

Office of Environmental Management – Grand Junction



Moab UMTRA Project
June 2009 Validation Data Package for
Performance Assessment of the
Monthly Sampling for the Ground Water
Interim Action

September 2009



U.S. Department
of Energy

Office of Environmental Management

**Moab UMTRA Project
June 2009 Validation Data Package for Performance Assessment of
the Monthly Sampling for the
Ground Water Interim Action**

September 2009

**Moab UMTRA Project
June 2009 Monthly Ground Water Sampling Event**

Revision 0

Review and Approval

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Revision History

Revision No.	Date	Reason/Basis for Revision
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Attachment 1. Interim Action Well Field Monthly Sampling Trip Report

Acronyms and Abbreviations

bgs	below ground surface
CCB	continuing calibration blank
CF	Configuration
cfs	cubic feet per second
COC	chain of custody
EB	equipment blank
EDD	electronic data deliverable
EPA	Environmental Protection Agency
ft	feet
gpm	gallons per minute
IA	interim action
IDL	instrument detection limit
LCS	laboratory control sample
MB	method blank
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 and/or surface water samples collected from the Moab Uranium Mill Tailings Remedial Action (UMTRA) site. This data validation follows the criteria according to the *Environmental Procedures Catalog* (STO 6), "Standard Practice for Validation of Laboratory Data," GT-9(P) (2006).

As part of the scope of this document, the complete results of this data validation process are provided. Section 1 presents the Summary Criteria, the Sampling Event Summary, and the Sampling and Analysis. Section 2 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. The Data Presentation is contained in Section 3, which includes a summary of the anomalous data generated by the validation process. Various appendices contain the Water Sampling Field Activities Verification, Water Quality Data, Water Level Data, and the Minimums and Maximums Report table. Attachment 1 contains the trip report. All Colorado River flow discussed in this document is measured from the U.S. Geological Survey (USGS) Cisco gauging station No. 09180500.

This validation data package (VDP) presents the results of the June 2009 monthly sampling event completed from June 22 through 25, 2009, in which ground water samples were collected from a variety of locations across the well field. Ground water samples were also collected from key monitoring locations within the wood chip area during this event. Section 1.0 contains the Summary Criteria with a sample location map (Section 1.1), the Sampling Event Summary (Section 1.2), and the Sampling and Analyses (Section 1.3) for this June 2009 monthly sampling event.

1.1 Summary Criteria

Sampling Period: June 22 through 25, 2009

The purpose of this sampling was to collect data that can be used to evaluate the performance of the ground water interim action (IA) well field. All sampling locations are shown on Figure 1 (well field) and Figure 2 (wood chip area). A summary of site conditions is presented in Figure 3.

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. There were two locations with six analytical results that were considered anomalous based on the Minimums and Maximums Report (Section 3.1 and Appendix B). All were anomalously low and are associated with the influx of surface water into the well field during the high river stage.

2. Were all IA well field pumps operating within the planned parameters?

Yes. Configuration (CF) 3 wells and extraction well PW02 were extracting ground water at rates of approximately 65 and 10 gallons per minute (gpm), respectively, during this sampling event. CF1 and CF4 wells were shut down in accordance with the Well Field Optimization Plan. As a result, the total well field extraction rate was approximately 75 gpm.

3. Was the evaporation pond functioning properly?

Yes. The pond level was 7.4 feet (ft) 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?

No.

1.2 Sampling Event Summary

This VDP presents the validated data associated with the ground water collected during the June 2009 IA monthly sampling event at the former uranium tailings processing site in Moab, Utah. This VDP includes a discussion of the data validation process in Section 2.0, with a description of how these data are qualified based on field and laboratory verification assessments (Sections 2.1 and 2.2). Attachment 1 contains the trip report detailing the field events associated with this sampling event.

A list of flagged data is presented in Table 3 in Section 2.2. No data were rejected (flagged as “R”) as a result of this validation process. A Minimums and Maximums Report (presented in Section 3.1) was generated to determine if the data are within a normal statistical range. Based on the results of the Minimums and Maximums Report, there were six anomalous data points from only two locations (all were historic lows) associated with this sampling event (see Anomalous Data Review in Section 3.2).

While independent of the data validation process, a brief summary of the most recent concentration trends based on the May 2009 data is provided for Baseline Area and CFs 3, 2, 1, and 4 (listed from north to south) within the well field. In most instances, standard selected performance indicator monitoring wells were sampled during this event, and time versus concentration plots (ammonia, total dissolved solids [TDS], and uranium) are presented to display historical trends exhibited by the data over the past 2 years. Time versus concentration plots are also provided for the evaporation pond inlet sample location in this discussion. Colorado River flows over the same time frame are also plotted to determine whether the magnitude of river flows influences analyte concentrations, while the evaporation pond level is plotted with the inlet analyte concentrations.

Ground water samples were also collected from five locations within the uranium plume area located northwest of the tailings pile. Sample results from the June 2009 monthly sampling event were compared to the results from the previous sampling event (August 2008) in which these locations were sampled.

Baseline Area

Of the performance indicator wells, a ground water sample was only collected from Baseline Area location 0493 (54 ft below ground surface [bgs]) during this past month. Due to the fact that only one location was sampled, time versus concentration plots were not warranted. A review of the data indicates ammonia, TDS, and uranium concentrations did not significantly change compared to the previous sample collected from this location in September 2008.

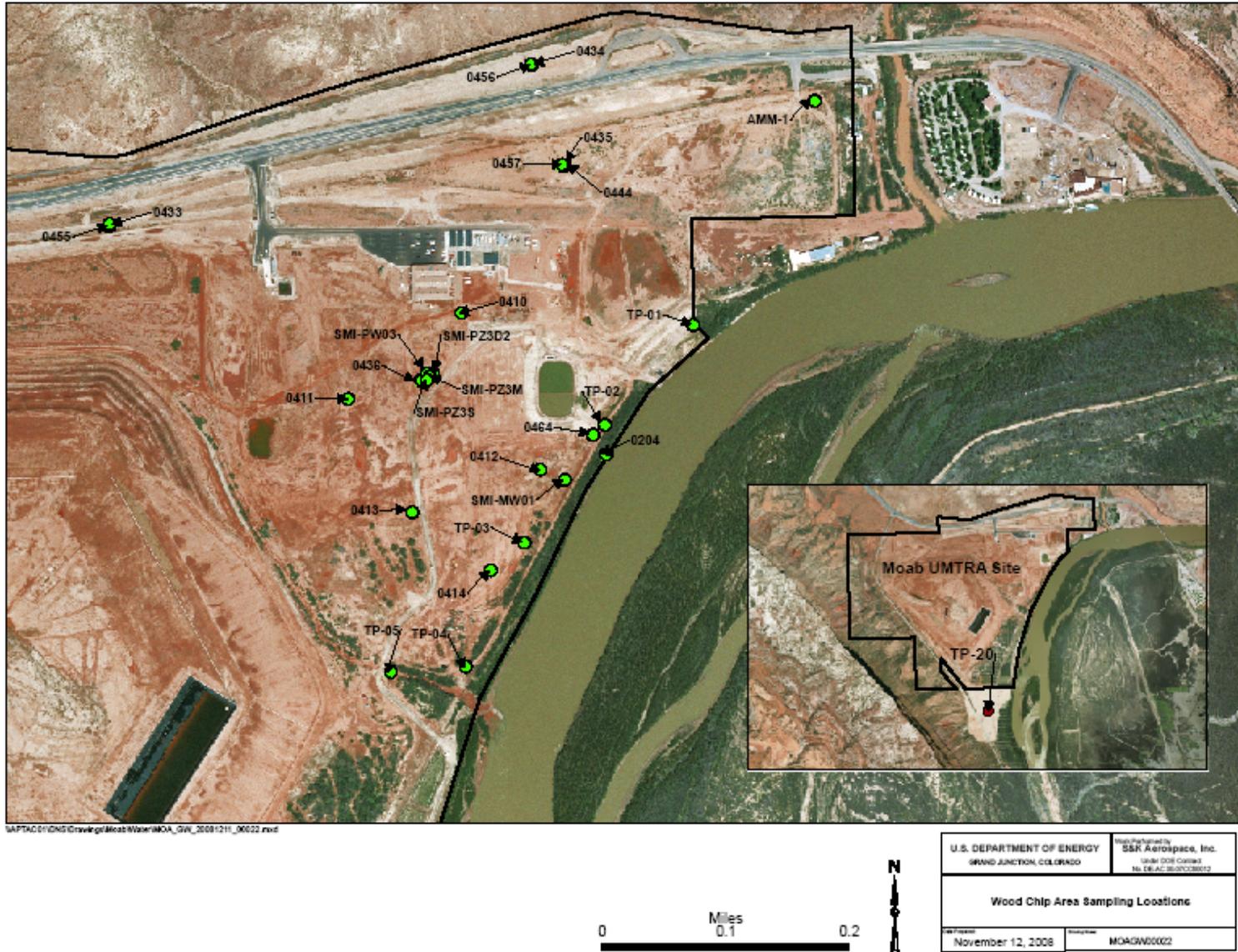


Figure 2. Map of Sample Locations in the Wood Chip Area (includes locations not sampled)



\\moab.tac.local\Applications\DNS\Drawings\MoabiWater\MOA_GW_20090827_00087.mxd

Scale (ft)
250



U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S&K Aerospace, Inc. Under DOE Contract No. DE-AC 28-07CC8812
Site Conditions	
Date Reported August 27, 2009	Sampling Name MOAGW00087

Figure 3. June 2009 Sampling Event Site Conditions

CF3

Among the locations typically discussed in this section for CF3, samples were collected from 0683 (27 ft bgs), 0688 (31 ft bgs), and 0689 (46 ft bgs) during this past month. A review of the time versus concentration plots (Figures 4, 5, and 6) suggest the ammonia, TDS, and uranium concentrations are consistent with historical levels. The upgradient sample (from 27 ft bgs) suggests this portion of the well field was not impacted by surface water influx during late June 2009.

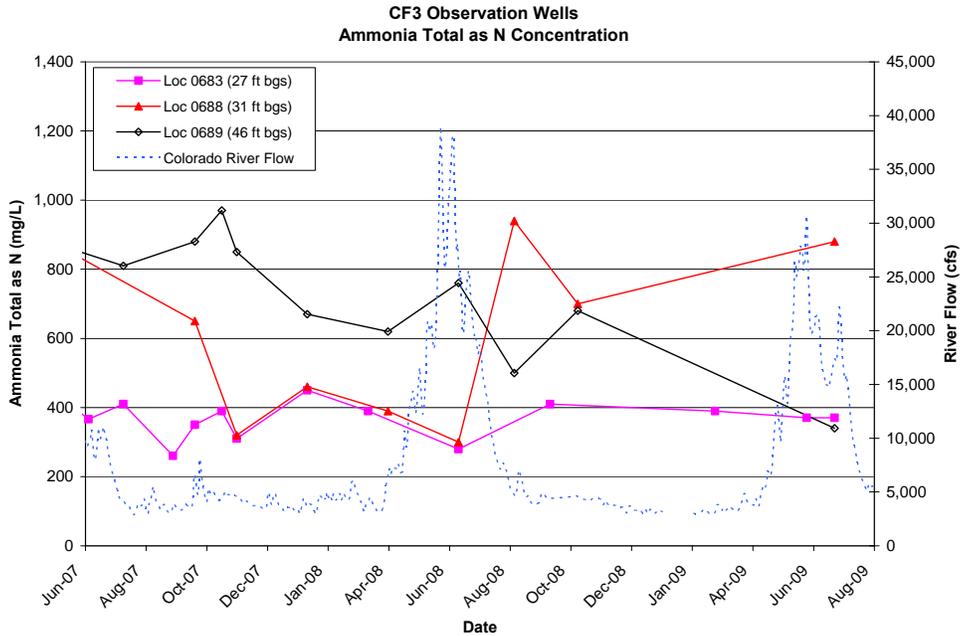


Figure 4. CF3 Observation Wells Time Versus Ammonia Total as N Concentration Plot

