0.00029	
Uranium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.31			#	0.00029	
Uranium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.33			#	0.00029	
Uranium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.011		J	#	2.9E-005	
Uranium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0016		J	#	2.9E-005	
Uranium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.0016		J	#	2.9E-005	
Uranium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.0018			#	2.9E-005	
Uranium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0018		J	#	2.9E-005	
Vanadium	mg/L	0274	SL	07/13/2011	0001	0	-	0	0.00077	B	J	#	0.00053	
Vanadium	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.00053	U		#	0.00053	
Vanadium	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.00062	B		#	0.00053	
Vanadium	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0012	B		#	0.00053	
Vanadium	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.00085	B		#	0.00053	
Vanadium	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.00083	B		#	0.00053	
Vanadium	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0078	B	J	#	0.00053	
Vanadium	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.0014	B	J	#	0.00053	
Vanadium	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00087	B	J	#	0.00053	
Vanadium	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00053	U		#	0.00053	
Vanadium	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.0011	B	J	#	0.00053	

## Water Quality Data (continued)

July 2011 CF4 and Surface Water Sampling  
 General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 8/31/2011

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	0274	SL	07/13/2011	0001	0	-	0	0.00072	U		#	0.00072	
Zinc	mg/L	0780	WL	07/14/2011	0001	28	-	28	0.00072	U		#	0.00072	
Zinc	mg/L	0782	WL	07/14/2011	0001	33	-	33	0.00072	U		#	0.00072	
Zinc	mg/L	0784	WL	07/14/2011	0001	18	-	18	0.0047	B		#	0.00072	
Zinc	mg/L	0786	WL	07/14/2011	0001	28	-	28	0.00072	U		#	0.00072	
Zinc	mg/L	0787	WL	07/14/2011	0001	36	-	36	0.00072	U		#	0.00072	
Zinc	mg/L	CF5-Pond	SL	07/13/2011	0001	0	-	0	0.0038	B		#	0.00072	
Zinc	mg/L	CR1	SL	07/13/2011	0001	0	-	0	0.00072	U		#	0.00072	
Zinc	mg/L	CR5	SL	07/13/2011	0001	0	-	0	0.00072	U		#	0.00072	
Zinc	mg/L	CR5	SL	07/13/2011	0002	0	-	0	0.00072	U		#	0.00072	
Zinc	mg/L	MWS-1	SL	07/13/2011	0001	0	-	0	0.00072	U		#	0.00072	

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

**DATA QUALIFIERS:**

- F Low flow sampling method used.
- 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.

**QA QUALIFIER:**

- # Validated according to quality assurance guidelines.

## Water Level Data

July 2011 CF4 and Surface Water Sampling  
STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site  
REPORT DATE: 12/5/2011

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0780		3968.45	07/14/2011		7.11	3961.34	
0782		3968.46	07/14/2011		7.07	3961.39	
0784		3968.73	07/14/2011		7.3	3961.43	
0786		3968.14	07/14/2011		6.75	3961.39	
0787		3968.43	07/14/2011		7.07	3961.36	

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

# Trip Report



DATE: August 09, 2011  
TO: K. Pill  
FROM: James Ritchey  
SUBJECT: July 2011 Surface Water Sampling Trip Report

**Site:** Moab

**Date of Sampling Event:** July 13-14, 2011

**Team Members:** Elizabeth Glowiak, James Ritchey

**RIN Number Assigned:** All samples were assigned to RIN 1107060.

**Sample Shipment:** All samples were shipped in two coolers overnight UPS to ALS Environmental from Moab, Utah, on July 14, 2010 (Tracking No. 0190127791 and 0191923008).

## July 2011 CF4 and Surface Water Sampling

**Number of Locations Sampled:** Five surface water samples (0274, CR1, CR5, MWS-1, and CF5 Pond) and five CF4 observation wells (0780, 0782, 0784, 0786, and 0787) were sampled. Including one surface water duplicate, 11 samples were collected during the July 2011 sampling event. Samples were analyzed for target analyte list metals (including uranium), ammonia, TDS, and anions.

**Locations Not Sampled:** None.

**Field Variance:** None.

**Quality-control Sample Cross Reference:** False identifications assigned to the quality-control samples are shown below.

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2000	CR5	Duplicate from 4 inches below water surface	Surface Water	JUL 003

ID = identification

## Trip Report (continued)

**Location-specific Information:** Each surface water sample was collected using a peristaltic pump and dedicated tubing. The table below provides additional information:

Sample ID	Location	Date	Comments
JUL 001	CR1	07/13/2011	Approximately 8 inches deep, moderate flow, high turbidity, sandy substrate.
JUL 002	CR5	07/13/2011	Approximately 4 inches deep, stagnant, much woody debris, very turbid.
JUL 004	MWS-1	07/13/2011	At least 1 foot deep, turbid, moderate flow, gravel/sand substrate, flow through from up river out Moab wash. First time this location has been sampled. Small fish up to 2 inches observed
JUL 005	0274	07/13/2011	Approximately 1 to 2 feet deep, moderate flow, muddy substrate.
JUL 006	CF5 Pond	07/13/2011	Ponded water, collected along east fence of Policaro Road, there is inflow on the north end from the river.

ID = identification



*Surface Water Location CR-1*

## Trip Report (continued)



*Surface Water Location CR-5*



*Surface Water Location MWS-1*

## Trip Report (continued)



*Surface Water Location CF5 Pond*



*Surface Water Location 0274*

## Trip Report (continued)

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

CF4 Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0780	07/14/2011	09:25	7.11	28
0782	07/14/2011	09:45	7.07	33
0784	07/14/2011	09:09	7.30	18
0786	07/14/2011	08:36	6.75	28
0787	07/14/2011	08:51	7.07	36

ft bgs = feet below ground surface; ft btoc = feet below top of casing

**Site Issues:** The USGS Cisco gauging station (Station No. 09180500) mean daily Colorado River flows during this sampling event are shown below.

Date	Daily Mean Flow (cfs)
07/13/2011	27,500
07/14/2011	27,100

**Equipment Issues:** None.

**Corrective Action Required/Taken:** None.