

Office of Environmental Management – Grand Junction



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

August 2009



U.S. Department
of Energy

Office of Environmental Management

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

August 2009

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

Revision 0

Review and Approval

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8/20/09

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Date

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Revision History

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Attachment 1. IA 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
ICB	initial calibration blank
ICP	inductively coupled plasma
IDL	instrument detection limit
LCS	laboratory control sample
MB	method blank
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
RIN	report identification number
RL	reporting limit
RPD	relative percent difference
RS	replicate sample
SD	serial dilution
SDG	sample data group
TDS	total dissolved solids
UMTRA	Uranium Mill Tailings Remedial Action
USGS	U.S. Geological Survey
VDP	validation data package

1.0 Introduction

The purpose of this document is to summarize the results of the data validation process associated with ground water 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 May 2009 monthly sampling event completed from May 26 through 28, 2009, in which ground water samples were collected from a variety of locations across the well field. 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 May 2009 monthly sampling event.

1.1 Summary Criteria

Sampling Period: May 26 through 28, 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. A summary of site conditions is presented in Figure 2.

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. All were anomalously low and are likely 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 were extracting ground water at a rate of approximately 65 gallons per minute (gpm) during this sampling event. CF1 and CF4 wells were shut down in accordance with the Well Field Optimization Plan, and PW02 was not operating due to electrical problems. As a result, the total well field extraction rate was approximately 65 gpm.

3. Was the evaporation pond functioning properly?

Yes. The pond level was 8.0 feet (ft) during this sampling event.

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

No. The CF1 extraction well could not be sampled due to the fact that they were not operating at this time.

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 May 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 2 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, CF3, CF2, CF1, and CF4 (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.

Baseline Area

Samples were collected from Baseline Area locations 0405 (18 ft below ground surface [bgs]) and 0488 (39 ft bgs) during this past month. A review of the time versus concentration plots (Figures 3, 4, and 5) suggest ammonia, TDS, and uranium concentrations in samples collected from these locations have decreased due to the influx of surface water during the 2009 spring runoff.

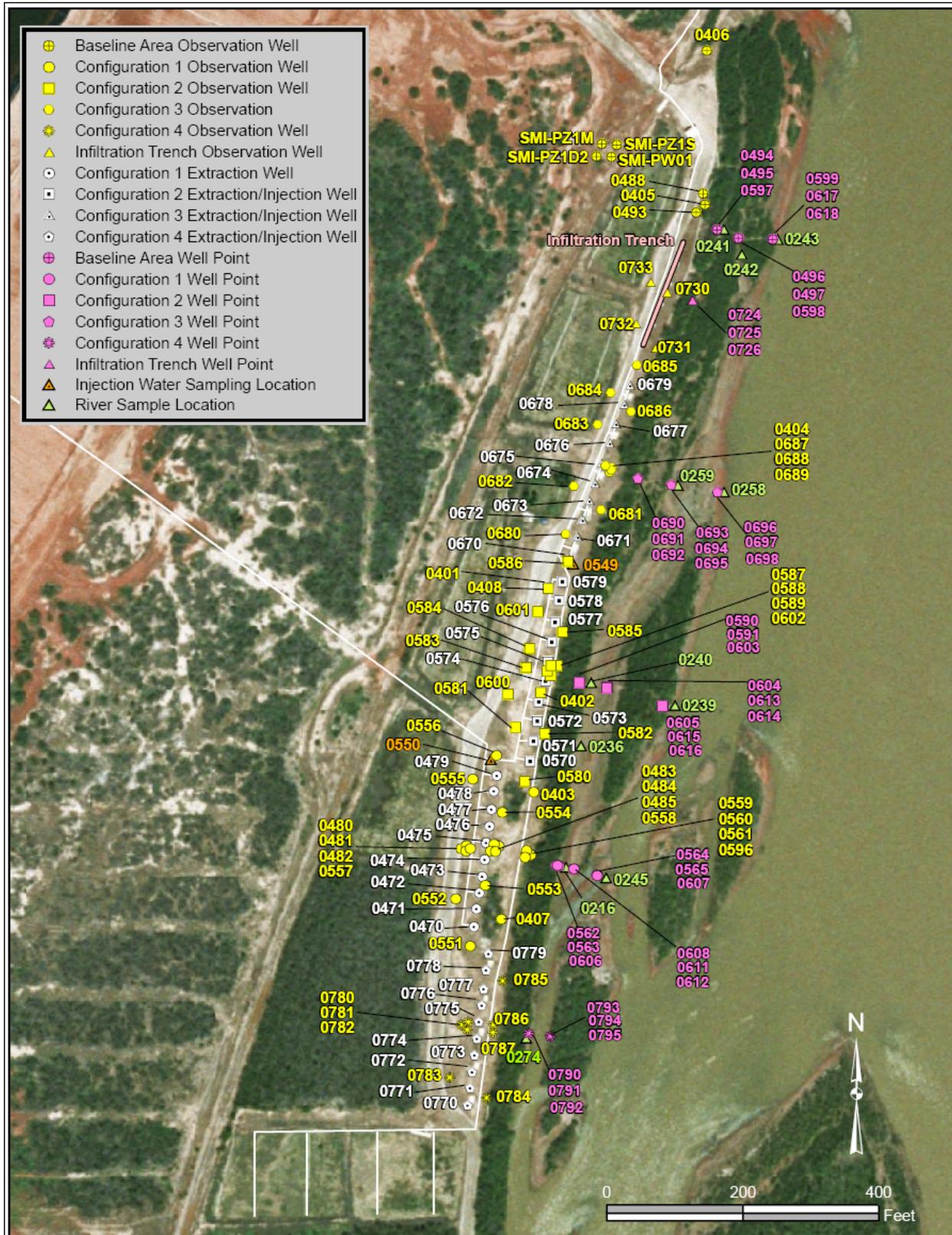


Figure 1. Map of Sample Locations at the IA Well Field and Baseline Area (includes locations not sampled)



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● Well and Well Point Locations

Scale (ft)
250



U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO		Work Performed by S&K Aerospace, Inc. Under DOE Contract No. DE-AC 2047CC08812	
Site Conditions			
Issue Date August 17, 2009	Drawing Name MOAGW00085		

Figure 2. May 2009 Sampling Event Site Conditions

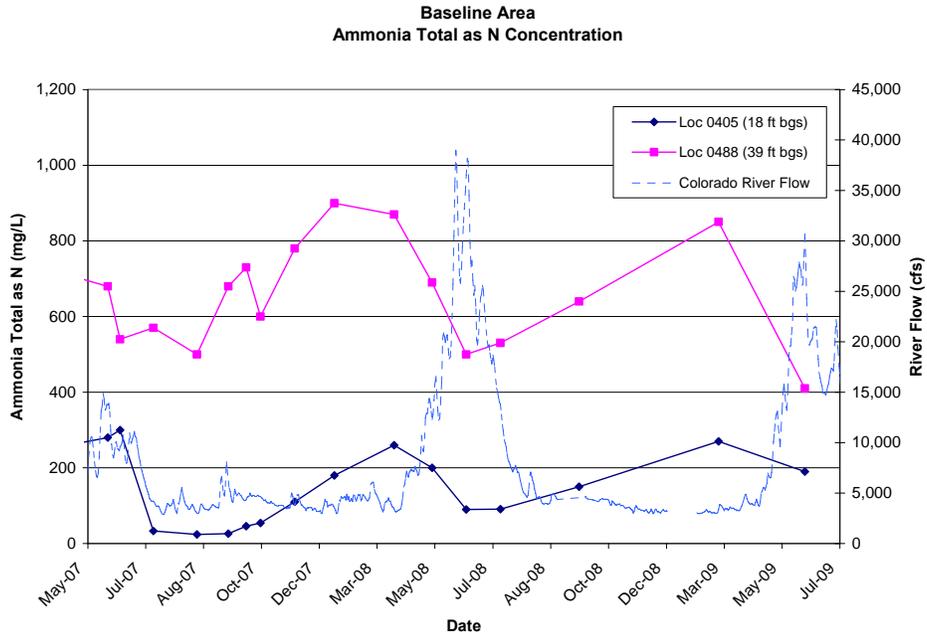


Figure 3. Baseline Area Observation Well Time Versus Ammonia Total as N Concentration Plot