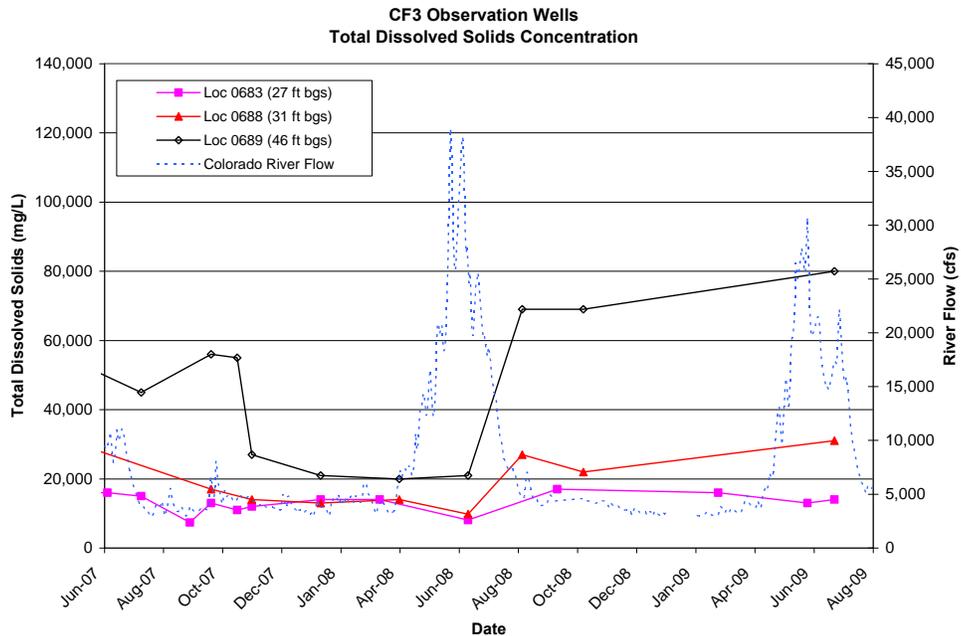


Figure 5. CF3 Observation Wells Time Versus TDS Concentration Plot

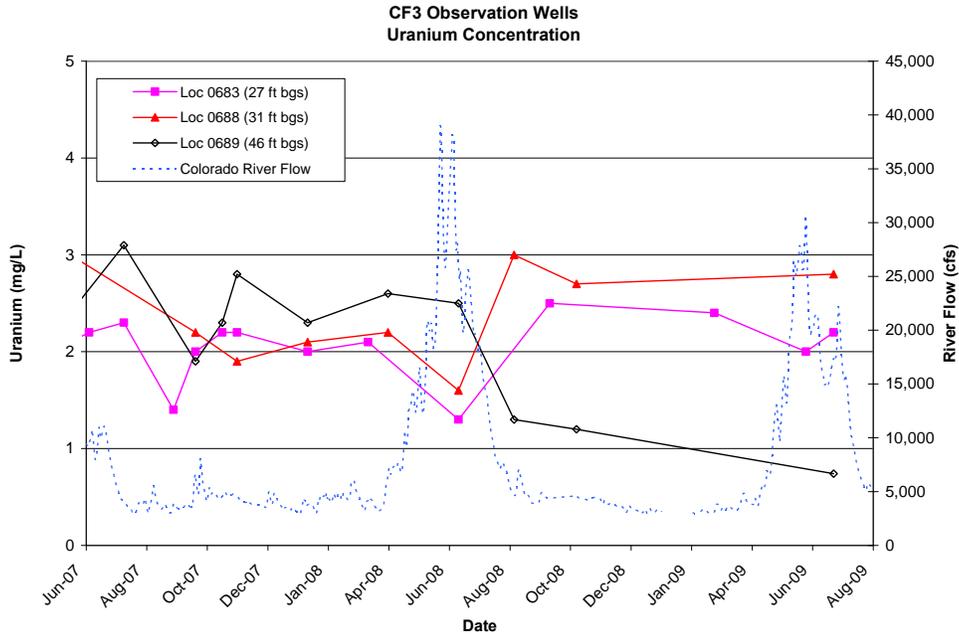


Figure 6. CF3 Observation Wells Time Versus Uranium Concentration Plot

CF2

Among the indicator wells, samples were collected only from 0588 (34 ft bgs) and 0589 (52 ft bgs) during this sampling event. The time versus ammonia (Figure 7), TDS (Figure 8), and uranium (Figure 9) concentration plots indicate these analyte concentrations have started to rebound from the low concentrations measured in the shallower zone during May 2009 but did not significantly change in the deeper zone.

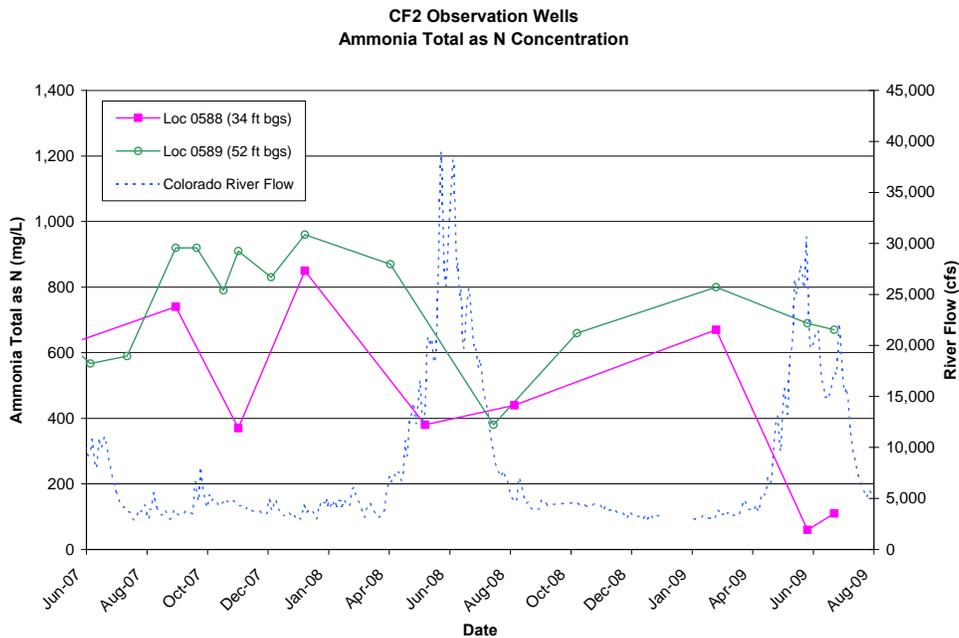


Figure 7. CF2 Observation Wells Time Versus Ammonia Total as N Concentration Plot

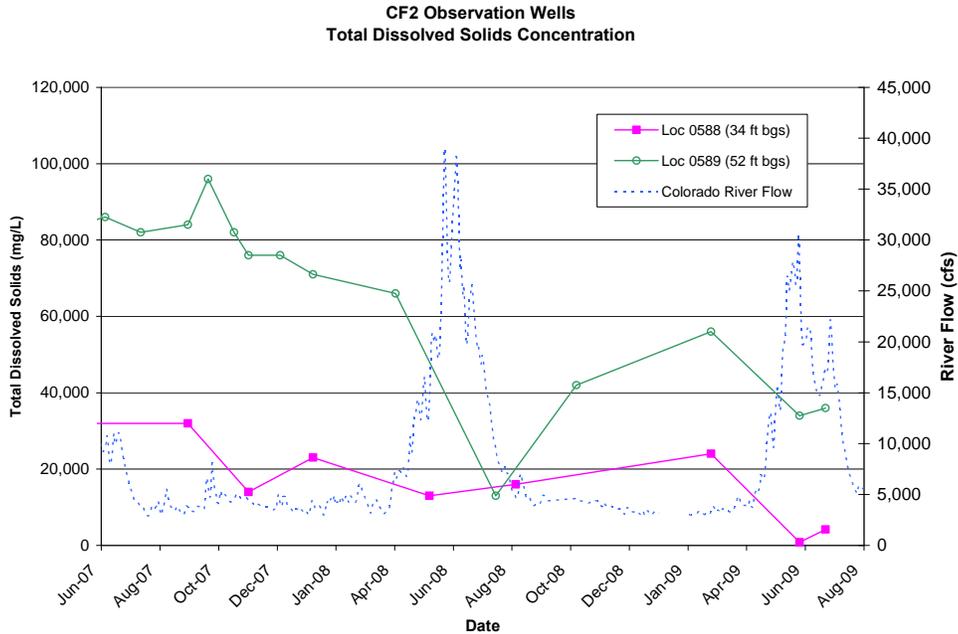


Figure 8. CF2 Observation Wells Time Versus TDS Concentration Plot

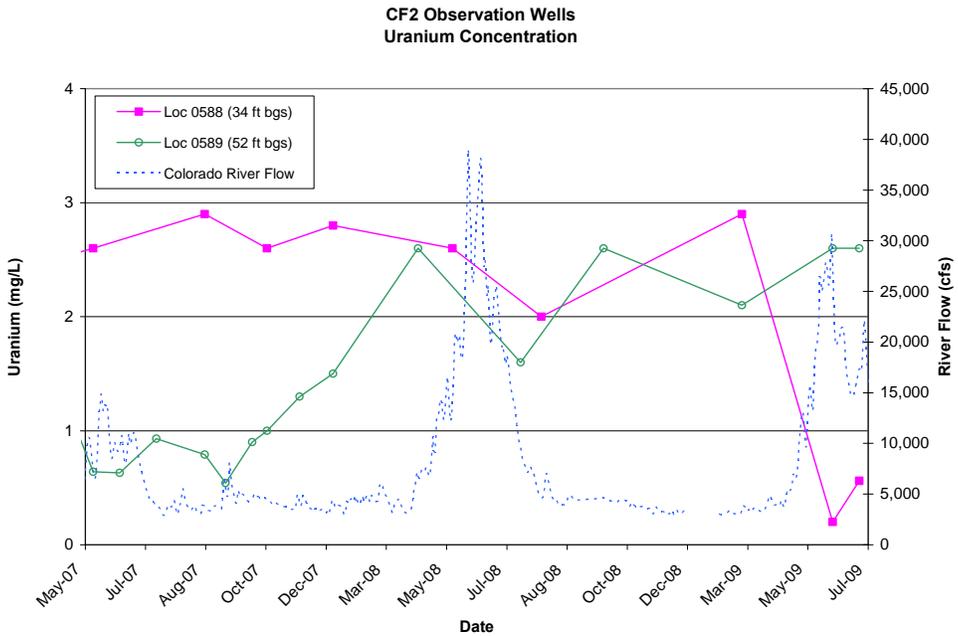


Figure 9. CF2 Observation Wells Time Versus Uranium Concentration Plot

CF1

Samples were collected from locations 0483 (from 18 ft bgs), 0560 (from 31 ft bgs), and 0557 (40 ft bgs) during the June 2009 monthly sampling event. Changes in ammonia, TDS, and uranium concentrations (Figures 10, 11, and 12, respectively) suggest that by the end of June 2009 the Colorado River spring runoff had continued to infiltrate and lower concentrations in the downgradient area of CF1 to a depth of approximately 30 ft bgs; the data also suggest the river stage may have started to reduce concentrations in the area upgradient of the CF1 extraction wells to a depth of 40 ft bgs.

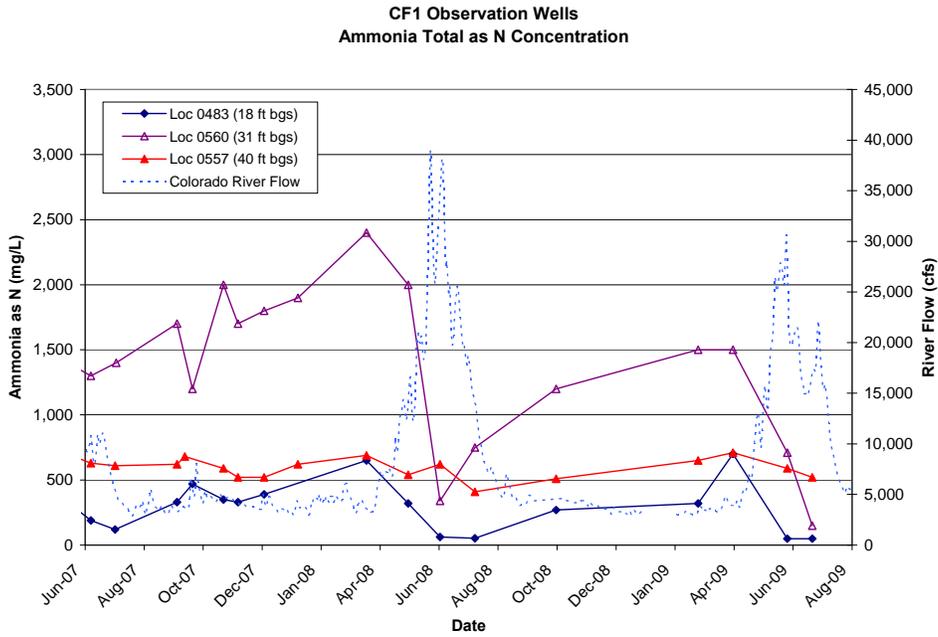


Figure 10. CF1 Observation Wells Time Versus Ammonia Total as N Concentration Plot

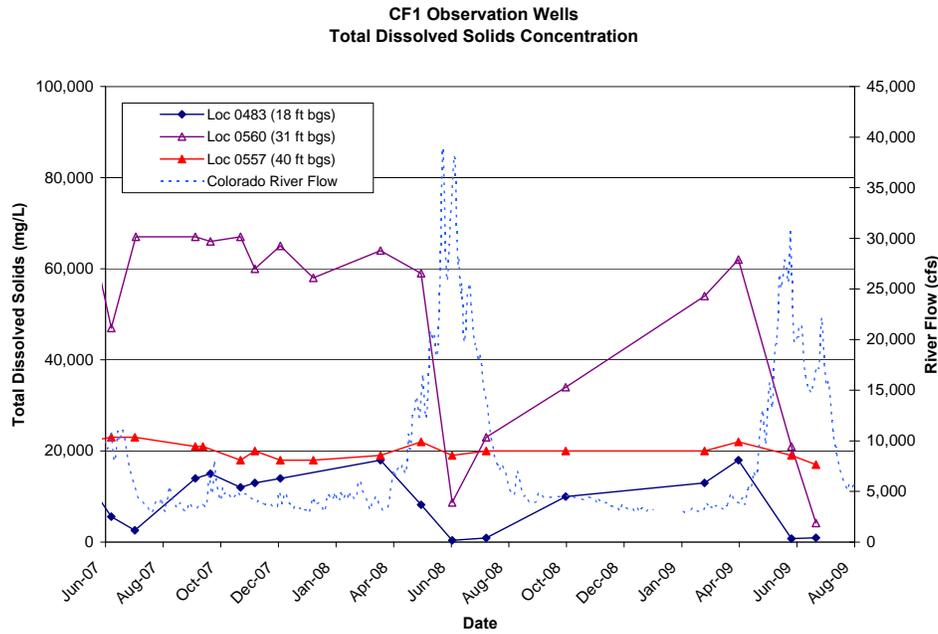


Figure 11. CF1 Observation Wells Time Versus TDS Concentration Plot

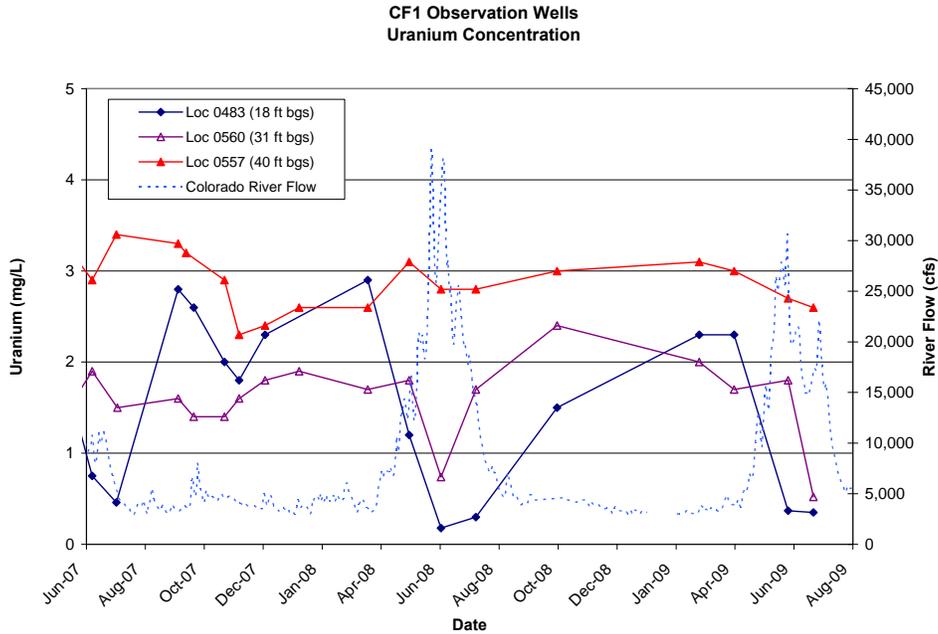


Figure 12. CF1 Observation Wells Time Versus Uranium Concentration Plot

CF1 Observation Wells 0403 and 0407

Observation wells 0403 and 0407 are located along the river bank within CF1. As shown in the time versus analyte concentration plots below (Figures 13, 14, and 15), the ground water system in this vicinity of the well field continued to experience the influx of freshwater during June 2009.