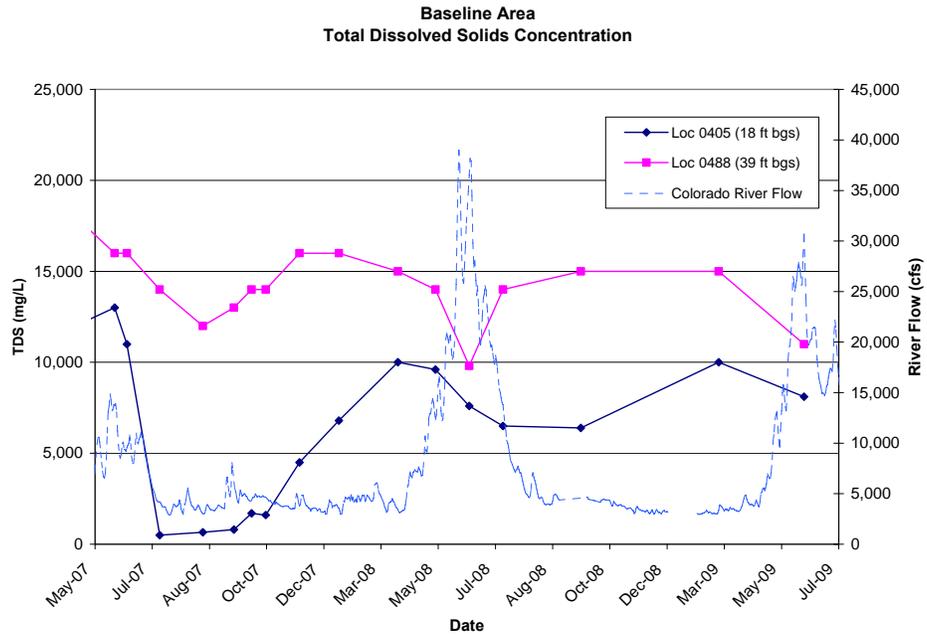


Figure 4. Baseline Area Observation Well Time Versus TDS Concentration Plot

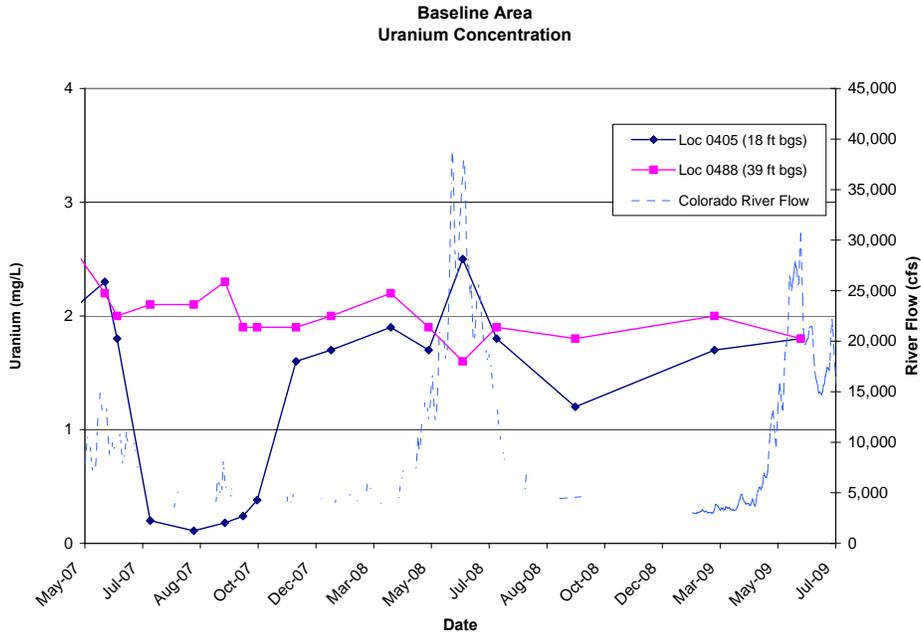


Figure 5. Baseline Area Observation Well Time Versus Uranium Concentration Plot

CF3

Among the locations typically discussed in this Section for CF3, samples were collected from 0683 (27 ft bgs), 0688 (39 ft bgs), and 0689 (54 ft bgs) during this past month. A review of the time versus concentration plots (Figures 6, 7, and 8) suggests the changes in ammonia, TDS, and uranium concentrations in response to the 2009 Colorado River runoff are consistent with the response observed during previous above average runoff events. Ammonia concentrations increased significantly in the sample collected from 39 ft bgs and decreased in the sample collected from 54 ft bgs. TDS concentrations increased in samples from both depths, and uranium concentrations decreased significantly in the sample from 54 ft bgs. The upgradient sample (from 27 ft bgs) suggests this portion of the well field was not impacted by surface water influx during late May 2009.

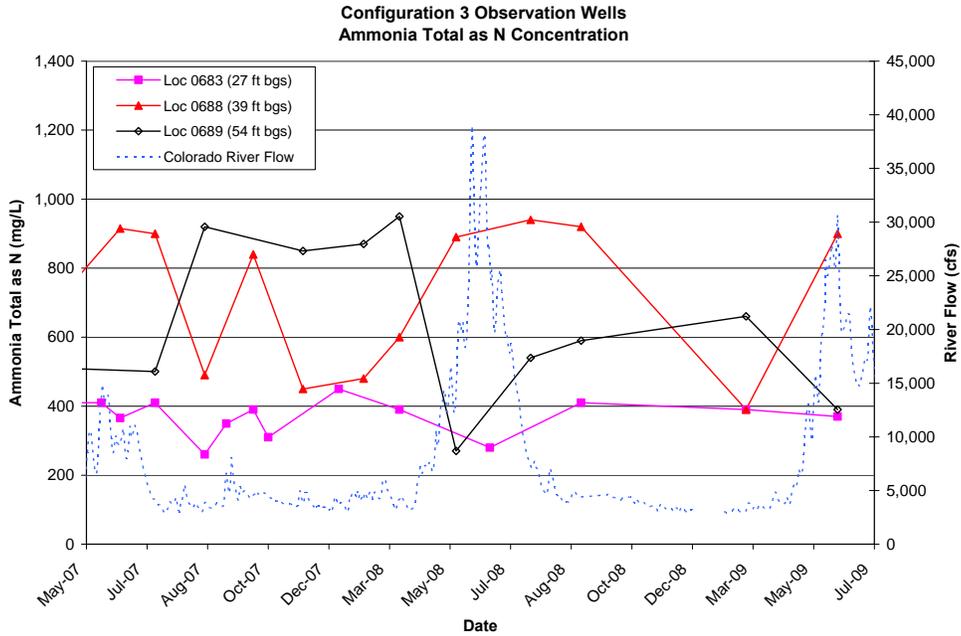


Figure 6. CF3 Observation Well Time Versus Ammonia Total as N Concentration Plot

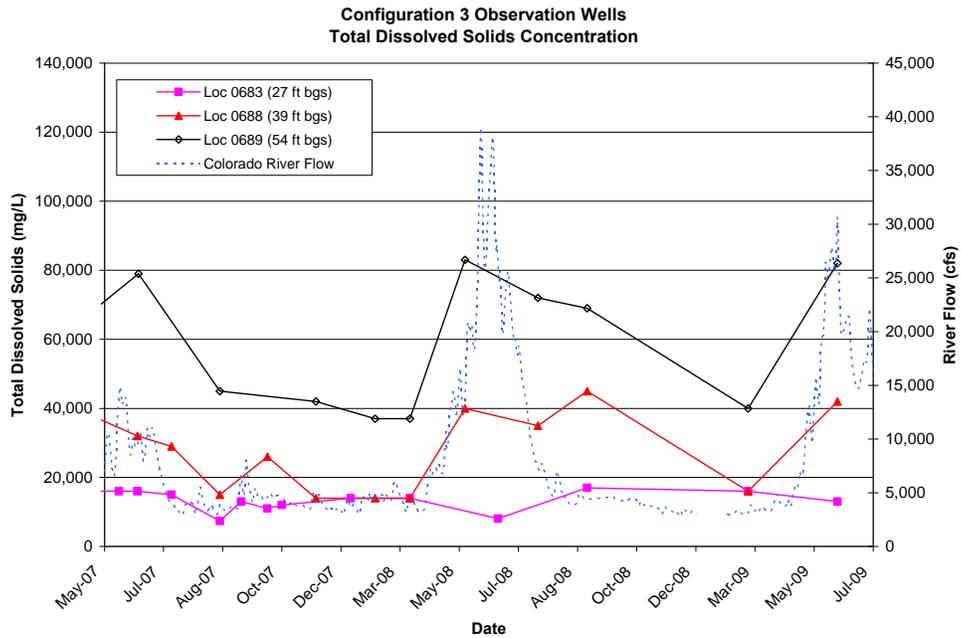


Figure 7. CF3 Observation Well Time Versus TDS Concentration Plot

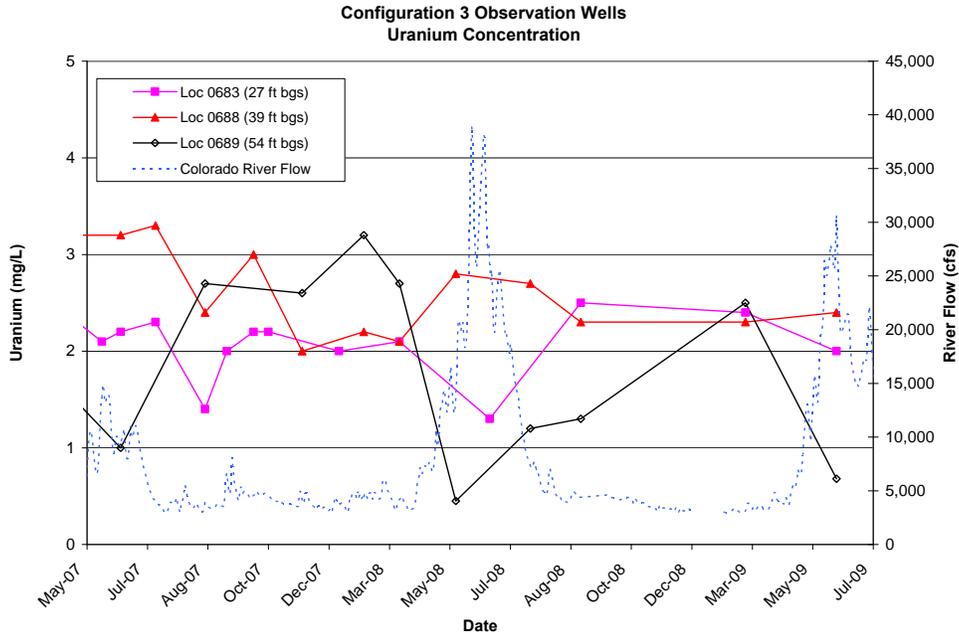


Figure 8. CF3 Observation Well Time Versus Uranium Concentration Plot

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 9), TDS (Figure 10), and uranium (Figure 11) concentration plots indicate these analyte concentrations decreased in the shallower zone, but did not significantly change in the deeper zone.

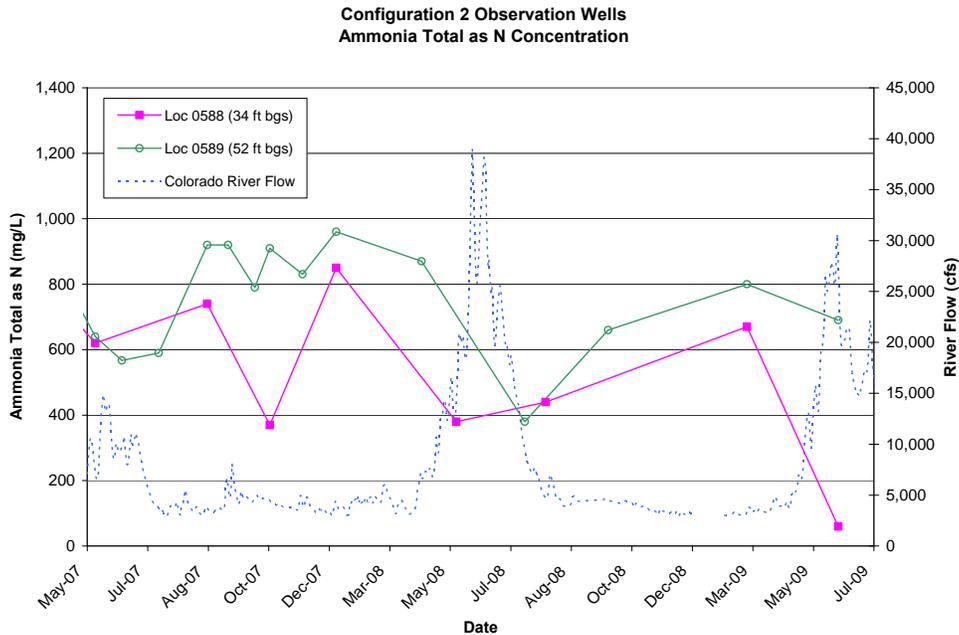


Figure 9. CF2 Observation Well Time Versus Ammonia Total as N Concentration Plot

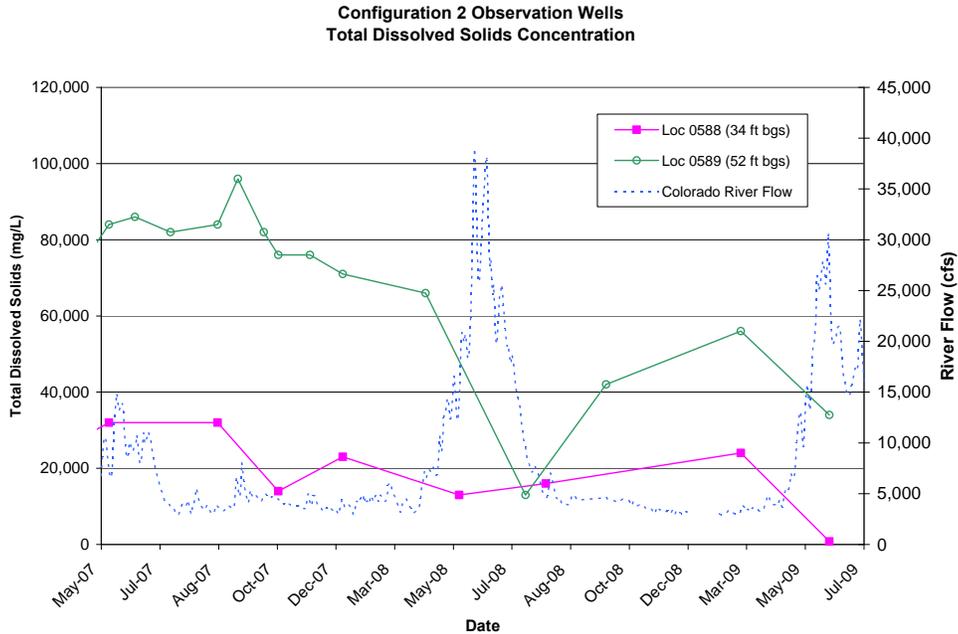


Figure 10. CF2 Observation Well Time Versus TDS Concentration Plot

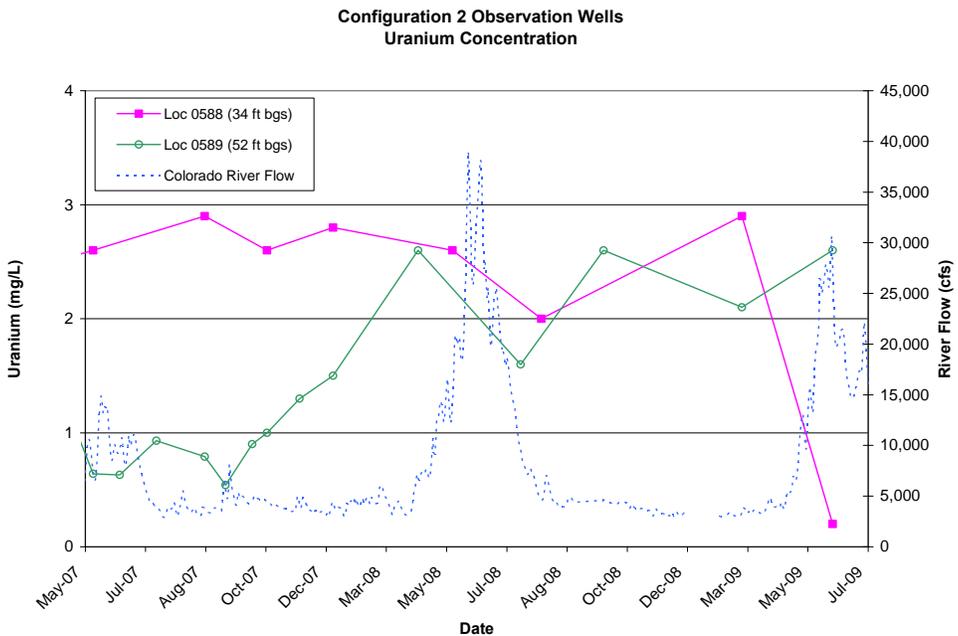


Figure 11. CF2 Observation Well Time Versus Uranium Concentration Plot

CF1

Samples were collected from locations 0483 (from 18 ft bgs), 0560 (from 31 ft bgs), and 0557 (40 ft bgs) during the May 2009 sampling event. Changes in ammonia, TDS, and uranium concentrations (Figures 12, 13, and 14, respectively) suggest that by the end of May 2009 the Colorado River spring runoff had impacted the downgradient area of CF1 down to a depth of approximately 30 ft bgs, while no significant changes were noted at a depth of 40 ft bgs upgradient of the CF1 extraction wells.

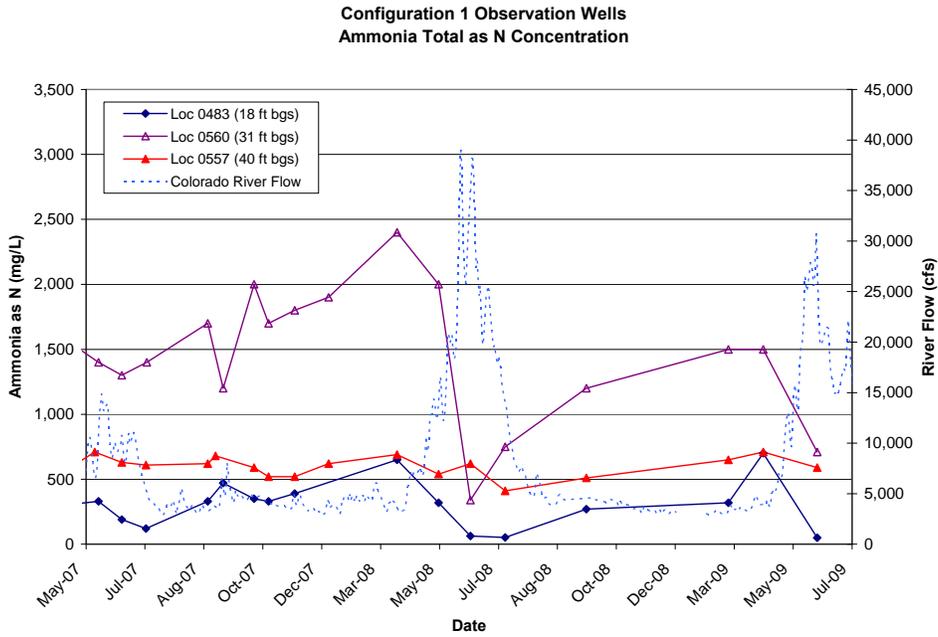


Figure 12. CF1 Observation Well Time Versus Ammonia Total as N Concentration Plot

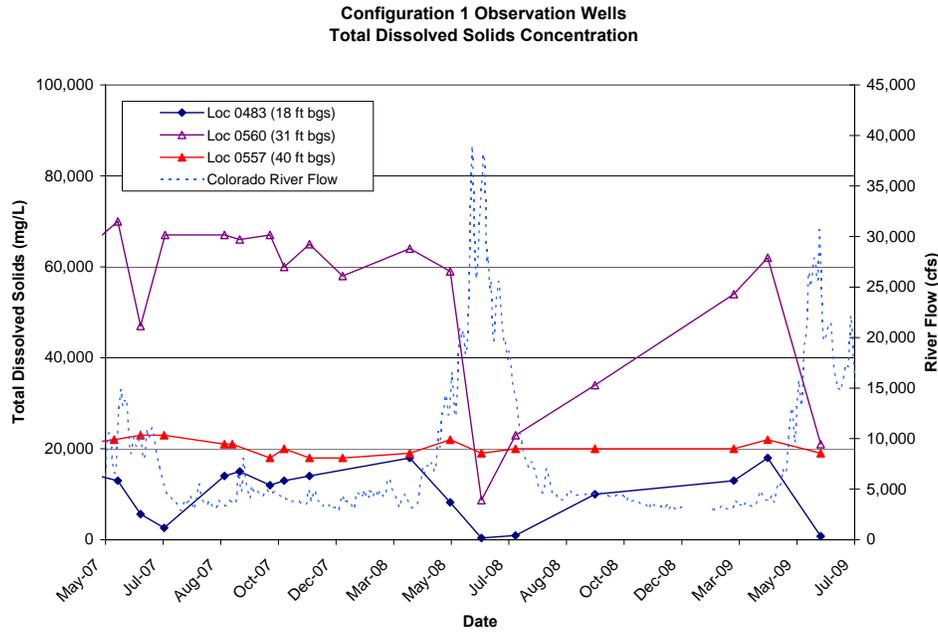


Figure 13. CF1 Observation Well Time Versus TDS Concentration Plot

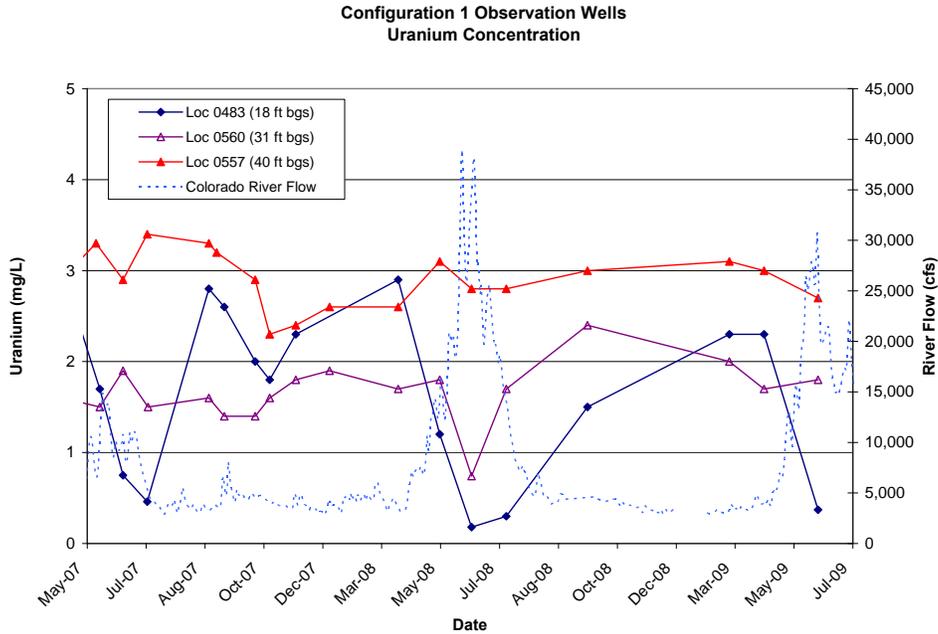


Figure 14. CF1 Observation Well Time Versus Uranium Concentration Plot

CF1 Observation Wells 0403 and 0407

Samples were also collected from these locations, which are located on the river bank within CF1, during the May 2009 sampling event. As shown in the time versus analyte concentration plots below (Figures 15, 16, and 17), these concentrations have also decreased significantly during the 2009 runoff.