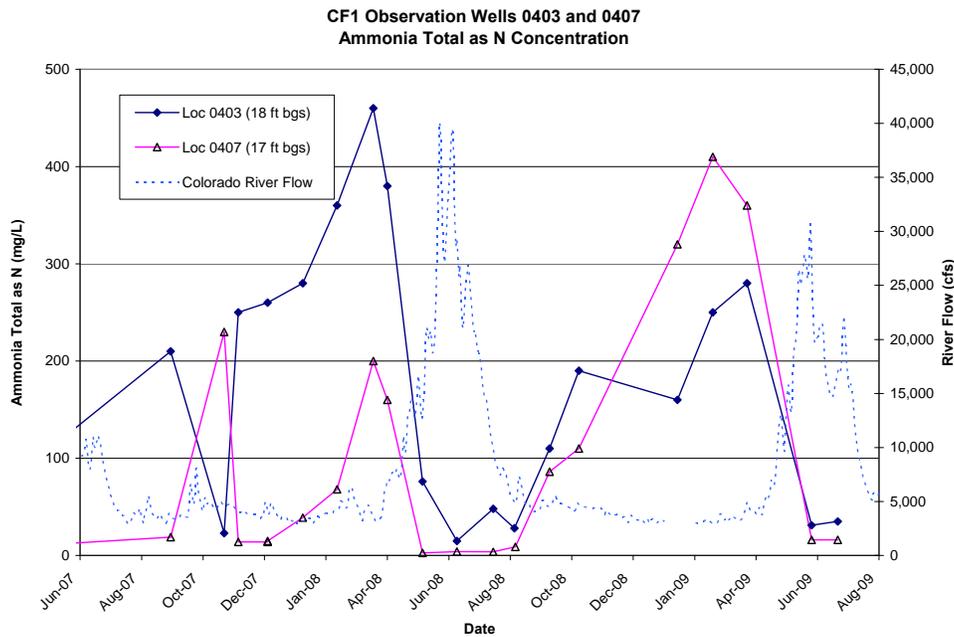


Figure 13. CF1 Observation Wells 0403 and 0407 Time Versus Ammonia Total as N Concentration Plot

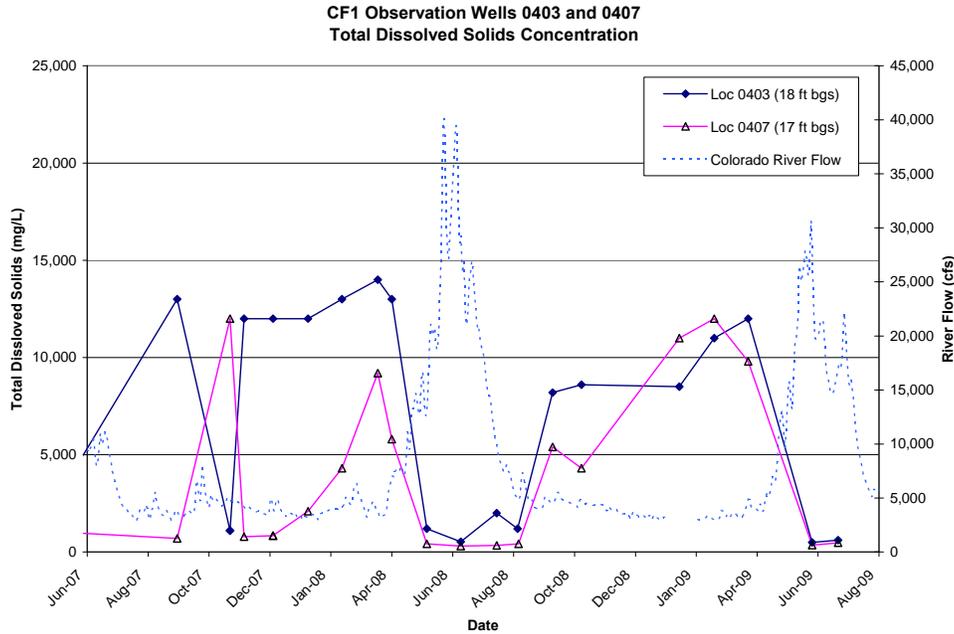


Figure 14. CF1 Observation Wells 0403 and 0407 Time Versus TDS Concentration Plot

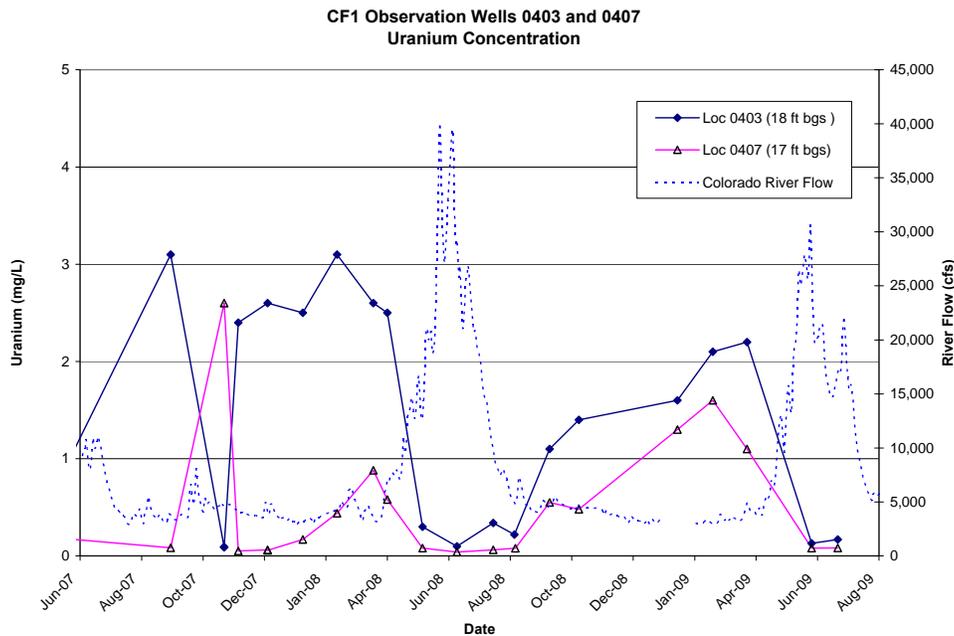


Figure 15. CF1 Observation Wells 0403 and 0407 Time Versus Uranium Concentration Plot

CF4

Of the indicator wells typically discussed in this summary for CF4, locations 0780 (28 ft bgs), 0786 (28 ft bgs), 0782 (33 ft bgs), and 0787 (36 ft bgs) were sampled during the June monthly sampling event. Ammonia, TDS, and uranium concentration trends over the past 2 years are displayed in Figures 16, 17, and 18, respectively. In general, ammonia and uranium concentrations started to rebound in June 2009 in all four locations.

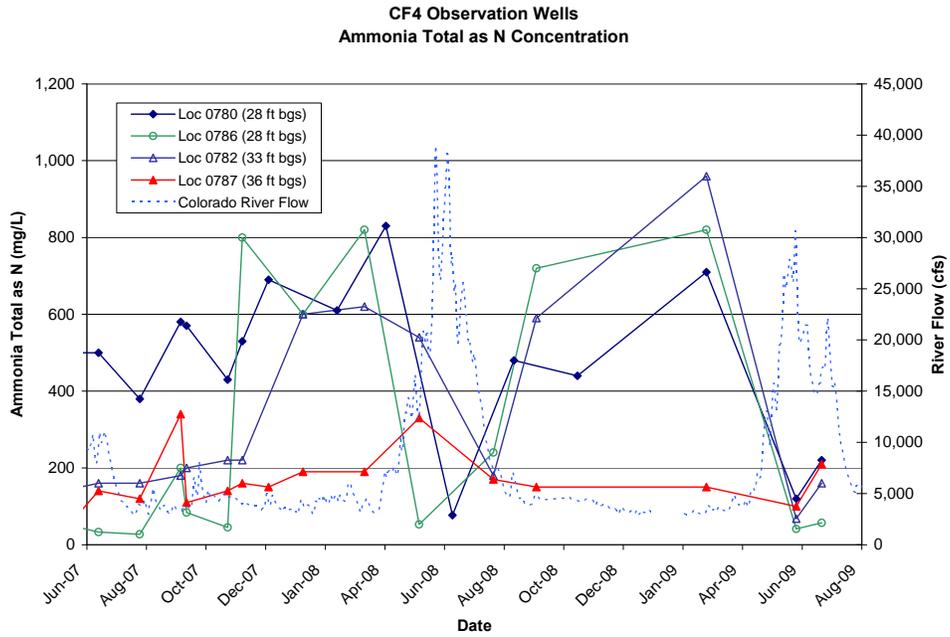


Figure 16. CF4 Observation Wells Time Versus Ammonia Total as N Concentration Plot

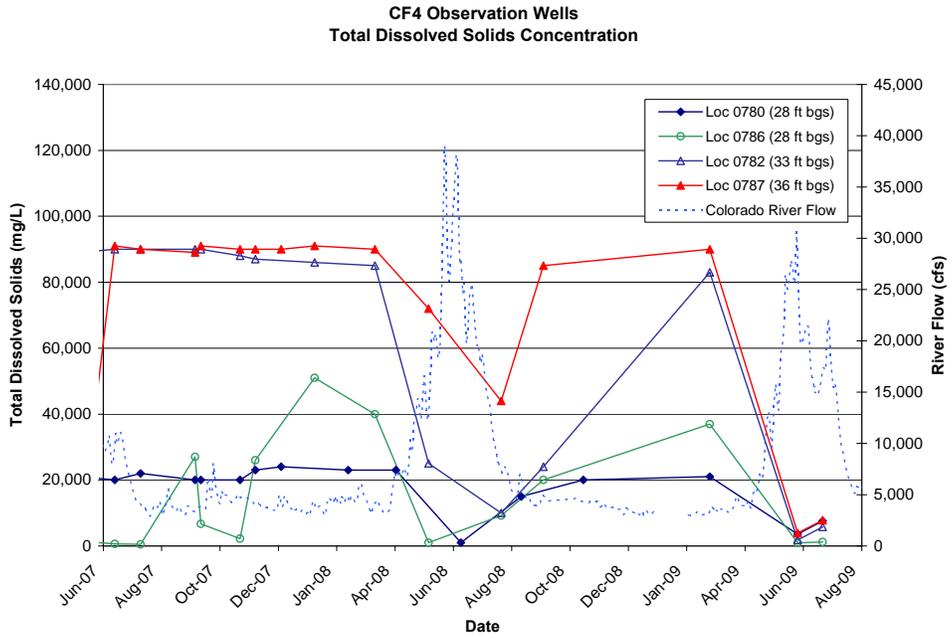


Figure 17. CF4 Observation Wells Time Versus TDS Concentration Plot

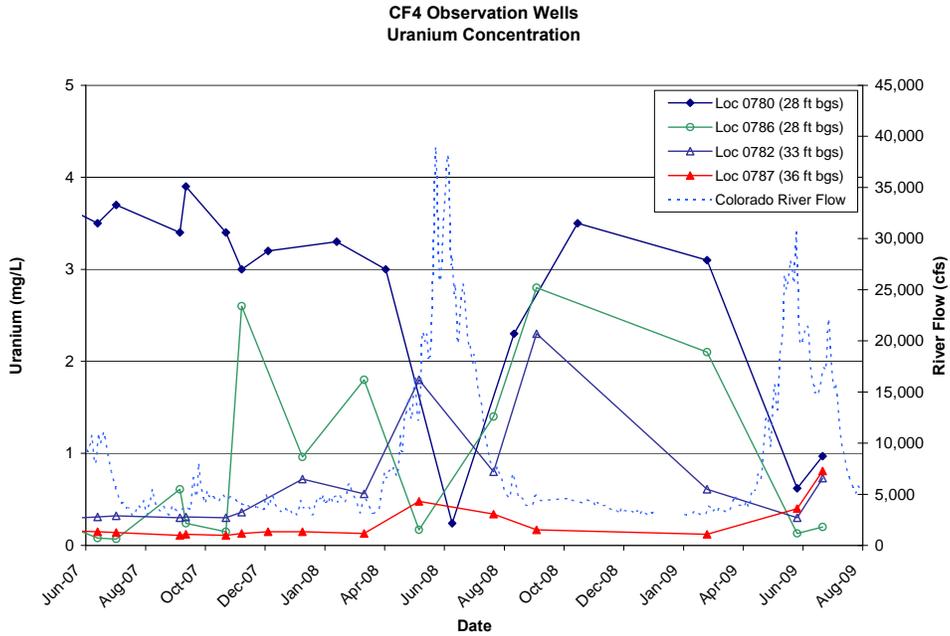


Figure 18. CF4 Observation Wells Time Versus Uranium Concentration Plot

Evaporation Pond Inlet (Location 0547)

Figures 19, 20, and 21 display the ammonia, TDS, and uranium concentration trends, respectively, for the evaporation pond inlet sampling location. As the plots display, analyte concentrations measured in June 2009 began to rebound and remained within the historical range over the past 2 years.

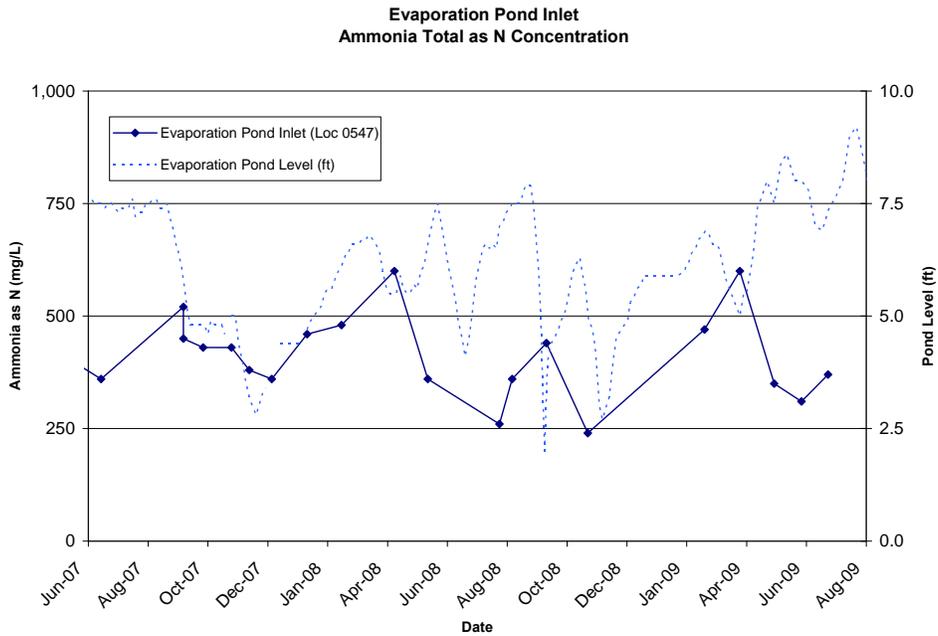


Figure 19. Evaporation Pond Inlet Time Versus Ammonia Total as N Concentration Plot

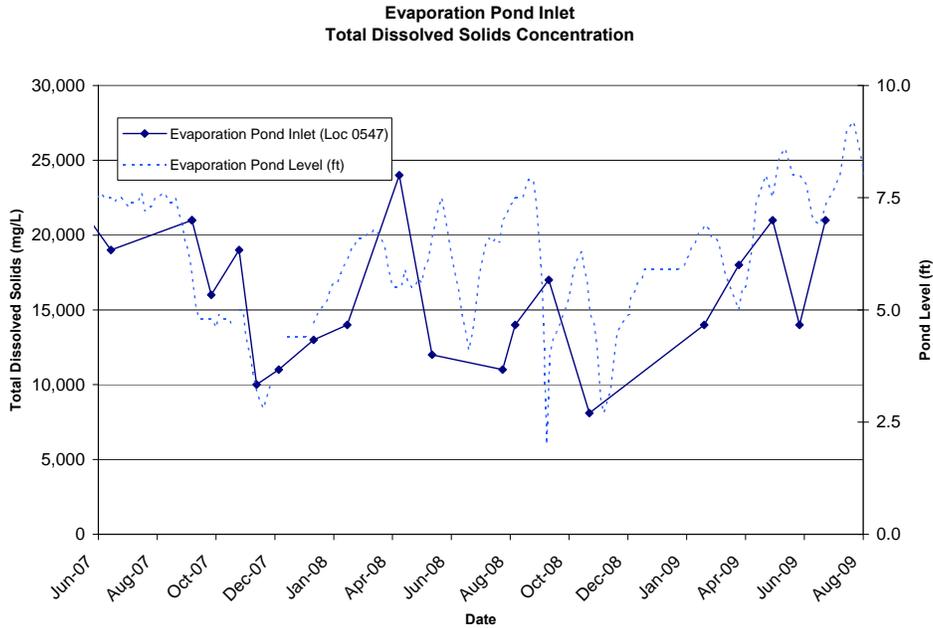


Figure 20. Evaporation Pond Inlet Time Versus TDS Concentration Plot

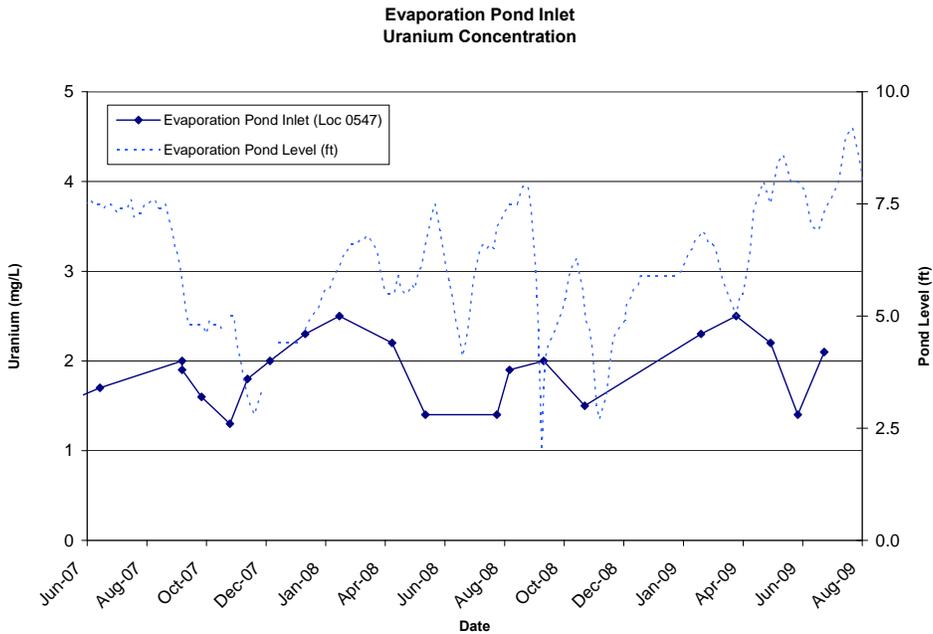


Figure 21. Evaporation Pond Inlet Time Versus Uranium Concentration Plot

Wood Chip Area Sampling Event

A total of five locations were sampled in the wood chip area during the June 2009 monthly sampling event. Table 2 presents a summary of these results compared to the two previous events. All samples exceeded the Drinking Water Standard of 0.044 milligrams per liter.

Table 1. Comparison of Sampling Results from the Wood Chip Area

Location	Uranium Concentrations (mg/L)		
	June 2009	August 2008	December 2002
0411	12	19	no data
0413	4.9	1.5	1.73 ^a
0414	3.9	5.3	3.18
SMI-MW01	6	5	13.2 ^b
SMI-PZ3S	0.5	1.4	3.24

Note: ^a = Result from sample collected September 2002; ^b = Result from sample collected November 2000
 mg/L = milligrams per liter

Surface Water Sampling Results

Surface water samples were not collected as part of this sampling event; however, a number of surface water samples were collected in mid-June 2009 as part of the routine sampling event (Report Identification Number [RIN] 0906033). Refer to this VDP for the June 2009 surface water sampling results.

1.3 Sampling and Analyses

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

The data validations indicate that the data meet the quality-control criteria specified for this project. An adequate number of duplicates were collected, and all samples were collected using dedicated equipment; therefore, no equipment blanks (EBs) were required. All samples were analyzed within their prescribed holding times. No significant discrepancies were noted regarding sample shipping and receiving, preservation times, instrument calibration, method blanks (MBs), or matrix spikes (MSs), except as qualified or noted in the Laboratory Performance Assessment (Section 2.2).

There were two locations with six anomalous data points (all historic low results). One of the locations (0560) is in CF2 and had historic lows for ammonia, chloride, manganese, sulfate, and TDS. The other location (SMI-MW01) is in the wood chip area and had historic low results for ammonia. Please refer to the Anomalous Data Review Table (Section 3.2) for more details.

According to the USGS Cisco gauging station, the mean daily Colorado River flow rates varied between 17,000 and 17,400 cubic feet per second (cfs) during this sampling period.

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 this sampling event 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.

2.2 Laboratory Performance Assessment

General Information

RIN: 0906032
 Sample Event: June 2009 IA Well Field Monthly Sampling Event
 Site(s): Moab, Utah
 Laboratory: ALS Laboratory Group, Fort Collins, Colorado
 Sample Data Group (SDG) Nos.: 0906250 and 0906277
 Analysis: Metals and Inorganics
 Validator: Rachel Cowan
 Review Date: July 27, 2009

This validation was performed according to the *Environmental Procedures Catalog* (STO 6), “Standard Practice for Validation of Laboratory Data,” GT-9(P) (2006). The procedure was applied at Level 1, Data Deliverables Examination. The level 1 validation was performed on 100 percent of the samples, which included a review of the chain of custody (COC), case narratives, field and sample identifications, holding times, preservation, and cooler receipt. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Preparation Method	Analytical Method
Ammonia as N, NH ₃ -N	WCH-A-005	EPA 350.1	EPA 350.1
Copper	MET-A-020	SW-846 3005A	SW-846 6010B
Chloride	MIS-A-039	SW-846 9056	SW-846 9056
Manganese	G17	SW-846 3005A	SW-846 6010B
Selenium	G14	SW-846 3005A	SW-846 6020A
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
TDS	WIC-A-033	EPA 160.1	EPA 160.1
Uranium	G1	SW-846 3005A	SW-846 6020A

Data Qualifier Summary

Analytical results were qualified as listed in Table 3. Refer to Table 4 for an explanation of the data qualifiers applied.

Table 3. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
0906250-5 through -9, 0906277-2 through -7, -9, -19	0577, 0559, 0560, 0583, 0588; 0406, 0413, 0414, 0493, 0547, 0548, 0671, SMI-PW02	Ammonia	J	MS1

J = results are estimated; UJ = analytical results below the detection limit

Table 4. Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Nondetects)	Explanation
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.
SD2	J	N/A	Results for the affected analyte(s) are regarded as estimated (J) because the result of the sample used for serial dilution analysis is greater than or equal to 50 times (100 times for inductively coupled plasma-mass spectrometry) the practical quantitation limit, and the percent difference is greater than 10%.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received a total of 34 samples for RIN 0906032 in two SDGs, which arrived June 25, 2009 (UPS tracking number 1Z5W1Y510194331115 for SDG 0906250) and on June 26, 2009 (UPS tracking number 1Z5W1Y510198287658 for SDG 0906277). The SDGs were each accompanied by a COC form. The COC forms were 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 0906250 was received intact in one cooler with a temperature of 1.2°C, and SDG 0906277 was received intact in one cooler with a temperature of 3.4°C; both comply with requirements. 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 detects were found to be within quality-control procedures except for the following.

MS and Replicate Analysis

MS sample analysis, performed at a frequency of one per 20 samples unless otherwise noted, is a measure of the ability to recover analytes in a particular matrix. Replicate sample (RS) analysis consists of matrix spike duplicate (MSD) samples and field duplicates analyzed at a frequency of

one per 20 samples per method or procedural requirements. These RSs are indicators of laboratory precision for each sample matrix.

Method EPA 350.1, Ammonia

For SDG 0906250, there was only one MS/MSD sample pair, which failed because the native sample concentration was greater than four times the spike concentration. As per protocol, the samples were not flagged for MS failure. However, since there were not enough MSDs (analytical method requires one MS at the rate of 10 percent), there were ammonia samples that were not associated with the MS, so samples 0906250-5 through 9 were “J”-flagged for MS1. For SDG 0906277, there was only one MS/MSD sample pair, so samples 0906577-2 through-7, -9 and -19 were “J”-flagged for MS1.

Although there was no MSD for SDG 0906250, the field duplicate passed; as there was one RS for 15 samples, no samples were “J”-flagged for RS1.

Method EPA SW-846 9056, Chloride and Sulfate

The method requires that one RS be analyzed for every 10 samples. For SDG 0906250, there was only one MSD analyzed for 15 chloride and sulfate samples; however, the field duplicate passed. As there were two RSs for 15 samples, no chloride or sulfate results were “J”-flagged for RS1. For SDG 0906277, one of the MSDs could not be analyzed because the native concentration in the samples was more than four times the spike concentration. However, the field duplicate passed, so there were two RSs for 19 samples; no chloride or sulfate results needed to be “J”-flagged for RS1.

Laboratory Control Sample

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

LCSs were not reported for copper, manganese, selenium, or uranium. As a standard practice, ALS Laboratory Group does not prepare LCSs for samples that are field-filtered and field-acidified and then run directly on the instruments 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 copper (SDG 0906250 only), manganese, selenium (SDG 0906277 only), and uranium MSs passed requirements, so no copper, manganese, selenium, or uranium samples needed to be qualified for LCS failure.

Method and Calibration Blanks

MBs are analyzed to assess any contamination that may have occurred during sample preparation. Initial calibration blanks and continuing calibration blanks (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 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. All blanks passed these criteria with the following exceptions.

Method SW-846 6010B, Manganese

All CCB results for manganese in SDG 0906250 were negative, and the absolute values were greater than the manganese IDL. However, none of the manganese results were less than five times the IDL, so none needed to be “J”-flagged. All CCB results for manganese in SDG 0906277 were greater than the IDL. However, none of the manganese results were less than five times the associated CCB results, so none of the manganese results needed to be “J”-flagged.

Method SW-846 6020A, Selenium and Uranium

One selenium CCB result in SDG 0906277 and all uranium CCB results in both SDGs were greater than each analyte’s IDL. Each sample’s uranium and selenium results were checked, and no results were less than five times their associated blank’s concentration, so no results were flagged for this reason.

EBs

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

No samples were collected using nondedicated equipment, so no EBs were collected.

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 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 spectroscopy SD data are evaluated when the concentration of the undiluted sample is greater than 100 times the RL. All evaluated SD data were acceptable with the following exceptions.

Method SW-846 6010B, Copper

The SD sample (0906250-14) selected as the quality-control sample for the copper analytical run in SDG 0906250 exceeded the maximum limit of 10 percent. However, the copper concentration in the SD sample was less than 50 times the RL, so no copper results were “J”-flagged for reason SD2.

Method SW-846 6020A, Selenium

The SD sample (0906277-2) selected as the quality-control sample for the selenium analytical run in SDG 0906277 exceeded the maximum limit of 10 percent. However, the selenium concentration in the SD sample was less than 100 times the RL, so no selenium results were “J”-flagged for reason SD2.