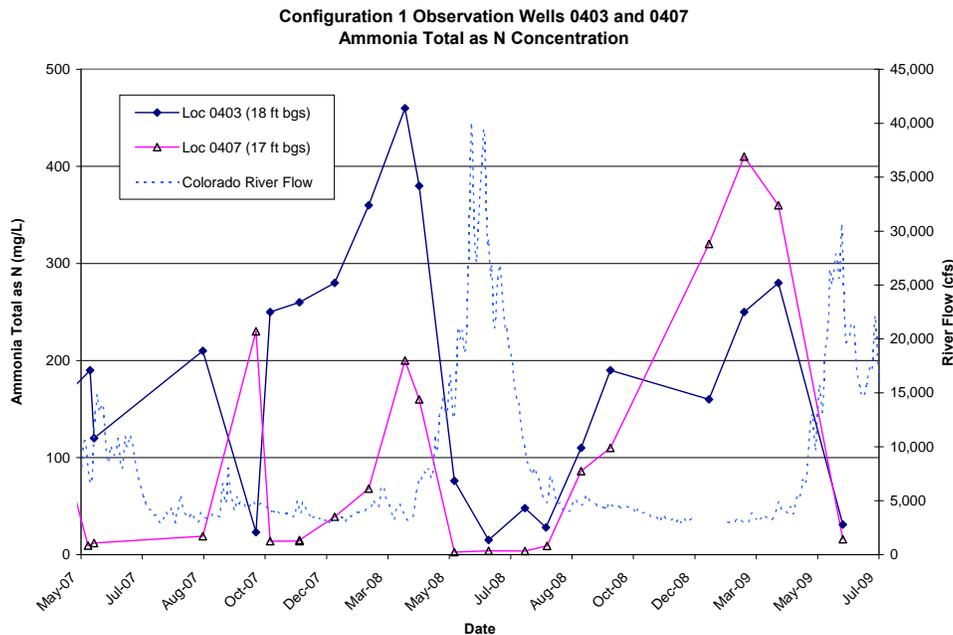


Figure 15. CF1 Observation Wells 0403 and 0407 Time Versus Ammonia Total as N Concentration Plot

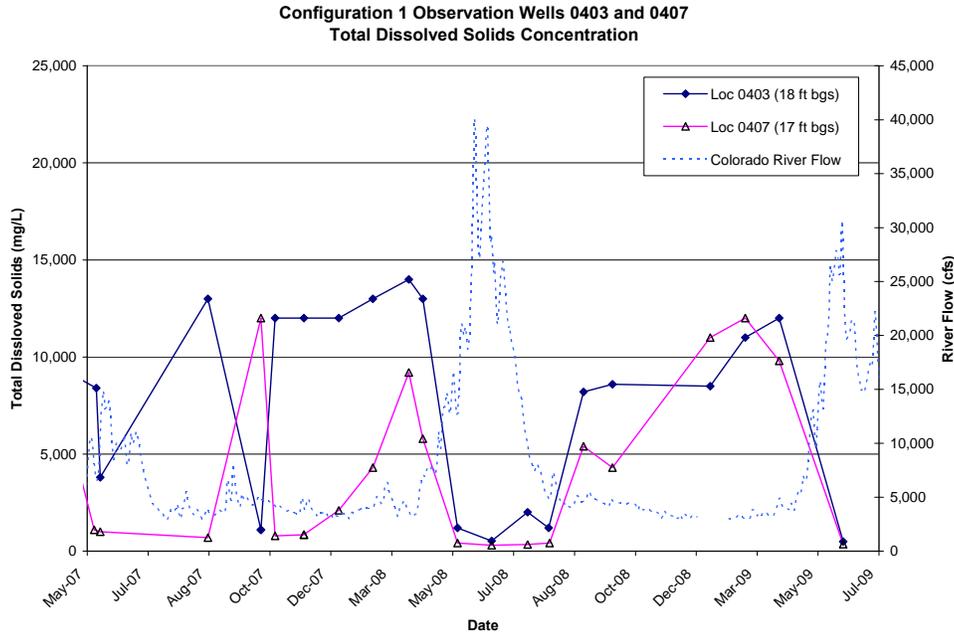


Figure 16. CF1 Observation Wells 0403 and 0407 Time Versus TDS Concentration Plot

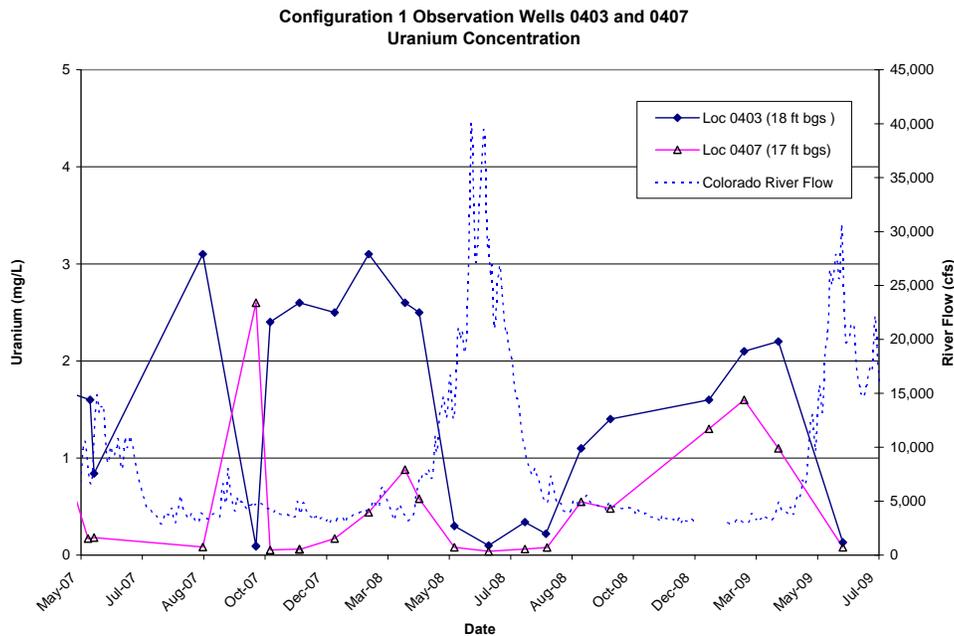


Figure 17. CF1 Observation Wells 0403 and 0407 Time Versus Uranium Concentration Plot

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 May 2009. Ammonia, TDS, and uranium concentration trends over the past 2 years are displayed in Figures 18, 19, and 20, respectively. In general, ammonia and uranium concentrations decreased significantly in the samples collected from above approximately 35 ft bgs, while TDS concentrations decreased regardless of depth and location within CF4.

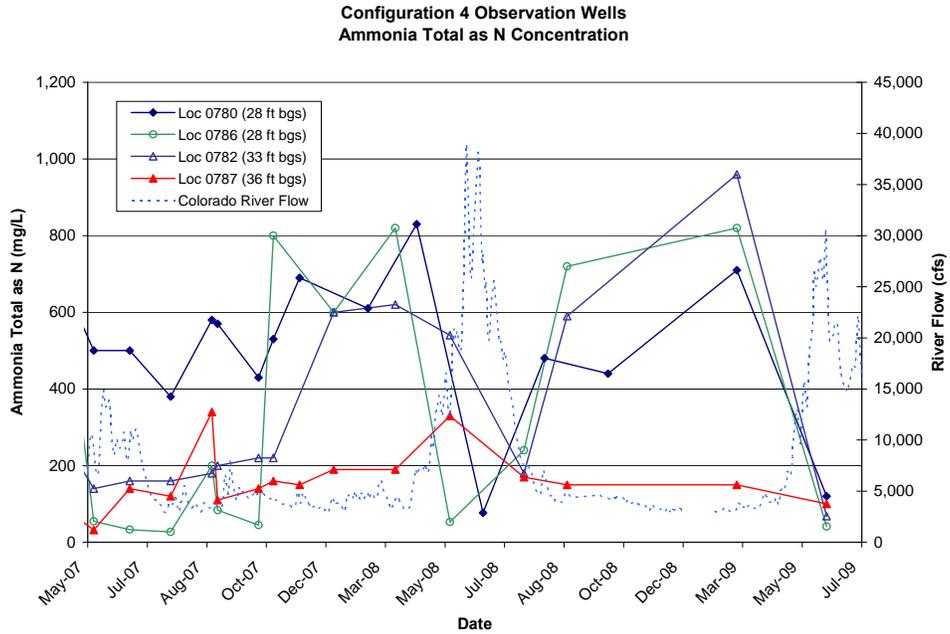


Figure 18. CF4 Observation Well Time Versus Ammonia Total as N Concentration Plot