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. Duplicate samples were collected from location 0577 (0906250-5 in SDG 0906250) and 0683 (0906277-14 in SDG 0906277) in the June 2009 monthly sampling event. The duplicates results

met the U.S. Environmental Protection Agency (EPA) recommended laboratory duplicate criteria of less than 20 relative percent difference (RPD).

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 1 (SDG 0906250) and July 8, 2009 (SDG 0906277). 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, except for the following.

The case narrative for metals SDG 0906250 did not report any problems with the copper SD. However, the quality assurance section did show that the recovery rate for the SD was unacceptable.

2.3 Field Analyses/Activities

The following information summarizes the field analyses and activities for the June 2009 monthly sampling event.

Field Activities

All monitor wells were purged and sampled using the low-flow sampling method; this method was not used at extraction wells. Two duplicate samples were collected. There are no established regulatory criteria for the evaluation of field duplicate samples; therefore, EPA guidance for laboratory duplicates (which is conservative for field duplicates) was used to assess the precision of the field duplicates. All results met the criteria of ± 20 RPD and are considered acceptable, except manganese (86 RPD). Copper was not analyzed in the field duplicate from SDG 0906250.

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 (Section 3.2), a table containing the Water Quality and Water Level Data (Sections 3.3 and 3.4, respectively), and the Blanks Report (Section 3.5).

3.1 Minimums and Maximums Report

The Minimums and Maximums Report (see Appendix B) is generated by the Sample Management System used to query the SEEPro database. The DataVal program compares the new data set with historical data and lists all new data that fall outside the historical data range. Values listed in the 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 two sample locations with six analytical results that were considered anomalous based on the minimums and maximums report.

Loc. No.	Analyte	Type of Anomaly	Disposition
SMI-MW01	Ammonia	Low	Analyte concentration impacted by high Colorado River stage
0560	Ammonia	Low	Analyte concentration impacted by high Colorado River stage
0560	Chloride	Low	Analyte concentration impacted by high Colorado River stage
0560	Manganese	Low	Analyte concentration impacted by high Colorado River stage
0560	Sulfate	Low	Analyte concentration impacted by high Colorado River stage
0560	TDS	Low	Analyte concentration impacted by high Colorado River stage

3.3 Water Quality Data

All water quality data are presented in Appendix C.

3.4 Water Level Data

All water level data are presented in Appendix D.

3.5 Blanks Report

All samples were collected using dedicated equipment; therefore, an EB was not required for this sampling event.

Appendix A.
Water Sampling Field Activities Verification

Appendix A. Water Sampling Field Activities Verification (continued)

Sampling Event/RIN	June 2009/RIN 0906032	Date(s) of Water Sampling	June 22-25, 2009
Date(s) of Verification	July 31, 2009	Name of Verifier	Rachel Cowan

	Response (Yes, No, NA)	Comments
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	
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? Did the operational checks meet criteria?	Yes	
	Yes	
5. Were the number and types (alkalinity, temperature, electrical conductivity, pH, turbidity, dissolved oxygen, oxidation reduction potential) of field measurements taken as specified?	Yes	
6. Was the category of the well documented?	Yes	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling?	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?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	

Appendix A. Water Sampling Field Activities Verification (continued)

	Response (Yes, No, NA)	Comments
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	There were 34 samples, and two duplicates were collected.
10. Were EBs taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	NA	All samples were collected on dedicated equipment; therefore, it was not necessary to collect an EB.
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: PARAGON (Fort Collins, CO)

RIN: 0906032

Comparison: All Historical Data

Report Date: 8/8/2009

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	0406	06/23/2009	Sulfate	3700		7616.9		3800		15	0		
MOA01	0406	06/23/2009	Total Dissolved Solids	7300		12000	F	7400		14	0		
MOA01	0413	06/24/2009	Sulfate	550		940	FQ	630		5	0		
MOA01	0413	06/24/2009	Uranium	1.2		1.73	LQ	1.5	J	5	0		
MOA01	0414	06/25/2009	Ammonia Total as N	17	J	32.997	QF	24.612	FJQ	5	0		
MOA01	0557	06/22/2009	Chloride	3600		39000	F	3800	J	52	0		
MOA01	0557	06/22/2009	Chloride	3500		39000	F	3800	J	52	0		
MOA01	0557	06/22/2009	Sulfate	8000		15000	F	8100	J	52	0		
MOA01	0557	06/22/2009	Total Dissolved Solids	17000		70000	F	18000		52	0		
MOA01	0559	06/22/2009	Sulfate	110		8100	F	140	UJ	53	1		
MOA01	0559	06/22/2009	Total Dissolved Solids	360		22000	F	590	F	53	0		
MOA01	0559	06/22/2009	Uranium	0.079		2.4	F	0.12		53	0		
MOA01	0560	06/22/2009	Ammonia Total as N	150	J	2400		340	J	53	0		
MOA01	0560	06/22/2009	Chloride	1300		56000	F	3000		53	0		
MOA01	0560	06/22/2009	Manganese	0.36		12	F	0.8		22	0		
MOA01	0560	06/22/2009	Sulfate	1200		11000	F	3200		53	0		
MOA01	0560	06/22/2009	Total Dissolved Solids	4200		75000	F	8700		53	0		
MOA01	0560	06/22/2009	Uranium	0.52		2.4		0.74		53	0		

Appendix B. Minimums and Maximums Report (continued)

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: PARAGON (Fort Collins, CO)

RIN: 0906032

Comparison: All Historical Data

Report Date: 8/8/2009

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	0787	06/22/2009	Uranium	0.81		0.72	F	0.11	J	27	0
MOA01	SMI-MW01	06/25/2009	Ammonia Total as N	0.61		2.3		1.5	J	5	0
MOA01	SMI-MW01	06/25/2009	Chloride	340		927		540		5	0
MOA01	SMI-MW01	06/25/2009	Sulfate	860		4760		1100		7	0
MOA01	SMI-PZ3S	06/24/2009	Chloride	710		962	F	780		8	0
MOA01	SMI-PZ3S	06/24/2009	Sulfate	970		1300		1000		8	0

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 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.

Appendix C.
Water Quality Data

Appendix C. Water Quality Data

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site

REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	(Ft BLS)	Lab	Data		QA			
Ammonia Total as N	mg/L	0403	WL	06/22/2009	0001	18	-	18	35		#	2	
Ammonia Total as N	mg/L	0406	WL	06/23/2009	0001	18	-	18	210	J	#	5	
Ammonia Total as N	mg/L	0407	WL	06/22/2009	0001	17	-	17	16		#	2	
Ammonia Total as N	mg/L	0411	WL	06/24/2009	0001	8	-	8	3.1		#	0.1	
Ammonia Total as N	mg/L	0413	WL	06/24/2009	0001	9	-	9	10	J	#	2	
Ammonia Total as N	mg/L	0414	WL	06/25/2009	0001	7.5	-	7.5	17	J	#	5	
Ammonia Total as N	mg/L	0480	WL	06/22/2009	0001	18	-	18	110		#	5	
Ammonia Total as N	mg/L	0483	WL	06/22/2009	0001	18	-	18	49		#	5	
Ammonia Total as N	mg/L	0493	WL	06/23/2009	0001	54	-	54	890	J	#	20	
Ammonia Total as N	mg/L	0547	TS	06/24/2009	0001	0	-	0	370	J	#	20	
Ammonia Total as N	mg/L	0548	TS	06/24/2009	0001	0	-	0	410	J	#	20	
Ammonia Total as N	mg/L	0557	WL	06/22/2009	0001	40	-	40	520	J	#	20	
Ammonia Total as N	mg/L	0557	WL	06/22/2009	0002	40	-	40	490		#	20	
Ammonia Total as N	mg/L	0559	WL	06/22/2009	0001	19	-	19	10	J	#	1	
Ammonia Total as N	mg/L	0560	WL	06/22/2009	0001	31	-	31	150	J	#	10	
Ammonia Total as N	mg/L	0583	WL	06/23/2009	0001	18	-	18	74	J	#	5	
Ammonia Total as N	mg/L	0588	WL	06/23/2009	0001	34	-	34	110	J	#	10	
Ammonia Total as N	mg/L	0589	WL	06/23/2009	0001	52	-	52	670		#	20	
Ammonia Total as N	mg/L	0671	WL	06/24/2009	0001	14.4	-	44.4	180	J	#	10	
Ammonia Total as N	mg/L	0673	WL	06/24/2009	0001	16.3	-	46.3	380		#	20	
Ammonia Total as N	mg/L	0675	WL	06/24/2009	0001	16	-	46	390		#	20	
Ammonia Total as N	mg/L	0677	WL	06/24/2009	0001	15.2	-	45.2	450		#	20	
Ammonia Total as N	mg/L	0679	WL	06/24/2009	0001	15	-	45	260		#	10	
Ammonia Total as N	mg/L	0683	WL	06/23/2009	0001	27	-	27	350		#	20	
Ammonia Total as N	mg/L	0683	WL	06/23/2009	0002	27	-	27	370		#	20	
Ammonia Total as N	mg/L	0688	WL	06/23/2009	0001	31	-	31	880		#	20	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range		Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	(Ft BLS)	Lab		Data	QA		
Ammonia Total as N	mg/L	0689	WL	06/23/2009	0001	46	- 46	340		#	10	
Ammonia Total as N	mg/L	0780	WL	06/22/2009	0001	28	- 28	220		#	5	
Ammonia Total as N	mg/L	0782	WL	06/22/2009	0001	33	- 33	160		#	5	
Ammonia Total as N	mg/L	0786	WL	06/22/2009	0001	28	- 28	57		#	5	
Ammonia Total as N	mg/L	0787	WL	06/22/2009	0001	36	- 36	210		#	5	
Ammonia Total as N	mg/L	SMI-MW01	WL	06/25/2009	0001	16	- 16	0.61		#	0.1	
Ammonia Total as N	mg/L	SMI-PW02	WL	06/25/2009	0001	20.04	- 60.04	610	J	#	20	
Ammonia Total as N	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	- 25	4.8		#	1	
Chloride	mg/L	0403	WL	06/22/2009	0001	18	- 18	50		#	2	
Chloride	mg/L	0406	WL	06/23/2009	0001	18	- 18	760		#	20	
Chloride	mg/L	0407	WL	06/22/2009	0001	17	- 17	32		#	2	
Chloride	mg/L	0411	WL	06/24/2009	0001	8	- 8	440		#	20	
Chloride	mg/L	0413	WL	06/24/2009	0001	9	- 9	670		#	10	
Chloride	mg/L	0414	WL	06/25/2009	0001	7.5	- 7.5	630		#	20	
Chloride	mg/L	0480	WL	06/22/2009	0001	18	- 18	350		#	10	
Chloride	mg/L	0483	WL	06/22/2009	0001	18	- 18	94		#	4	
Chloride	mg/L	0493	WL	06/23/2009	0001	54	- 54	5200		#	100	
Chloride	mg/L	0547	TS	06/24/2009	0001	0	- 0	7100		#	100	
Chloride	mg/L	0548	TS	06/24/2009	0001	0	- 0	6700		#	100	
Chloride	mg/L	0557	WL	06/22/2009	0001	40	- 40	3600		#	40	
Chloride	mg/L	0557	WL	06/22/2009	0002	40	- 40	3500		#	40	
Chloride	mg/L	0559	WL	06/22/2009	0001	19	- 19	26		#	1	
Chloride	mg/L	0560	WL	06/22/2009	0001	31	- 31	1300		#	20	
Chloride	mg/L	0583	WL	06/23/2009	0001	18	- 18	640		#	20	
Chloride	mg/L	0588	WL	06/23/2009	0001	34	- 34	570		#	20	
Chloride	mg/L	0589	WL	06/23/2009	0001	52	- 52	15000		#	200	
Chloride	mg/L	0671	WL	06/24/2009	0001	14.4	- 44.4	5000		#	100	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	Lab	Data QA					
Chloride	mg/L	0673	WL	06/24/2009	0001	16.3	- 46.3	11000		#	200	
Chloride	mg/L	0675	WL	06/24/2009	0001	16	- 46	7300		#	100	
Chloride	mg/L	0677	WL	06/24/2009	0001	15.2	- 45.2	4700		#	100	
Chloride	mg/L	0679	WL	06/24/2009	0001	15	- 45	1900		#	40	
Chloride	mg/L	0683	WL	06/23/2009	0001	27	- 27	1400		#	40	
Chloride	mg/L	0683	WL	06/23/2009	0002	27	- 27	1400		#	40	
Chloride	mg/L	0688	WL	06/23/2009	0001	31	- 31	9800		#	100	
Chloride	mg/L	0689	WL	06/23/2009	0001	46	- 46	43000		#	1000	
Chloride	mg/L	0780	WL	06/22/2009	0001	28	- 28	2300		#	40	
Chloride	mg/L	0782	WL	06/22/2009	0001	33	- 33	1900		#	20	
Chloride	mg/L	0786	WL	06/22/2009	0001	28	- 28	310		#	10	
Chloride	mg/L	0787	WL	06/22/2009	0001	36	- 36	2500		#	40	
Chloride	mg/L	SMI-MW01	WL	06/25/2009	0001	16	- 16	340		#	10	
Chloride	mg/L	SMI-PW02	WL	06/25/2009	0001	20.04	- 60.04	13000		#	200	
Chloride	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	- 25	710		#	10	
Copper	mg/L	0787	WL	06/22/2009	0001	36	- 36	0.014	U	#	0.014	
Dissolved Oxygen	mg/L	0403	WL	06/22/2009	0001	18	- 18	0.41		#		
Dissolved Oxygen	mg/L	0406	WL	06/23/2009	0001	18	- 18	0.5		#		
Dissolved Oxygen	mg/L	0407	WL	06/22/2009	0001	17	- 17	0.28		#		
Dissolved Oxygen	mg/L	0411	WL	06/24/2009	0001	8	- 8	4.59		#		
Dissolved Oxygen	mg/L	0413	WL	06/24/2009	0001	9	- 9	0.75		#		
Dissolved Oxygen	mg/L	0414	WL	06/25/2009	0001	7.5	- 7.5	0.37		#		
Dissolved Oxygen	mg/L	0480	WL	06/22/2009	0001	18	- 18	1.17		#		
Dissolved Oxygen	mg/L	0483	WL	06/22/2009	0001	18	- 18	1.4		#		
Dissolved Oxygen	mg/L	0493	WL	06/23/2009	0001	54	- 54	0.5		#		
Dissolved Oxygen	mg/L	0547	TS	06/24/2009	0001	0	- 0	4.39		#		
Dissolved Oxygen	mg/L	0548	TS	06/24/2009	0001	0	- 0	14.96		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Dissolved Oxygen	mg/L	0557	WL	06/22/2009	0001	40	-	40	3.65		#		
Dissolved Oxygen	mg/L	0559	WL	06/22/2009	0001	19	-	19	0.46		#		
Dissolved Oxygen	mg/L	0560	WL	06/22/2009	0001	31	-	31	0.83		#		
Dissolved Oxygen	mg/L	0583	WL	06/23/2009	0001	18	-	18	1.23		#		
Dissolved Oxygen	mg/L	0588	WL	06/23/2009	0001	34	-	34	0.6		#		
Dissolved Oxygen	mg/L	0589	WL	06/23/2009	0001	52	-	52	1		#		
Dissolved Oxygen	mg/L	0671	WL	06/24/2009	0001	14.4	-	44.4	3.94		#		
Dissolved Oxygen	mg/L	0673	WL	06/24/2009	0001	16.3	-	46.3	1.86		#		
Dissolved Oxygen	mg/L	0675	WL	06/24/2009	0001	16	-	46	2.39		#		
Dissolved Oxygen	mg/L	0677	WL	06/24/2009	0001	15.2	-	45.2	2.08		#		
Dissolved Oxygen	mg/L	0679	WL	06/24/2009	0001	15	-	45	1.55		#		
Dissolved Oxygen	mg/L	0683	WL	06/23/2009	0001	27	-	27	0.31		#		
Dissolved Oxygen	mg/L	0688	WL	06/23/2009	0001	39	-	39	0.33		#		
Dissolved Oxygen	mg/L	0688	WL	06/23/2009	0001	31	-	31	0.65		#		
Dissolved Oxygen	mg/L	0689	WL	06/23/2009	0001	54	-	54	0.28		#		
Dissolved Oxygen	mg/L	0689	WL	06/23/2009	0001	46	-	46	0.31		#		
Dissolved Oxygen	mg/L	0780	WL	06/22/2009	0001	28	-	28	1.15		#		
Dissolved Oxygen	mg/L	0782	WL	06/22/2009	0001	33	-	33	0.96		#		
Dissolved Oxygen	mg/L	0786	WL	06/22/2009	0001	28	-	28	0.65		#		
Dissolved Oxygen	mg/L	0787	WL	06/22/2009	0001	36	-	36	0.87		#		
Dissolved Oxygen	mg/L	SMI-MW01	WL	06/25/2009	0001	16	-	16	0.78		#		
Dissolved Oxygen	mg/L	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	1.97		#		
Dissolved Oxygen	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	1.04		#		
Manganese	mg/L	0403	WL	06/22/2009	0001	18	-	18	0.74		#	0.00012	
Manganese	mg/L	0406	WL	06/23/2009	0001	18	-	18	1.4		#	0.00058	
Manganese	mg/L	0407	WL	06/22/2009	0001	17	-	17	0.14		#	0.00012	
Manganese	mg/L	0411	WL	06/24/2009	0001	8	-	8	0.065		#	0.00058	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data		
Manganese	mg/L	0413	WL	06/24/2009	0001	9	-	9	0.1		#	0.00023	
Manganese	mg/L	0414	WL	06/25/2009	0001	7.5	-	7.5	0.087		#	0.00058	
Manganese	mg/L	0480	WL	06/22/2009	0001	18	-	18	0.71		#	0.00023	
Manganese	mg/L	0483	WL	06/22/2009	0001	18	-	18	0.15		#	0.00023	
Manganese	mg/L	0493	WL	06/23/2009	0001	54	-	54	7.8		#	0.0029	
Manganese	mg/L	0547	TS	06/24/2009	0001	0	-	0	4.2		#	0.0029	
Manganese	mg/L	0548	TS	06/24/2009	0001	0	-	0	2.4		#	0.0029	
Manganese	mg/L	0557	WL	06/22/2009	0001	40	-	40	4.8		#	0.0012	
Manganese	mg/L	0557	WL	06/22/2009	0002	40	-	40	4.8		#	0.0012	
Manganese	mg/L	0559	WL	06/22/2009	0001	19	-	19	0.12		#	0.00012	
Manganese	mg/L	0560	WL	06/22/2009	0001	31	-	31	0.36		#	0.00058	
Manganese	mg/L	0583	WL	06/23/2009	0001	18	-	18	1.5		#	0.00058	
Manganese	mg/L	0588	WL	06/23/2009	0001	34	-	34	1.1		#	0.00058	
Manganese	mg/L	0589	WL	06/23/2009	0001	52	-	52	6.6		#	0.0058	
Manganese	mg/L	0671	WL	06/24/2009	0001	14.4	-	44.4	3.8		#	0.0012	
Manganese	mg/L	0673	WL	06/24/2009	0001	16.3	-	46.3	4.6		#	0.0029	
Manganese	mg/L	0675	WL	06/24/2009	0001	16	-	46	4.3		#	0.0029	
Manganese	mg/L	0677	WL	06/24/2009	0001	15.2	-	45.2	4.1		#	0.0012	
Manganese	mg/L	0679	WL	06/24/2009	0001	15	-	45	3		#	0.0012	
Manganese	mg/L	0683	WL	06/23/2009	0001	27	-	27	4.6		#	0.0012	
Manganese	mg/L	0683	WL	06/23/2009	0002	27	-	27	4.5		#	0.0012	
Manganese	mg/L	0688	WL	06/23/2009	0001	31	-	31	5.3		#	0.0029	
Manganese	mg/L	0689	WL	06/23/2009	0001	46	-	46	6.6		#	0.0058	
Manganese	mg/L	0780	WL	06/22/2009	0001	28	-	28	1.8		#	0.0012	
Manganese	mg/L	0782	WL	06/22/2009	0001	33	-	33	1.3		#	0.00058	
Manganese	mg/L	0786	WL	06/22/2009	0001	28	-	28	0.18		#	0.00023	
Manganese	mg/L	0787	WL	06/22/2009	0001	36	-	36	1.6		#	0.0012	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data		
Manganese	mg/L	SMI-MW01	WL	06/25/2009	0001	16	-	16	0.3		#	0.00023	
Manganese	mg/L	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	5.7		#	0.0029	
Manganese	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	0.025		#	0.00023	
Oxidation Reduction Potential	mV	0403	WL	06/22/2009	0001	18	-	18	-112		#		
Oxidation Reduction Potential	mV	0406	WL	06/23/2009	0001	18	-	18	120		#		
Oxidation Reduction Potential	mV	0407	WL	06/22/2009	0001	17	-	17	-128.4		#		
Oxidation Reduction Potential	mV	0411	WL	06/24/2009	0001	8	-	8	134		#		
Oxidation Reduction Potential	mV	0413	WL	06/24/2009	0001	9	-	9	145		#		
Oxidation Reduction Potential	mV	0414	WL	06/25/2009	0001	7.5	-	7.5	133		#		
Oxidation Reduction Potential	mV	0480	WL	06/22/2009	0001	18	-	18	151.2		#		
Oxidation Reduction Potential	mV	0483	WL	06/22/2009	0001	18	-	18	97.9		#		
Oxidation Reduction Potential	mV	0493	WL	06/23/2009	0001	54	-	54	78		#		
Oxidation Reduction Potential	mV	0547	TS	06/24/2009	0001	0	-	0	171		#		
Oxidation Reduction Potential	mV	0548	TS	06/24/2009	0001	0	-	0	111		#		
Oxidation Reduction Potential	mV	0557	WL	06/22/2009	0001	40	-	40	120.3		#		
Oxidation Reduction Potential	mV	0559	WL	06/22/2009	0001	19	-	19	42		#		
Oxidation Reduction Potential	mV	0560	WL	06/22/2009	0001	31	-	31	-55.5		#		
Oxidation Reduction Potential	mV	0583	WL	06/23/2009	0001	18	-	18	103		#		
Oxidation Reduction Potential	mV	0588	WL	06/23/2009	0001	34	-	34	-27.6		#		
Oxidation Reduction Potential	mV	0589	WL	06/23/2009	0001	52	-	52	59		#		
Oxidation Reduction Potential	mV	0671	WL	06/24/2009	0001	14.4	-	44.4	123		#		
Oxidation Reduction Potential	mV	0673	WL	06/24/2009	0001	16.3	-	46.3	148		#		
Oxidation Reduction Potential	mV	0675	WL	06/24/2009	0001	16	-	46	144		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Oxidation Reduction Potential	mV	0677	WL	06/24/2009	0001	15.2	-	45.2	153		#		
Oxidation Reduction Potential	mV	0679	WL	06/24/2009	0001	15	-	45	144		#		
Oxidation Reduction Potential	mV	0683	WL	06/23/2009	0001	27	-	27	131.7		#		
Oxidation Reduction Potential	mV	0688	WL	06/23/2009	0001	31	-	31	93		#		
Oxidation Reduction Potential	mV	0688	WL	06/23/2009	0001	39	-	39	123.6		#		
Oxidation Reduction Potential	mV	0689	WL	06/23/2009	0001	54	-	54	99.9		#		
Oxidation Reduction Potential	mV	0689	WL	06/23/2009	0001	46	-	46	106.5		#		
Oxidation Reduction Potential	mV	0780	WL	06/22/2009	0001	28	-	28	10.4		#		
Oxidation Reduction Potential	mV	0782	WL	06/22/2009	0001	33	-	33	-40.4		#		
Oxidation Reduction Potential	mV	0786	WL	06/22/2009	0001	28	-	28	-58.1		#		
Oxidation Reduction Potential	mV	0787	WL	06/22/2009	0001	36	-	36	97.4		#		
Oxidation Reduction Potential	mV	SMI-MW01	WL	06/25/2009	0001	16	-	16	143		#		
Oxidation Reduction Potential	mV	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	167		#		
Oxidation Reduction Potential	mV	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	110		#		
pH	s.u.	0403	WL	06/22/2009	0001	18	-	18	7.43		#		
pH	s.u.	0406	WL	06/23/2009	0001	18	-	18	6.94		#		
pH	s.u.	0407	WL	06/22/2009	0001	17	-	17	7.48		#		
pH	s.u.	0411	WL	06/24/2009	0001	8	-	8	7.27		#		
pH	s.u.	0413	WL	06/24/2009	0001	9	-	9	7.63		#		
pH	s.u.	0414	WL	06/25/2009	0001	7.5	-	7.5	7.54		#		
pH	s.u.	0480	WL	06/22/2009	0001	18	-	18	7.27		#		
pH	s.u.	0483	WL	06/22/2009	0001	18	-	18	7.83		#		
pH	s.u.	0493	WL	06/23/2009	0001	54	-	54	6.79		#		
pH	s.u.	0547	TS	06/24/2009	0001	0	-	0	6.81		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
pH	s.u.	0548	TS	06/24/2009	0001	0	-	0	7.82		#		
pH	s.u.	0557	WL	06/22/2009	0001	40	-	40	6.81		#		
pH	s.u.	0559	WL	06/22/2009	0001	19	-	19	7.65		#		
pH	s.u.	0560	WL	06/22/2009	0001	31	-	31	7.66		#		
pH	s.u.	0583	WL	06/23/2009	0001	18	-	18	6.92		#		
pH	s.u.	0588	WL	06/23/2009	0001	34	-	34	7.49		#		
pH	s.u.	0589	WL	06/23/2009	0001	52	-	52	6.79		#		
pH	s.u.	0671	WL	06/24/2009	0001	14.4	-	44.4	6.83		#		
pH	s.u.	0673	WL	06/24/2009	0001	16.3	-	46.3	6.75		#		
pH	s.u.	0675	WL	06/24/2009	0001	16	-	46	6.73		#		
pH	s.u.	0677	WL	06/24/2009	0001	15.2	-	45.2	6.81		#		
pH	s.u.	0679	WL	06/24/2009	0001	15	-	45	6.92		#		
pH	s.u.	0683	WL	06/23/2009	0001	27	-	27	6.76		#		
pH	s.u.	0688	WL	06/23/2009	0001	31	-	31	6.74		#		
pH	s.u.	0688	WL	06/23/2009	0001	39	-	39	6.78		#		
pH	s.u.	0689	WL	06/23/2009	0001	46	-	46	6.74		#		
pH	s.u.	0689	WL	06/23/2009	0001	54	-	54	6.74		#		
pH	s.u.	0780	WL	06/22/2009	0001	28	-	28	7.2		#		
pH	s.u.	0782	WL	06/22/2009	0001	33	-	33	7.42		#		
pH	s.u.	0786	WL	06/22/2009	0001	28	-	28	8.27		#		
pH	s.u.	0787	WL	06/22/2009	0001	36	-	36	7.37		#		
pH	s.u.	SMI-MW01	WL	06/25/2009	0001	16	-	16	7.46		#		
pH	s.u.	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	6.88		#		
pH	s.u.	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	8.04		#		
Selenium	mg/L	0406	WL	06/23/2009	0001	18	-	18	0.01	E	#	9.1E-005	