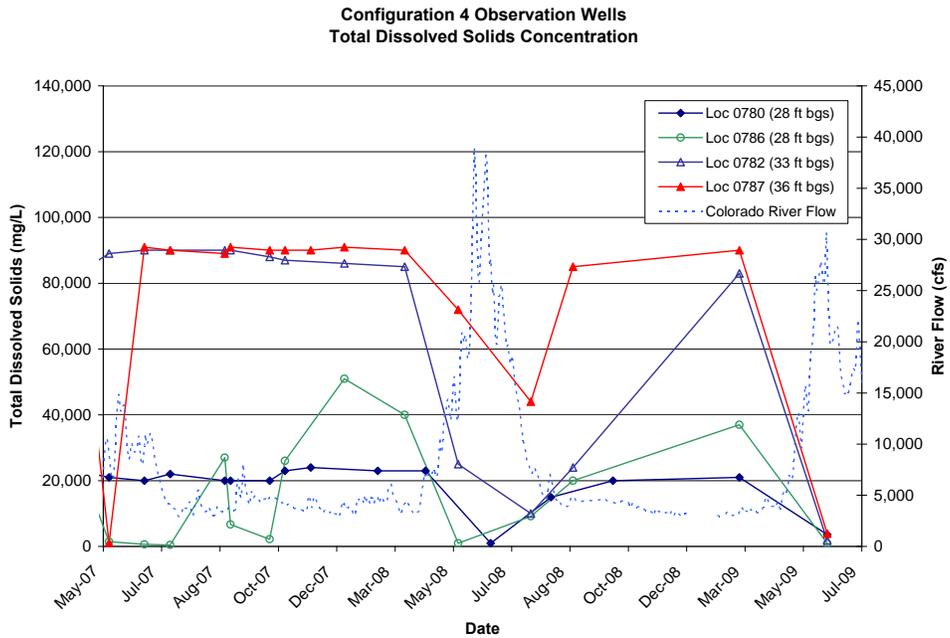


Figure 19. CF4 Observation Well Time Versus TDS Concentration Plot

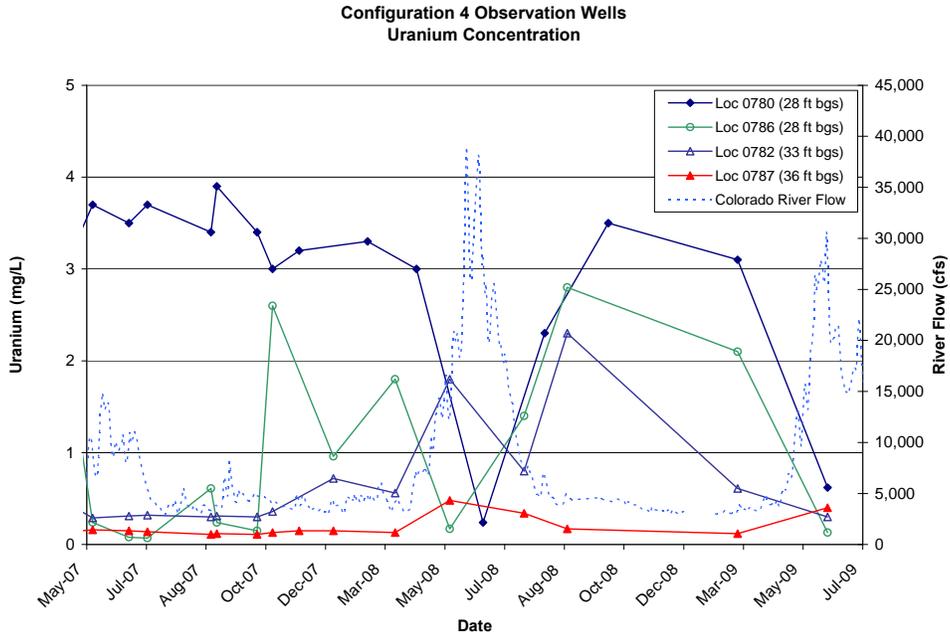


Figure 20. CF1 Observation Well Time Versus Uranium Concentration Plot

Evaporation Pond Inlet (Location 0547)

Figures 21, 22, and 23 display the ammonia, TDS, and uranium concentration trends, respectively, for the evaporation pond inlet sampling location. As the plots display, analyte concentrations measured in May 2009 are within the historical range within the past 2 years.

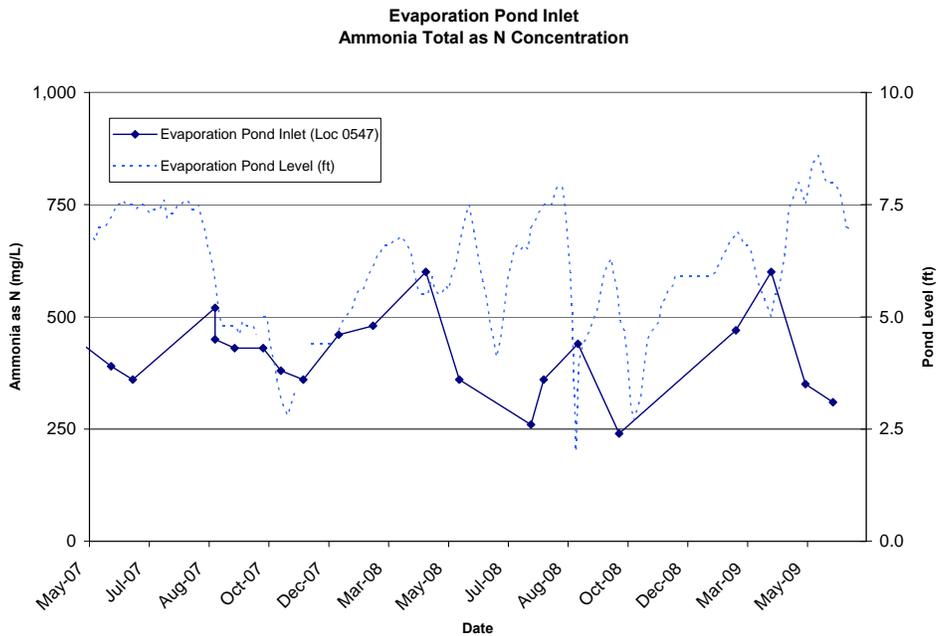


Figure 21. Evaporation Pond Inlet Time Versus Ammonia Total as N Concentration Plot

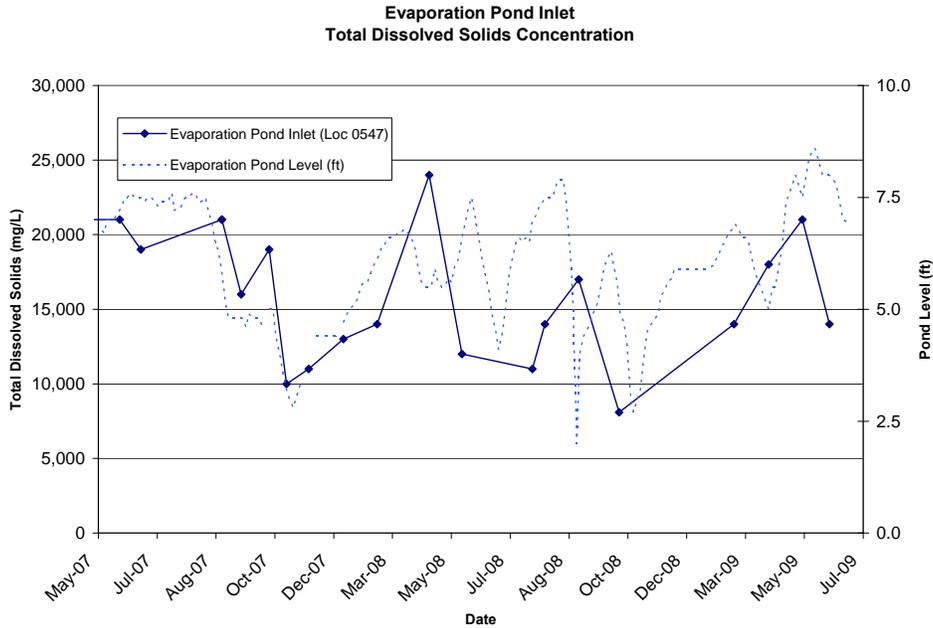


Figure 22. Evaporation Pond Inlet Time Versus TDS Concentration Plot

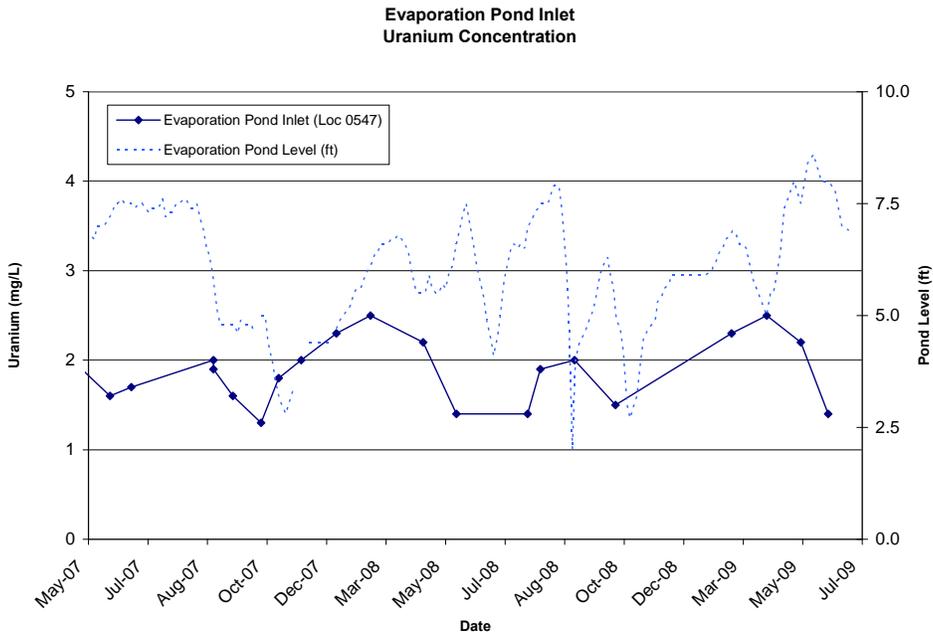


Figure 23. Evaporation Pond Inlet Time Versus Uranium Concentration Plot

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-May 2009 as part of the routine sampling event (Report Identification Number [RIN] 0905030). Refer to this VDP for the May 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 IA 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 six anomalous data points from only two locations (all were historic lows) associated with this sampling event. See the Anomalous Data Review (Section 3.2) for more details.

According to the USGS Cisco gauging station, the mean daily Colorado River flow rates varied between 24,500 and 31,000 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 checklist.

2.2 Laboratory Performance Assessment

General Information

RIN:	0905031
Sample Event:	May 2009 IA Well Field Monthly Sampling
Site(s):	Moab, Utah
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Sample Data Group (SDG) No.:	0905252
Analysis:	Metals and Inorganics
Validator:	Rachel Cowan
Review Date:	July 20, 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 1.

Table 1. 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
Total Dissolved Solids	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 2. Refer to Table 3 below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
0905252-2 through -9, -19, -20	0405, 0407, 0733, 0730, 0480, 0483, 0488, 0547, 0676, 0678	Ammonia	J	MS1

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

Table 3. 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.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received a total of 29 samples for RIN 0905030 in two packages, which arrived on May 29, 2009 (UPS tracking numbers 1Z5W1Y510194595073 and 1Z5W1Y510190449489). The sample group was accompanied by a COC form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times and that signatures and dates were present indicating

sample relinquishment and receipt. The sample submittal documents, including the COC forms and the sample tickets, had no errors or omissions.

Preservation and Holding Times

SDG 0905252 was received intact in two coolers with temperatures of 0.6 and 1.2°C, which 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

The ammonia samples did not have the appropriate number of MS samples as per method requirements, so samples 0905252-2 through 9, -19, and -20 were “J”-flagged for MS1.

Method EPA SW-846 9056, Chloride

The method requires that RSs be analyzed for every 10 samples. There were two MSDs analyzed for chloride. In addition, the field duplicate passed, thus there were three RSs for 29 samples, so no chloride results were 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 manganese 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, manganese and uranium MSs passed requirements, so no copper, manganese, 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 (ICBs) and continuing calibration blanks (CCBs) are analyzed to assess instrument contamination prior to and during sample analysis. Detected

sample results associated with blanks results greater than the method detection limit (MDL) or instrument detection limit (IDL) (depending on method requirements) were “J”-qualified when the detections were less than five times the associated blank concentration. Nondetects were not qualified. All blanks passed these criteria with the following exceptions.

All calibration blanks for selenium and uranium were greater than each analyte’s associated 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. In addition, manganese’s CCB 7 and CCB 8 were also greater than its IDL, but the associated manganese results were less than five times the concentrations of CCB 7 and CCB 8, so these manganese results were not flagged.

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.