Selenium	mg/L	0413	WL	06/24/2009	0001	9	-	9	0.19		#	0.00091	
Selenium	mg/L	0414	WL	06/25/2009	0001	7.5	-	7.5	0.1		#	0.00018	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	Lab	Data	QA					
Selenium	mg/L	0683	WL	06/23/2009	0001	27	-	27	0.018		#	9.1E-005	
Selenium	mg/L	0683	WL	06/23/2009	0002	27	-	27	0.019		#	9.1E-005	
Selenium	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	0.037		#	9.1E-005	
Specific Conductance	µmhos/cm	0403	WL	06/22/2009	0001	18	-	18	1327		#		
Specific Conductance	µmhos/cm	0406	WL	06/23/2009	0001	18	-	18	11484		#		
Specific Conductance	µmhos/cm	0407	WL	06/22/2009	0001	17	-	17	955		#		
Specific Conductance	µmhos/cm	0411	WL	06/24/2009	0001	8	-	8	7207		#		
Specific Conductance	µmhos/cm	0413	WL	06/24/2009	0001	9	-	9	4099		#		
Specific Conductance	µmhos/cm	0414	WL	06/25/2009	0001	7.5	-	7.5	6038		#		
Specific Conductance	µmhos/cm	0480	WL	06/22/2009	0001	18	-	18	5377		#		
Specific Conductance	µmhos/cm	0483	WL	06/22/2009	0001	18	-	18	2148		#		
Specific Conductance	µmhos/cm	0493	WL	06/23/2009	0001	54	-	54	37110		#		
Specific Conductance	µmhos/cm	0547	TS	06/24/2009	0001	0	-	0	34600		#		
Specific Conductance	µmhos/cm	0548	TS	06/24/2009	0001	0	-	0	33441		#		
Specific Conductance	µmhos/cm	0557	WL	06/22/2009	0001	40	-	40	25574		#		
Specific Conductance	µmhos/cm	0559	WL	06/22/2009	0001	19	-	19	756		#		
Specific Conductance	µmhos/cm	0560	WL	06/22/2009	0001	31	-	31	8400		#		
Specific Conductance	µmhos/cm	0583	WL	06/23/2009	0001	18	-	18	9399		#		
Specific Conductance	µmhos/cm	0588	WL	06/23/2009	0001	34	-	34	7479		#		
Specific Conductance	µmhos/cm	0589	WL	06/23/2009	0001	52	-	52	58308		#		
Specific Conductance	µmhos/cm	0671	WL	06/24/2009	0001	14.4	-	44.4	26650		#		
Specific Conductance	µmhos/cm	0673	WL	06/24/2009	0001	16.3	-	46.3	42308		#		
Specific Conductance	µmhos/cm	0675	WL	06/24/2009	0001	16	-	46	33030		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Specific Conductance	µmhos/cm	0677	WL	06/24/2009	0001	15.2	-	45.2	25821		#		
Specific Conductance	µmhos/cm	0679	WL	06/24/2009	0001	15	-	45	12480		#		
Specific Conductance	µmhos/cm	0683	WL	06/23/2009	0001	27	-	27	19461		#		
Specific Conductance	µmhos/cm	0688	WL	06/23/2009	0001	31	-	31	45808		#		
Specific Conductance	µmhos/cm	0688	WL	06/23/2009	0001	39	-	39	63794		#		
Specific Conductance	µmhos/cm	0689	WL	06/23/2009	0001	46	-	46	119633		#		
Specific Conductance	µmhos/cm	0689	WL	06/23/2009	0001	54	-	54	122429		#		
Specific Conductance	µmhos/cm	0780	WL	06/22/2009	0001	28	-	28	13589		#		
Specific Conductance	µmhos/cm	0782	WL	06/22/2009	0001	33	-	33	10880		#		
Specific Conductance	µmhos/cm	0786	WL	06/22/2009	0001	28	-	28	2731		#		
Specific Conductance	µmhos/cm	0787	WL	06/22/2009	0001	36	-	36	13860		#		
Specific Conductance	µmhos/cm	SMI-MW01	WL	06/25/2009	0001	16	-	16	4226		#		
Specific Conductance	µmhos/cm	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	50277		#		
Specific Conductance	µmhos/cm	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	5751		#		
Sulfate	mg/L	0403	WL	06/22/2009	0001	18	-	18	230		#	5	
Sulfate	mg/L	0406	WL	06/23/2009	0001	18	-	18	3700		#	50	
Sulfate	mg/L	0407	WL	06/22/2009	0001	17	-	17	140		#	5	
Sulfate	mg/L	0411	WL	06/24/2009	0001	8	-	8	1500		#	50	
Sulfate	mg/L	0413	WL	06/24/2009	0001	9	-	9	550		#	25	
Sulfate	mg/L	0414	WL	06/25/2009	0001	7.5	-	7.5	1200		#	50	
Sulfate	mg/L	0480	WL	06/22/2009	0001	18	-	18	1200		#	25	
Sulfate	mg/L	0483	WL	06/22/2009	0001	18	-	18	360		#	10	
Sulfate	mg/L	0493	WL	06/23/2009	0001	54	-	54	12000		#	250	
Sulfate	mg/L	0547	TS	06/24/2009	0001	0	-	0	6200		#	250	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	Lab	Data	QA					
Sulfate	mg/L	0548	TS	06/24/2009	0001	0	-	0	7200		#	250	
Sulfate	mg/L	0557	WL	06/22/2009	0001	40	-	40	8100		#	100	
Sulfate	mg/L	0557	WL	06/22/2009	0002	40	-	40	8000		#	100	
Sulfate	mg/L	0559	WL	06/22/2009	0001	19	-	19	110		#	2.5	
Sulfate	mg/L	0560	WL	06/22/2009	0001	31	-	31	1200		#	50	
Sulfate	mg/L	0583	WL	06/23/2009	0001	18	-	18	2800		#	50	
Sulfate	mg/L	0588	WL	06/23/2009	0001	34	-	34	2000		#	50	
Sulfate	mg/L	0589	WL	06/23/2009	0001	52	-	52	9700		#	250	
Sulfate	mg/L	0671	WL	06/24/2009	0001	14.4	-	44.4	6100		#	100	
Sulfate	mg/L	0673	WL	06/24/2009	0001	16.3	-	46.3	6300		#	250	
Sulfate	mg/L	0675	WL	06/24/2009	0001	16	-	46	6500		#	250	
Sulfate	mg/L	0677	WL	06/24/2009	0001	15.2	-	45.2	6800		#	100	
Sulfate	mg/L	0679	WL	06/24/2009	0001	15	-	45	4800		#	100	
Sulfate	mg/L	0683	WL	06/23/2009	0001	27	-	27	7400		#	100	
Sulfate	mg/L	0683	WL	06/23/2009	0002	27	-	27	7500		#	100	
Sulfate	mg/L	0688	WL	06/23/2009	0001	31	-	31	10000		#	250	
Sulfate	mg/L	0689	WL	06/23/2009	0001	46	-	46	5700		#	500	
Sulfate	mg/L	0780	WL	06/22/2009	0001	28	-	28	2500		#	100	
Sulfate	mg/L	0782	WL	06/22/2009	0001	33	-	33	1800		#	50	
Sulfate	mg/L	0786	WL	06/22/2009	0001	28	-	28	380		#	25	
Sulfate	mg/L	0787	WL	06/22/2009	0001	36	-	36	2200		#	100	
Sulfate	mg/L	SMI-MW01	WL	06/25/2009	0001	16	-	16	860		#	25	
Sulfate	mg/L	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	8000		#	250	
Sulfate	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	970		#	25	
Temperature	C	0403	WL	06/22/2009	0001	18	-	18	15.35		#		
Temperature	C	0406	WL	06/23/2009	0001	18	-	18	17.23		#		
Temperature	C	0407	WL	06/22/2009	0001	17	-	17	15.2		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Temperature	C	0411	WL	06/24/2009	0001	8	-	8	21.2		#		
Temperature	C	0413	WL	06/24/2009	0001	9	-	9	18.51		#		
Temperature	C	0414	WL	06/25/2009	0001	7.5	-	7.5	19.71		#		
Temperature	C	0480	WL	06/22/2009	0001	18	-	18	16		#		
Temperature	C	0483	WL	06/22/2009	0001	18	-	18	15.64		#		
Temperature	C	0493	WL	06/23/2009	0001	54	-	54	17.8		#		
Temperature	C	0548	TS	06/24/2009	0001	0	-	0	11.25		#		
Temperature	C	0557	WL	06/22/2009	0001	40	-	40	17.34		#		
Temperature	C	0559	WL	06/22/2009	0001	19	-	19	16.32		#		
Temperature	C	0560	WL	06/22/2009	0001	31	-	31	18.18		#		
Temperature	C	0583	WL	06/23/2009	0001	18	-	18	17.37		#		
Temperature	C	0588	WL	06/23/2009	0001	34	-	34	15.95		#		
Temperature	C	0589	WL	06/23/2009	0001	52	-	52	17.45		#		
Temperature	C	0671	WL	06/24/2009	0001	14.4	-	44.4	15.33		#		
Temperature	C	0673	WL	06/24/2009	0001	16.3	-	46.3	15.98		#		
Temperature	C	0675	WL	06/24/2009	0001	16	-	46	14.84		#		
Temperature	C	0677	WL	06/24/2009	0001	15.2	-	45.2	15.12		#		
Temperature	C	0679	WL	06/24/2009	0001	15	-	45	14.89		#		
Temperature	C	0683	WL	06/23/2009	0001	27	-	27	16.02		#		
Temperature	C	0688	WL	06/23/2009	0001	31	-	31	17.19		#		
Temperature	C	0688	WL	06/23/2009	0001	39	-	39	18.36		#		
Temperature	C	0689	WL	06/23/2009	0001	54	-	54	17.72		#		
Temperature	C	0689	WL	06/23/2009	0001	46	-	46	19.51		#		
Temperature	C	0780	WL	06/22/2009	0001	28	-	28	15.46		#		
Temperature	C	0782	WL	06/22/2009	0001	33	-	33	15.69		#		
Temperature	C	0786	WL	06/22/2009	0001	28	-	28	14.62		#		
Temperature	C	0787	WL	06/22/2009	0001	36	-	36	16.06		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Temperature	C	SMI-MW01	WL	06/25/2009	0001	16	-	16	17.06		#		
Temperature	C	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	18.53		#		
Temperature	C	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	18.08		#		
Total Dissolved Solids	mg/L	0403	WL	06/22/2009	0001	18	-	18	610		#	20	
Total Dissolved Solids	mg/L	0406	WL	06/23/2009	0001	18	-	18	7300		#	200	
Total Dissolved Solids	mg/L	0407	WL	06/22/2009	0001	17	-	17	470		#	20	
Total Dissolved Solids	mg/L	0411	WL	06/24/2009	0001	8	-	8	4700		#	200	
Total Dissolved Solids	mg/L	0413	WL	06/24/2009	0001	9	-	9	2500		#	80	
Total Dissolved Solids	mg/L	0414	WL	06/25/2009	0001	7.5	-	7.5	3600		#	80	
Total Dissolved Solids	mg/L	0480	WL	06/22/2009	0001	18	-	18	3000		#	80	
Total Dissolved Solids	mg/L	0483	WL	06/22/2009	0001	18	-	18	940		#	80	
Total Dissolved Solids	mg/L	0493	WL	06/23/2009	0001	54	-	54	26000		#	400	
Total Dissolved Solids	mg/L	0547	TS	06/24/2009	0001	0	-	0	21000		#	400	
Total Dissolved Solids	mg/L	0548	TS	06/24/2009	0001	0	-	0	22000		#	400	
Total Dissolved Solids	mg/L	0557	WL	06/22/2009	0001	40	-	40	18000		#	400	
Total Dissolved Solids	mg/L	0557	WL	06/22/2009	0002	40	-	40	17000		#	400	
Total Dissolved Solids	mg/L	0559	WL	06/22/2009	0001	19	-	19	360		#	20	
Total Dissolved Solids	mg/L	0560	WL	06/22/2009	0001	31	-	31	4200		#	200	
Total Dissolved Solids	mg/L	0583	WL	06/23/2009	0001	18	-	18	6200		#	200	
Total Dissolved Solids	mg/L	0588	WL	06/23/2009	0001	34	-	34	4200		#	80	
Total Dissolved Solids	mg/L	0589	WL	06/23/2009	0001	52	-	52	36000		#	1000	
Total Dissolved Solids	mg/L	0671	WL	06/24/2009	0001	14.4	-	44.4	17000		#	400	
Total Dissolved Solids	mg/L	0673	WL	06/24/2009	0001	16.3	-	46.3	27000		#	1000	
Total Dissolved Solids	mg/L	0675	WL	06/24/2009	0001	16	-	46	22000		#	400	
Total Dissolved Solids	mg/L	0677	WL	06/24/2009	0001	15.2	-	45.2	17000		#	400	
Total Dissolved Solids	mg/L	0679	WL	06/24/2009	0001	15	-	45	10000		#	200	
Total Dissolved Solids	mg/L	0683	WL	06/23/2009	0001	27	-	27	14000		#	400	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	Lab	Data	QA					
Total Dissolved Solids	mg/L	0683	WL	06/23/2009	0002	27	-	27	14000		#	400	
Total Dissolved Solids	mg/L	0688	WL	06/23/2009	0001	31	-	31	31000		#	1000	
Total Dissolved Solids	mg/L	0689	WL	06/23/2009	0001	46	-	46	80000		#	2000	
Total Dissolved Solids	mg/L	0780	WL	06/22/2009	0001	28	-	28	7600		#	200	
Total Dissolved Solids	mg/L	0782	WL	06/22/2009	0001	33	-	33	5800		#	200	
Total Dissolved Solids	mg/L	0786	WL	06/22/2009	0001	28	-	28	1200		#	40	
Total Dissolved Solids	mg/L	0787	WL	06/22/2009	0001	36	-	36	7800		#	200	
Total Dissolved Solids	mg/L	SMI-MW01	WL	06/25/2009	0001	16	-	16	2500		#	80	
Total Dissolved Solids	mg/L	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	33000		#	1000	
Total Dissolved Solids	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	3400		#	80	
Turbidity	NTU	0403	WL	06/22/2009	0001	18	-	18	1.15		#		
Turbidity	NTU	0406	WL	06/23/2009	0001	18	-	18	2.54		#		
Turbidity	NTU	0407	WL	06/22/2009	0001	17	-	17	3.2		#		
Turbidity	NTU	0411	WL	06/24/2009	0001	8	-	8	6.25		#		
Turbidity	NTU	0413	WL	06/24/2009	0001	9	-	9	183		#		
Turbidity	NTU	0414	WL	06/25/2009	0001	7.5	-	7.5	7		#		
Turbidity	NTU	0480	WL	06/22/2009	0001	18	-	18	2.72		#		
Turbidity	NTU	0483	WL	06/22/2009	0001	18	-	18	3.01		#		
Turbidity	NTU	0493	WL	06/23/2009	0001	54	-	54	2.14		#		
Turbidity	NTU	0547	TS	06/24/2009	0001	0	-	0	12.9		#		
Turbidity	NTU	0548	TS	06/24/2009	0001	0	-	0	17.4		#		
Turbidity	NTU	0557	WL	06/22/2009	0001	40	-	40	1.92		#		
Turbidity	NTU	0559	WL	06/22/2009	0001	19	-	19	1.89		#		
Turbidity	NTU	0560	WL	06/22/2009	0001	31	-	31	8.46		#		
Turbidity	NTU	0583	WL	06/23/2009	0001	18	-	18	1.28		#		
Turbidity	NTU	0588	WL	06/23/2009	0001	34	-	34	2.58		#		
Turbidity	NTU	0589	WL	06/23/2009	0001	52	-	52	1.56		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	Lab	Data QA					
Turbidity	NTU	0671	WL	06/24/2009	0001	14.4	- 44.4	3.09		#		
Turbidity	NTU	0673	WL	06/24/2009	0001	16.3	- 46.3	2.12		#		
Turbidity	NTU	0675	WL	06/24/2009	0001	16	- 46	4.95		#		
Turbidity	NTU	0677	WL	06/24/2009	0001	15.2	- 45.2	4.38		#		
Turbidity	NTU	0679	WL	06/24/2009	0001	15	- 45	12.4		#		
Turbidity	NTU	0683	WL	06/23/2009	0001	27	- 27	2.18		#		
Turbidity	NTU	0688	WL	06/23/2009	0001	31	- 31	1.43		#		
Turbidity	NTU	0688	WL	06/23/2009	0001	39	- 39	1.45		#		
Turbidity	NTU	0689	WL	06/23/2009	0001	46	- 46	2.28		#		
Turbidity	NTU	0689	WL	06/23/2009	0001	54	- 54	4.78		#		
Turbidity	NTU	0780	WL	06/22/2009	0001	28	- 28	2.83		#		
Turbidity	NTU	0782	WL	06/22/2009	0001	33	- 33	2.67		#		
Turbidity	NTU	0786	WL	06/22/2009	0001	28	- 28	2.39		#		
Turbidity	NTU	0787	WL	06/22/2009	0001	36	- 36	0.77		#		
Turbidity	NTU	SMI-MW01	WL	06/25/2009	0001	16	- 16	5.36		#		
Turbidity	NTU	SMI-PW02	WL	06/25/2009	0001	20.04	- 60.04	5.27		#		
Turbidity	NTU	SMI-PZ3S	WL	06/24/2009	0001	25	- 25	3.32		#		
Uranium	mg/L	0403	WL	06/22/2009	0001	18	- 18	0.17		#	4.5E-005	
Uranium	mg/L	0406	WL	06/23/2009	0001	18	- 18	1.4		#	0.00022	
Uranium	mg/L	0407	WL	06/22/2009	0001	17	- 17	0.083		#	2.2E-005	
Uranium	mg/L	0411	WL	06/24/2009	0001	8	- 8	12		#	0.0022	
Uranium	mg/L	0413	WL	06/24/2009	0001	9	- 9	1.2		#	0.00022	
Uranium	mg/L	0414	WL	06/25/2009	0001	7.5	- 7.5	4.9		#	0.00045	
Uranium	mg/L	0480	WL	06/22/2009	0001	18	- 18	0.74		#	9.E-005	
Uranium	mg/L	0483	WL	06/22/2009	0001	18	- 18	0.35		#	9.E-005	
Uranium	mg/L	0493	WL	06/23/2009	0001	54	- 54	3.1		#	0.00022	
Uranium	mg/L	0547	TS	06/24/2009	0001	0	- 0	2.1		#	0.00022	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 8/8/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data		
Uranium	mg/L	0548	TS	06/24/2009	0001	0	-	0	2.4		#	0.00022	
Uranium	mg/L	0557	WL	06/22/2009	0001	40	-	40	2.7		#	0.00022	
Uranium	mg/L	0557	WL	06/22/2009	0002	40	-	40	2.6		#	0.00022	
Uranium	mg/L	0559	WL	06/22/2009	0001	19	-	19	0.079		#	2.2E-005	
Uranium	mg/L	0560	WL	06/22/2009	0001	31	-	31	0.52		#	9.E-005	
Uranium	mg/L	0583	WL	06/23/2009	0001	18	-	18	1.6		#	9.E-005	
Uranium	mg/L	0588	WL	06/23/2009	0001	34	-	34	0.56		#	9.E-005	
Uranium	mg/L	0589	WL	06/23/2009	0001	52	-	52	2.6		#	0.00022	
Uranium	mg/L	0671	WL	06/24/2009	0001	14.4	-	44.4	1.9		#	0.00022	
Uranium	mg/L	0673	WL	06/24/2009	0001	16.3	-	46.3	1.7		#	0.00022	
Uranium	mg/L	0675	WL	06/24/2009	0001	16	-	46	1.9		#	0.00022	
Uranium	mg/L	0677	WL	06/24/2009	0001	15.2	-	45.2	1.8		#	0.00022	
Uranium	mg/L	0679	WL	06/24/2009	0001	15	-	45	1.4		#	0.00022	
Uranium	mg/L	0683	WL	06/23/2009	0001	27	-	27	2.2		#	0.00022	
Uranium	mg/L	0683	WL	06/23/2009	0002	27	-	27	2.1		#	0.00022	
Uranium	mg/L	0688	WL	06/23/2009	0001	31	-	31	2.8		#	0.00022	
Uranium	mg/L	0689	WL	06/23/2009	0001	46	-	46	0.74		#	4.5E-005	
Uranium	mg/L	0780	WL	06/22/2009	0001	28	-	28	0.97		#	9.E-005	
Uranium	mg/L	0782	WL	06/22/2009	0001	33	-	33	0.73		#	9.E-005	
Uranium	mg/L	0786	WL	06/22/2009	0001	28	-	28	0.2		#	0.00022	
Uranium	mg/L	0787	WL	06/22/2009	0001	36	-	36	0.81		#	0.00022	
Uranium	mg/L	SMI-MW01	WL	06/25/2009	0001	16	-	16	6		#	0.0022	
Uranium	mg/L	SMI-PW02	WL	06/25/2009	0001	20.04	-	60.04	3.1		#	0.00022	
Uranium	mg/L	SMI-PZ3S	WL	06/24/2009	0001	25	-	25	1.4		#	0.00022	

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 (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 Level Data

Appendix D. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site
REPORT DATE: 8/27/2009

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0403	O	3968.95	06/22/2009		10.85	3958.1	
0406	O	3969.91	06/23/2009		11.3	3958.61	
0407	O	3969.09	06/22/2009		10.93	3958.16	
0411	O	3964.88	06/24/2009		5.73	3959.15	
0413	O	3965.33	06/24/2009		6.33	3959	
0414	O	3963.2	06/25/2009		4.73	3958.47	
0480		3968.65	06/22/2009		10.64	3958.01	
0483		3968.9	06/22/2009		10.83	3958.07	
0557		3968.85	06/22/2009		11.28	3957.57	
0559		3969.92	06/22/2009		11.7	3958.22	
0560		3968.77	06/22/2009		10.85	3957.92	
0583		3969.64	06/23/2009		11.38	3958.26	
0588		3968.82	06/23/2009		10.75	3958.07	
0589		3968.87	06/23/2009		10.82	3958.05	
0671		3969.5	06/24/2009		13.79	3955.71	
0673		3969.44	06/24/2009		14.91	3954.53	
0675		3969.64	06/24/2009		13.92	3955.72	
0677		3969.61	06/24/2009		13.35	3956.26	
0679		3969.59	06/24/2009		12.79	3956.8	
0683		3970.73	06/23/2009		13.91	3956.82	
0688		3968.66	06/23/2009		12.3	3956.36	
0689		3968.66	06/23/2009		12.09	3956.57	
0780		3968.45	06/22/2009		10.51	3957.94	
0782		3968.46	06/22/2009		10.49	3957.97	
0786		3968.14	06/22/2009		10.11	3958.03	
0787		3968.43	06/22/2009		10.5	3957.93	

Appendix D. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site
REPORT DATE: 8/27/2009

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
SMI-MW01	O	3968.32	06/25/2009		9.28	3959.04	
SMI-PW02	O	3967.48	06/25/2009		10.32	3957.16	
SMI-PZ3S	O	3975.03	06/24/2009		15.85	3959.18	

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

Attachment 1.
Interim Action Well Field Monthly Sampling Trip Report

Attachment 1.
Interim Action Well Field Monthly Sampling Trip Report



DATE: July 08, 2009
TO: K. Pill, M. Mullis
FROM: E. Glowiak
SUBJECT: June 2009 Monthly Sampling Trip Report
Site: Moab, Utah

Date of Sampling Event: June 22-25, 2009

Team Members: James Ritchey, Elizabeth Glowiak

RIN Number Assigned: All samples were assigned to RIN 0906032.

Sample Shipment: All samples were shipped in a cooler overnight UPS to ALS Laboratory Group from Moab, Utah, on June 24 and 25, 2009 (Tracking Nos. 1Z5W1Y510194331115 and 1Z5W1Y510198287658).

June 2009 CF1 Sampling

Number of Locations Sampled: One extraction well (SMI-PW02), seven observation wells (0403, 0407, 0480, 0483, 0557, 0559, and 0560), and two evaporation pond locations (0547 and 0548) were sampled. Including one duplicate, a total of 11 samples were collected during the June 2009 monthly sampling event.

Locations Not Sampled: None.

Field Variance: None

Quality-Control Sample Cross Reference: The following table shows the false identification assigned to the quality-control sample.

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2000	0557	Duplicate from 40 ft bgs	Ground Water	JUN 007

Attachment 1.
Interim Action Well Field Monthly Sampling Trip Report (continued)

Location-Specific Information – CF1 Extraction Wells: Extraction wells were sampled using dedicated submersible pumps.

Well No.	Date	Time	Water Level (ft btoc)	Pump Intake (ft bgs)
SMI-PW02	06/25/2009	13:30	10.32	55

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

Location-Specific Information – Observation Wells: All observation 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)
0403	06/22/2009	16:00	10.85	18
0407	06/22/2009	16:23	10.93	17
0480	06/22/2009	10:45	10.64	18
0483	06/22/2009	11:31	10.83	18
0557	06/22/2009	11:05	11.28	40
0559	06/22/2009	14:37	11.70	19
0560	06/22/2009	14:11	10.85	31

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

June 2009 CF2 Sampling

Number of Locations Sampled: Three observation wells (0583, 0588, and 0589) were sampled during the June 2009 monthly sampling event.

Locations Not Sampled: None.

Field Variance: None.

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.

Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0583	06/23/2009	09:58	11.38	18
0588	06/23/2009	10:28	10.75	34
0589	06/23/2009	10:50	10.82	52

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

June 2009 CF3 Sampling

Number of Locations Sampled: Five remediation wells (0671, 0673, 0675, 0677, and 0679) and three observation wells (0683, 0688-31, and 0689-46) were sampled. Including one duplicate, a total of nine locations were sampled during the June 2009 monthly sampling event.

Attachment 1. Interim Action Well Field Monthly Sampling Trip Report (continued)

Locations Not Sampled: None.

Field Variance: None.

Locations in Which Field Parameters Were Measured Only: Parameters were measured at locations 0688 at 39 ft and 0689 at 54 ft.

Well No.	Date	Time	Depth (ft bgs)	Depth To Water (ft btoc)	Field Parameters					
					Temp (°C)	Spec. Cond. (µS/cm)	D.O. (mg/L)	pH	ORP	Turb. (NTUs)
0688	06/23/2009	13:58	39	12:30	18.36	63,794	0.33	6.78	124	1.45
0689	06/23/2009	15:18	54	12:05	17.72	122,429	0.28	6.74	100	4.78

C = centigrade; D.O. = dissolved oxygen; µmS/cm = microsiemens per centimeter; mg/L = milligrams per liter; NTU = nephelometric turbidity unit; ORP = oxygen reduction potential; Spec. Cond. = special conditions; Temp. = temperature; Turb. = turbidity

Quality-Control Sample Cross Reference: The following table shows the false identification assigned to the quality-control sample.

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2001	0683	Duplicate from 27 ft bgs	Ground Water	JUN 016

ID = identification

Location-Specific Information – CF3 Remediation Wells: Extraction wells were sampled using dedicated submersible pumps.

Well No.	Date	Time	Water Level (ft btoc)	Pump Intake (ft bgs)
0671	06/24/2009	11:08	13.79	35
0673	06/24/2009	11:00	14.91	35
0675	06/24/2009	10:50	13.92	35
0677	06/24/2009	10:42	13.35	35
0679	06/24/2009	10:33	12.79	35

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

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.

Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0683	06/23/2009	15:35	13.91	27
0688-31	06/23/2009	13:33	12.30	31
0689-46	06/23/2009	14:21	12.09	46

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

Attachment 1.
Interim Action Well Field Monthly Sampling Trip Report (continued)

June 2009 CF4 Sampling

Number of Locations Sampled: Four observation wells (0780, 0782, 0786, and 0787) were collected during the June 2009 monthly sampling event.

Locations Not Sampled: None.

Field Variance: None.

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.

Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0780	06/22/2009	08:44	10.51	28
0782	06/22/2009	09:05	10.49	33
0786	06/22/2009	09:24	10.11	28
0787	06/22/2009	09:43	10.50	36

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

June 2009 Baseline Sampling

Number of Locations Sampled: Two observation wells (0406 and 0493) were sampled during the June 2009 monthly sampling event.

Locations Not Sampled: None.

Field Variance: None.

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.

Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0406	06/23/2009	16:35	11.30	18
0493	06/23/2009	16:12	9.60	54

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

June 2009 Wood Chip Area Sampling Event

Number of Locations Sampled: Five observation wells (0411, 0413, 0414, SMI-MW01, and SMI-PZ3S) were sampled during this event.

Locations Not Sampled: None.

Field Variance: None

Attachment 1.
Interim Action Well Field Monthly Sampling Trip Report (continued)

Location-Specific Information – Observation Wells: All observation 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)
0411	06/24/2009	08:00	5.73	8
0413	06/24/2009	08:30	6.33	9
0414	06/25/2009	07:57	4.73	7.5
SMI-MW01	06/25/2009	07:40	9.28	16
SMI-PZ3S	06/24/2009	08:10	15.85	25

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

Site Issues: The mean daily Colorado River flows during this sampling event, according to the USGS Cisco gauging station (Station No. 09180500), are provided below:

Date	Daily Mean Flow (cfs)
06/22/2009	17,000
06/23/2009	17,400
06/24/2009	17,300
06/25/2009	17,100

Equipment Issues: None.

Corrective Action Required/Taken: None.