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

Metals Serial Dilution

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

Method SW-846 6020A, Selenium

The SD sample (0905252-2) selected as the quality-control sample for the selenium analytical run in SDG 0905252 had a percent recovery of 54 percent, and the limit was 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 0407 (0905252-28) and 0782 (0905252-29) in the May 2009 monthly sampling event. The duplicate results met the U.S. Environmental Protection Agency (EPA) recommended laboratory duplicate criteria of less than 20 relative percent difference (RPD) except for manganese in 090525-29 (86 RPD). Since the MSDs for manganese had passed, no further RSs were needed according to the method requirements, so no manganese results were “J”-flagged.

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 June 16, 2009. The contents of the EDD files were manually examined to verify that the sample results accurately reflected the data contained in the sample data package and that all and only the requested data were delivered.

2.3 Field Analyses/Activities

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

Field Activities

All monitor wells were purged and sampled using the low-flow sampling method; this method was not used at operating 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 and selenium were not analyzed in the field duplicates.

2.4 Certification

Results were reported in correct units for all analytes requested. Appropriate contract-required laboratory qualifiers and target analyte lists were used. The RLs were met. All analytical quality-control criteria were met except as qualified on the Ground Water Quality Data by Parameter, Surface Water Quality by Parameter, or equipment/trip blank database printouts. The meaning of data qualifiers is defined on the database printouts or defined in the EPA *Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media Multi-Concentration*, (ILMO2.0) (1991). All data in this package are considered validated and may be treated as final results.

3.0 Data Presentation

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

3.1 Minimums and Maximums Report

The Minimums and Maximums Report (see Appendix B) is generated by the Sample Management System used to query the SEEPro database. The DataVal program compares the new data set with historical data and lists all new data that fall outside the historical data range. Values listed in the 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
0583	Manganese	Low	Concentration decreased by influx of surface water during the 2009 spring runoff
0782	Ammonia	Low	Concentration decreased by influx of surface water during the 2009 spring runoff
0782	Chloride	Low	Concentration decreased by influx of surface water during the 2009 spring runoff
0782	Manganese	Low	Concentration decreased by influx of surface water during the 2009 spring runoff
0782	Sulfate	Low	Concentration decreased by influx of surface water during the 2009 spring runoff
0782	TDS	Low	Concentration decreased by influx of surface water during the 2009 spring runoff

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

Sampling Event / RIN	May 2009/RIN 0905031	Date(s) of Water Sampling	May 26 - 28, 2009
Date(s) of Verification	July 20, 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	

Appendix A. Water Sampling Field Activities Verification (continued)

- | | |
|--|--|
| 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 There were 29 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? | No The presence or absence of ice was not documented for evaporation pond sample 0547. |
| 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: 0905031

Comparison: All Historical Data

Report Date: 7/15/2009

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	0403	05/27/2009	Total Dissolved Solids	490		19000	F	530		61	0
MOA01	0407	05/27/2009	Manganese	0.048		6.1	F	0.064		29	0
MOA01	0407	05/27/2009	Manganese	0.051		6.1	F	0.064		29	0
MOA01	0483	05/27/2009	Ammonia Total as N	49	J	1500	F	51		52	0
MOA01	0559	05/27/2009	Manganese	0.036		5.6	J	0.056		28	0
MOA01	0583	05/27/2009	Ammonia Total as N	67		600	F	77	F	43	0
MOA01	0583	05/27/2009	Chloride	200		2200	F	340	F	43	0
MOA01	0583	05/27/2009	Manganese	0.85		5.3	J	1.8		18	0
MOA01	0583	05/27/2009	Sulfate	900		8900	J	1600	F	43	0
MOA01	0583	05/27/2009	Total Dissolved Solids	1900		17000		3300	F	43	0
MOA01	0583	05/27/2009	Uranium	0.45		3.9	F	0.5	F	43	0
MOA01	0588	05/27/2009	Chloride	94		21000	F	120	F	51	1
MOA01	0588	05/27/2009	Manganese	0.15		8.1	F	0.255	F	24	0
MOA01	0689	05/26/2009	Manganese	8.5		7.8		3		24	0
MOA01	0782	05/27/2009	Ammonia Total as N	63		960		140	F	25	0
MOA01	0782	05/27/2009	Ammonia Total as N	68		960		140	F	25	0
MOA01	0782	05/27/2009	Chloride	580		54000	J	3700		25	0
MOA01	0782	05/27/2009	Chloride	560		54000	J	3700		25	0

Appendix B. Minimums and Maximums Report (continued)

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: PARAGON (Fort Collins, CO)

RIN: 0905031

Comparison: All Historical Data

Report Date: 7/15/2009

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	0782	05/27/2009	Manganese	0.23		9.9	J	2.2			17	0	
MOA01	0782	05/27/2009	Manganese	0.091		9.9	J	2.2			17	0	
MOA01	0782	05/27/2009	Sulfate	570		10000	F	3300			25	0	
MOA01	0782	05/27/2009	Sulfate	560		10000	F	3300			25	0	
MOA01	0782	05/27/2009	Total Dissolved Solids	1800		90000		10000			25	0	
MOA01	0786	05/27/2009	Manganese	0.12		7.8	F	0.13	J		17	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 Tentatively identified compound is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and contract-required detection limit. Organic: Analyte also found in MB.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference; see case narrative.
- H Holding time expired; value suspect.
- I Increased detection limit due to required dilution.
- J Estimated.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound.
- P > 25% difference in detected pesticide or Aroclor concentrations between two columns.
- U Analytical result below detection limit.
- W Postdigestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier; see case narrative.

DATA QUALIFIERS:

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

Appendix C.
Water Quality Data

Appendix C. Water Quality Data

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Alkalinity, Total (As CaCO3)	mg/L	0403	WL	05/27/2009	0001	18	-	18	168		#		
Alkalinity, Total (As CaCO3)	mg/L	0405	WL	05/26/2009	0001	18	-	18	624		#		
Alkalinity, Total (As CaCO3)	mg/L	0407	WL	05/27/2009	0001	17	-	17	196		#		
Alkalinity, Total (As CaCO3)	mg/L	0480	WL	05/27/2009	0001	18	-	18	366		#		
Alkalinity, Total (As CaCO3)	mg/L	0483	WL	05/27/2009	0001	18	-	18	398		#		
Alkalinity, Total (As CaCO3)	mg/L	0488	WL	05/26/2009	0001	39	-	39	708		#		
Alkalinity, Total (As CaCO3)	mg/L	0547	TS	05/28/2009	0001	0	-	0	674		#		
Alkalinity, Total (As CaCO3)	mg/L	0557	WL	05/27/2009	0001	40	-	40	980		#		
Alkalinity, Total (As CaCO3)	mg/L	0559	WL	05/27/2009	0001	19	-	19	310		#		
Alkalinity, Total (As CaCO3)	mg/L	0560	WL	05/27/2009	0001	36	-	36	662		#		
Alkalinity, Total (As CaCO3)	mg/L	0583	WL	05/27/2009	0001	18	-	18	380		#		
Alkalinity, Total (As CaCO3)	mg/L	0588	WL	05/27/2009	0001	34	-	34	282		#		
Alkalinity, Total (As CaCO3)	mg/L	0589	WL	05/27/2009	0001	52	-	52	832		#		
Alkalinity, Total (As CaCO3)	mg/L	0670	WL	05/26/2009	0001	15.9	-	45.9	520		#		
Alkalinity, Total (As CaCO3)	mg/L	0672	WL	05/26/2009	0001	15	-	45	506		#		
Alkalinity, Total (As CaCO3)	mg/L	0674	WL	05/26/2009	0001	15.1	-	45.1	560		#		
Alkalinity, Total (As CaCO3)	mg/L	0676	WL	05/26/2009	0001	15.9	-	45.9	590		#		
Alkalinity, Total (As CaCO3)	mg/L	0678	WL	05/26/2009	0001	16.3	-	46.3	404		#		
Alkalinity, Total (As CaCO3)	mg/L	0683	WL	05/26/2009	0001	27	-	27	834		#		
Alkalinity, Total (As CaCO3)	mg/L	0688	WL	05/26/2009	0001	39	-	39	924		#		
Alkalinity, Total (As CaCO3)	mg/L	0689	WL	05/26/2009	0001	54	-	54	388		#		
Alkalinity, Total (As CaCO3)	mg/L	0730	WL	05/26/2009	0001	18	-	18	424		#		
Alkalinity, Total (As CaCO3)	mg/L	0733	WL	05/26/2009	0001	18	-	18	666		#		
Alkalinity, Total (As CaCO3)	mg/L	0780	WL	05/27/2009	0001	28	-	28	424		#		
Alkalinity, Total (As CaCO3)	mg/L	0782	WL	05/27/2009	0001	33	-	33	310		#		
Alkalinity, Total (As CaCO3)	mg/L	0786	WL	05/27/2009	0001	28	-	28	280		#		
Alkalinity, Total (As CaCO3)	mg/L	0787	WL	05/27/2009	0001	36	-	36	388		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Date	ID					Lab	Data	QA		
Ammonia Total as N	mg/L	0403	WL	05/27/2009	0001	18	-	18	31			#	2	
Ammonia Total as N	mg/L	0405	WL	05/26/2009	0001	18	-	18	190		J	#	10	
Ammonia Total as N	mg/L	0407	WL	05/27/2009	0001	17	-	17	16		J	#	1	
Ammonia Total as N	mg/L	0407	WL	05/27/2009	0002	17	-	17	16			#	2	
Ammonia Total as N	mg/L	0480	WL	05/27/2009	0001	18	-	18	76		J	#	10	
Ammonia Total as N	mg/L	0483	WL	05/27/2009	0001	18	-	18	49		J	#	10	
Ammonia Total as N	mg/L	0488	WL	05/26/2009	0001	39	-	39	410		J	#	10	
Ammonia Total as N	mg/L	0547	TS	05/28/2009	0001	0	-	0	310		J	#	10	
Ammonia Total as N	mg/L	0557	WL	05/27/2009	0001	40	-	40	590			#	20	
Ammonia Total as N	mg/L	0559	WL	05/27/2009	0001	19	-	19	3.3			#	0.1	
Ammonia Total as N	mg/L	0560	WL	05/27/2009	0001	36	-	36	710			#	20	
Ammonia Total as N	mg/L	0583	WL	05/27/2009	0001	18	-	18	67			#	10	
Ammonia Total as N	mg/L	0588	WL	05/27/2009	0001	34	-	34	60			#	10	
Ammonia Total as N	mg/L	0589	WL	05/27/2009	0001	52	-	52	690			#	20	
Ammonia Total as N	mg/L	0670	WL	05/26/2009	0001	15.9	-	45.9	230			#	10	
Ammonia Total as N	mg/L	0672	WL	05/26/2009	0001	15	-	45	280			#	10	
Ammonia Total as N	mg/L	0674	WL	05/26/2009	0001	15.1	-	45.1	300			#	10	
Ammonia Total as N	mg/L	0676	WL	05/26/2009	0001	15.9	-	45.9	240		J	#	10	
Ammonia Total as N	mg/L	0678	WL	05/26/2009	0001	16.3	-	46.3	160		J	#	10	
Ammonia Total as N	mg/L	0683	WL	05/26/2009	0001	27	-	27	370			#	10	
Ammonia Total as N	mg/L	0688	WL	05/26/2009	0001	39	-	39	900			#	20	
Ammonia Total as N	mg/L	0689	WL	05/26/2009	0001	54	-	54	390			#	10	
Ammonia Total as N	mg/L	0730	WL	05/26/2009	0001	18	-	18	65		J	#	10	
Ammonia Total as N	mg/L	0733	WL	05/26/2009	0001	18	-	18	0.59		J	#	0.1	
Ammonia Total as N	mg/L	0780	WL	05/27/2009	0001	28	-	28	120			#	10	
Ammonia Total as N	mg/L	0782	WL	05/27/2009	0001	33	-	33	68			#	10	
Ammonia Total as N	mg/L	0782	WL	05/27/2009	0002	33	-	33	63			#	10	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Date	ID					Lab	Data	QA		
Ammonia Total as N	mg/L	0786	WL	05/27/2009	0001	28	-	28	41			#	10	
Ammonia Total as N	mg/L	0787	WL	05/27/2009	0001	36	-	36	100			#	10	
Chloride	mg/L	0403	WL	05/27/2009	0001	18	-	18	37			#	2	
Chloride	mg/L	0405	WL	05/26/2009	0001	18	-	18	860			#	20	
Chloride	mg/L	0407	WL	05/27/2009	0001	17	-	17	25			#	1	
Chloride	mg/L	0407	WL	05/27/2009	0002	17	-	17	25			#	2	
Chloride	mg/L	0480	WL	05/27/2009	0001	18	-	18	210			#	4	
Chloride	mg/L	0483	WL	05/27/2009	0001	18	-	18	76			#	4	
Chloride	mg/L	0488	WL	05/26/2009	0001	39	-	39	1000			#	40	
Chloride	mg/L	0547	TS	05/28/2009	0001	0	-	0	4500			#	100	
Chloride	mg/L	0557	WL	05/27/2009	0001	40	-	40	5000			#	100	
Chloride	mg/L	0559	WL	05/27/2009	0001	19	-	19	78			#	4	
Chloride	mg/L	0560	WL	05/27/2009	0001	36	-	36	8200			#	200	
Chloride	mg/L	0583	WL	05/27/2009	0001	18	-	18	200			#	10	
Chloride	mg/L	0588	WL	05/27/2009	0001	34	-	34	94			#	4	
Chloride	mg/L	0589	WL	05/27/2009	0001	52	-	52	13000			#	400	
Chloride	mg/L	0670	WL	05/26/2009	0001	15.9	-	45.9	2300			#	40	
Chloride	mg/L	0672	WL	05/26/2009	0001	15	-	45	5700			#	200	
Chloride	mg/L	0674	WL	05/26/2009	0001	15.1	-	45.1	6400			#	400	
Chloride	mg/L	0676	WL	05/26/2009	0001	15.9	-	45.9	2800			#	40	
Chloride	mg/L	0678	WL	05/26/2009	0001	16.3	-	46.3	1200			#	20	
Chloride	mg/L	0683	WL	05/26/2009	0001	27	-	27	1400			#	40	
Chloride	mg/L	0688	WL	05/26/2009	0001	39	-	39	18000			#	400	
Chloride	mg/L	0689	WL	05/26/2009	0001	54	-	54	48000			#	1000	
Chloride	mg/L	0730	WL	05/26/2009	0001	18	-	18	280			#	10	
Chloride	mg/L	0733	WL	05/26/2009	0001	18	-	18	360			#	10	
Chloride	mg/L	0780	WL	05/27/2009	0001	28	-	28	1200			#	20	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Chloride	mg/L	0782	WL	05/27/2009	0001	33 - 33	580			#	10	
Chloride	mg/L	0782	WL	05/27/2009	0002	33 - 33	560			#	10	
Chloride	mg/L	0786	WL	05/27/2009	0001	28 - 28	290			#	4	
Chloride	mg/L	0787	WL	05/27/2009	0001	36 - 36	1400			#	20	
Copper	mg/L	0787	WL	05/27/2009	0001	36 - 36	0.0069	U		#	0.0069	
Dissolved Oxygen	mg/L	0403	WL	05/27/2009	0001	18 - 18	0.58			#		
Dissolved Oxygen	mg/L	0405	WL	05/26/2009	0001	18 - 18	0.54			#		
Dissolved Oxygen	mg/L	0407	WL	05/27/2009	0001	17 - 17	0.46			#		
Dissolved Oxygen	mg/L	0480	WL	05/27/2009	0001	18 - 18	0.72			#		
Dissolved Oxygen	mg/L	0483	WL	05/27/2009	0001	18 - 18	0.52			#		
Dissolved Oxygen	mg/L	0488	WL	05/26/2009	0001	39 - 39	0.64			#		
Dissolved Oxygen	mg/L	0547	TS	05/28/2009	0001	0 - 0	5.15			#		
Dissolved Oxygen	mg/L	0557	WL	05/27/2009	0001	40 - 40	0.83			#		
Dissolved Oxygen	mg/L	0559	WL	05/27/2009	0001	19 - 19	2.24			#		
Dissolved Oxygen	mg/L	0560	WL	05/27/2009	0001	36 - 36	0.67			#		
Dissolved Oxygen	mg/L	0583	WL	05/27/2009	0001	18 - 18	1.09			#		
Dissolved Oxygen	mg/L	0588	WL	05/27/2009	0001	34 - 34	0.81			#		
Dissolved Oxygen	mg/L	0589	WL	05/27/2009	0001	52 - 52	0.75			#		
Dissolved Oxygen	mg/L	0670	WL	05/26/2009	0001	15.9 - 45.9	1.63			#		
Dissolved Oxygen	mg/L	0672	WL	05/26/2009	0001	15 - 45	1.32			#		
Dissolved Oxygen	mg/L	0674	WL	05/26/2009	0001	15.1 - 45.1	1.11			#		
Dissolved Oxygen	mg/L	0676	WL	05/26/2009	0001	15.9 - 45.9	1.24			#		
Dissolved Oxygen	mg/L	0678	WL	05/26/2009	0001	16.3 - 46.3	0.84			#		
Dissolved Oxygen	mg/L	0683	WL	05/26/2009	0001	27 - 27	0.79			#		
Dissolved Oxygen	mg/L	0688	WL	05/26/2009	0001	39 - 39	0.53			#		
Dissolved Oxygen	mg/L	0688	WL	05/26/2009	0001	31 - 31	0.61			#		
Dissolved Oxygen	mg/L	0689	WL	05/26/2009	0001	54 - 54	0.42			#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Dissolved Oxygen	mg/L	0689	WL	05/26/2009	0001	46 - 46	0.53			#		
Dissolved Oxygen	mg/L	0730	WL	05/26/2009	0001	18 - 18	0.6			#		
Dissolved Oxygen	mg/L	0733	WL	05/26/2009	0001	18 - 18	0.55			#		
Dissolved Oxygen	mg/L	0780	WL	05/27/2009	0001	28 - 28	0.52			#		
Dissolved Oxygen	mg/L	0782	WL	05/27/2009	0001	33 - 33	0.65			#		
Dissolved Oxygen	mg/L	0786	WL	05/27/2009	0001	28 - 28	0.62			#		
Dissolved Oxygen	mg/L	0787	WL	05/27/2009	0001	36 - 36	0.41			#		
Manganese	mg/L	0403	WL	05/27/2009	0001	18 - 18	0.43			#	0.00012	
Manganese	mg/L	0405	WL	05/26/2009	0001	18 - 18	3.9			#	0.00058	
Manganese	mg/L	0407	WL	05/27/2009	0001	17 - 17	0.051			#	0.00012	
Manganese	mg/L	0407	WL	05/27/2009	0002	17 - 17	0.048			#	0.00012	
Manganese	mg/L	0480	WL	05/27/2009	0001	18 - 18	0.092			#	0.00012	
Manganese	mg/L	0483	WL	05/27/2009	0001	18 - 18	0.095			#	0.00012	
Manganese	mg/L	0488	WL	05/26/2009	0001	39 - 39	4.6			#	0.0012	
Manganese	mg/L	0547	TS	05/28/2009	0001	0 - 0	3.4			#	0.0012	
Manganese	mg/L	0557	WL	05/27/2009	0001	40 - 40	5.2			#	0.0012	
Manganese	mg/L	0559	WL	05/27/2009	0001	19 - 19	0.036			#	0.00012	
Manganese	mg/L	0560	WL	05/27/2009	0001	36 - 36	3.2			#	0.0012	
Manganese	mg/L	0583	WL	05/27/2009	0001	18 - 18	0.85			#	0.00023	
Manganese	mg/L	0588	WL	05/27/2009	0001	34 - 34	0.15			#	0.00012	
Manganese	mg/L	0589	WL	05/27/2009	0001	52 - 52	6.4			#	0.0029	
Manganese	mg/L	0670	WL	05/26/2009	0001	15.9 - 45.9	2.4			#	0.00058	
Manganese	mg/L	0672	WL	05/26/2009	0001	15 - 45	2.8			#	0.0012	
Manganese	mg/L	0674	WL	05/26/2009	0001	15.1 - 45.1	3.6			#	0.0012	
Manganese	mg/L	0676	WL	05/26/2009	0001	15.9 - 45.9	2.8			#	0.0012	
Manganese	mg/L	0678	WL	05/26/2009	0001	16.3 - 46.3	2			#	0.00058	
Manganese	mg/L	0683	WL	05/26/2009	0001	27 - 27	4.5			#	0.0012	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Date	ID					Lab	Data	QA		
Manganese	mg/L	0688	WL	05/26/2009	0001	39	-	39	7.2			#	0.0029	
Manganese	mg/L	0689	WL	05/26/2009	0001	54	-	54	8.5			#	0.0058	
Manganese	mg/L	0730	WL	05/26/2009	0001	18	-	18	1.5			#	0.00023	
Manganese	mg/L	0733	WL	05/26/2009	0001	18	-	18	0.83			#	0.00023	
Manganese	mg/L	0780	WL	05/27/2009	0001	28	-	28	0.57			#	0.00058	
Manganese	mg/L	0782	WL	05/27/2009	0001	33	-	33	0.23			#	0.00023	
Manganese	mg/L	0782	WL	05/27/2009	0002	33	-	33	0.091			#	0.00023	
Manganese	mg/L	0786	WL	05/27/2009	0001	28	-	28	0.12			#	0.00012	
Manganese	mg/L	0787	WL	05/27/2009	0001	36	-	36	0.52			#	0.00058	
Oxidation Reduction Potential	mV	0403	WL	05/27/2009	0001	18	-	18	84			#		
Oxidation Reduction Potential	mV	0405	WL	05/26/2009	0001	18	-	18	134.6			#		
Oxidation Reduction Potential	mV	0407	WL	05/27/2009	0001	17	-	17	33			#		
Oxidation Reduction Potential	mV	0480	WL	05/27/2009	0001	18	-	18	65			#		
Oxidation Reduction Potential	mV	0483	WL	05/27/2009	0001	18	-	18	48			#		
Oxidation Reduction Potential	mV	0488	WL	05/26/2009	0001	39	-	39	135.7			#		
Oxidation Reduction Potential	mV	0547	TS	05/28/2009	0001	0	-	0	215			#		
Oxidation Reduction Potential	mV	0557	WL	05/27/2009	0001	40	-	40	109			#		
Oxidation Reduction Potential	mV	0559	WL	05/27/2009	0001	19	-	19	90			#		
Oxidation Reduction Potential	mV	0560	WL	05/27/2009	0001	36	-	36	47			#		
Oxidation Reduction Potential	mV	0583	WL	05/27/2009	0001	18	-	18	208.8			#		
Oxidation Reduction Potential	mV	0588	WL	05/27/2009	0001	34	-	34	116			#		
Oxidation Reduction Potential	mV	0589	WL	05/27/2009	0001	52	-	52	91.4			#		
Oxidation Reduction Potential	mV	0670	WL	05/26/2009	0001	15.9	-	45.9	232.6			#		
Oxidation Reduction Potential	mV	0672	WL	05/26/2009	0001	15	-	45	141			#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

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	0674	WL	05/26/2009	0001	15.1	-	45.1	143			#		
Oxidation Reduction Potential	mV	0676	WL	05/26/2009	0001	15.9	-	45.9	148.4			#		
Oxidation Reduction Potential	mV	0678	WL	05/26/2009	0001	16.3	-	46.3	142.1			#		
Oxidation Reduction Potential	mV	0683	WL	05/26/2009	0001	27	-	27	121.6			#		
Oxidation Reduction Potential	mV	0688	WL	05/26/2009	0001	39	-	39	70.2			#		
Oxidation Reduction Potential	mV	0688	WL	05/26/2009	0001	31	-	31	82.9			#		
Oxidation Reduction Potential	mV	0689	WL	05/26/2009	0001	54	-	54	4.44			#		
Oxidation Reduction Potential	mV	0689	WL	05/26/2009	0001	46	-	46	109			#		
Oxidation Reduction Potential	mV	0730	WL	05/26/2009	0001	18	-	18	123			#		
Oxidation Reduction Potential	mV	0733	WL	05/26/2009	0001	18	-	18	61.2			#		
Oxidation Reduction Potential	mV	0780	WL	05/27/2009	0001	28	-	28	-56			#		
Oxidation Reduction Potential	mV	0782	WL	05/27/2009	0001	33	-	33	-58			#		
Oxidation Reduction Potential	mV	0786	WL	05/27/2009	0001	28	-	28	-121			#		
Oxidation Reduction Potential	mV	0787	WL	05/27/2009	0001	36	-	36	43			#		
pH	s.u.	0403	WL	05/27/2009	0001	18	-	18	7.52			#		
pH	s.u.	0405	WL	05/26/2009	0001	18	-	18	6.82			#		
pH	s.u.	0407	WL	05/27/2009	0001	17	-	17	7.78			#		
pH	s.u.	0480	WL	05/27/2009	0001	18	-	18	8.15			#		
pH	s.u.	0483	WL	05/27/2009	0001	18	-	18	8.18			#		
pH	s.u.	0488	WL	05/26/2009	0001	39	-	39	6.83			#		
pH	s.u.	0547	TS	05/28/2009	0001	0	-	0	6.91			#		
pH	s.u.	0557	WL	05/27/2009	0001	40	-	40	6.84			#		
pH	s.u.	0559	WL	05/27/2009	0001	19	-	19	7.25			#		
pH	s.u.	0560	WL	05/27/2009	0001	36	-	36	7.05			#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Date	ID					Lab	Data	QA		
pH	s.u.	0583	WL	05/27/2009	0001	18	-	18	7.25			#		
pH	s.u.	0588	WL	05/27/2009	0001	34	-	34	8.11			#		
pH	s.u.	0589	WL	05/27/2009	0001	52	-	52	6.8			#		
pH	s.u.	0670	WL	05/26/2009	0001	15.9	-	45.9	6.88			#		
pH	s.u.	0672	WL	05/26/2009	0001	15	-	45	6.8			#		
pH	s.u.	0674	WL	05/26/2009	0001	15.1	-	45.1	6.77			#		
pH	s.u.	0676	WL	05/26/2009	0001	15.9	-	45.9	6.82			#		
pH	s.u.	0678	WL	05/26/2009	0001	16.3	-	46.3	5.94			#		
pH	s.u.	0683	WL	05/26/2009	0001	27	-	27	6.81			#		
pH	s.u.	0688	WL	05/26/2009	0001	39	-	39	6.73			#		
pH	s.u.	0688	WL	05/26/2009	0001	31	-	31	6.81			#		
pH	s.u.	0689	WL	05/26/2009	0001	54	-	54	6.68			#		
pH	s.u.	0689	WL	05/26/2009	0001	46	-	46	6.72			#		
pH	s.u.	0730	WL	05/26/2009	0001	18	-	18	7.08			#		
pH	s.u.	0733	WL	05/26/2009	0001	18	-	18	6.72			#		
pH	s.u.	0780	WL	05/27/2009	0001	28	-	28	7.69			#		
pH	s.u.	0782	WL	05/27/2009	0001	33	-	33	8.07			#		
pH	s.u.	0786	WL	05/27/2009	0001	28	-	28	8.54			#		
pH	s.u.	0787	WL	05/27/2009	0001	36	-	36	7.69			#		
Selenium	mg/L	0405	WL	05/26/2009	0001	18	-	18	0.013	E		#	9.1E-005	
Selenium	mg/L	0676	WL	05/26/2009	0001	15.9	-	45.9	0.0084			#	9.1E-005	
Selenium	mg/L	0683	WL	05/26/2009	0001	27	-	27	0.015			#	9.1E-005	
Specific Conductance	µmhos/cm	0403	WL	05/27/2009	0001	18	-	18	1057			#		
Specific Conductance	µmhos/cm	0405	WL	05/26/2009	0001	18	-	18	11117			#		
Specific Conductance	µmhos/cm	0407	WL	05/27/2009	0001	17	-	17	787			#		
Specific Conductance	µmhos/cm	0480	WL	05/27/2009	0001	18	-	18	2593			#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

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	0483	WL	05/27/2009	0001	18	-	18	1699			#		
Specific Conductance	µmhos/cm	0488	WL	05/26/2009	0001	39	-	39	15156			#		
Specific Conductance	µmhos/cm	0547	TS	05/28/2009	0001	0	-	0	20783			#		
Specific Conductance	µmhos/cm	0557	WL	05/27/2009	0001	40	-	40	27853			#		
Specific Conductance	µmhos/cm	0559	WL	05/27/2009	0001	19	-	19	1637			#		
Specific Conductance	µmhos/cm	0560	WL	05/27/2009	0001	36	-	36	34477			#		
Specific Conductance	µmhos/cm	0583	WL	05/27/2009	0001	18	-	18	3331			#		
Specific Conductance	µmhos/cm	0588	WL	05/27/2009	0001	34	-	34	1879			#		
Specific Conductance	µmhos/cm	0589	WL	05/27/2009	0001	52	-	52	51958			#		
Specific Conductance	µmhos/cm	0670	WL	05/26/2009	0001	15.9	-	45.9	14228			#		
Specific Conductance	µmhos/cm	0672	WL	05/26/2009	0001	15	-	45	24035			#		
Specific Conductance	µmhos/cm	0674	WL	05/26/2009	0001	15.1	-	45.1	27617			#		
Specific Conductance	µmhos/cm	0676	WL	05/26/2009	0001	15.9	-	45.9	15858			#		
Specific Conductance	µmhos/cm	0678	WL	05/26/2009	0001	16.3	-	46.3	9876			#		
Specific Conductance	µmhos/cm	0683	WL	05/26/2009	0001	27	-	27	17459			#		
Specific Conductance	µmhos/cm	0688	WL	05/26/2009	0001	31	-	31	29258			#		
Specific Conductance	µmhos/cm	0688	WL	05/26/2009	0001	39	-	39	61311			#		
Specific Conductance	µmhos/cm	0689	WL	05/26/2009	0001	46	-	46	103252			#		
Specific Conductance	µmhos/cm	0689	WL	05/26/2009	0001	54	-	54	114685			#		
Specific Conductance	µmhos/cm	0730	WL	05/26/2009	0001	18	-	18	5027			#		
Specific Conductance	µmhos/cm	0733	WL	05/26/2009	0001	18	-	18	4820			#		
Specific Conductance	µmhos/cm	0780	WL	05/27/2009	0001	28	-	28	6849			#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/15/2009

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	0782	WL	05/27/2009	0001	33	-	33	3848			#		
Specific Conductance	µmhos/cm	0786	WL	05/27/2009	0001	28	-	28	2133			#		
Specific Conductance	µmhos/cm	0787	WL	05/27/2009	0001	36	-	36	7350			#		
Sulfate	mg/L	0403	WL	05/27/2009	0001	18	-	18	190			#	5	
Sulfate	mg/L	0405	WL	05/26/2009	0001	18	-	18	4300			#	50	
Sulfate	mg/L	0407	WL	05/27/2009	0001	17	-	17	110			#	2.5	
Sulfate	mg/L	0407	WL	05/27/2009	0002	17	-	17	110			#	5	
Sulfate	mg/L	0480	WL	05/27/2009	0001	18	-	18	530			#	10	
Sulfate	mg/L	0483	WL	05/27/2009	0001	18	-	18	280			#	10	
Sulfate	mg/L	0488	WL	05/26/2009	0001	39	-	39	6600			#	100	
Sulfate	mg/L	0547	TS	05/28/2009	0001	0	-	0	5400			#	100	
Sulfate	mg/L	0557	WL	05/27/2009	0001	40	-	40	9200			#	100	
Sulfate	mg/L	0559	WL	05/27/2009	0001	19	-	19	300			#	10	
Sulfate	mg/L	0560	WL	05/27/2009	0001	36	-	36	7000			#	100	
Sulfate	mg/L	0583	WL	05/27/2009	0001	18	-	18	900			#	25	
Sulfate	mg/L	0588	WL	05/27/2009	0001	34	-	34	400			#	10	
Sulfate	mg/L	0589	WL	05/27/2009	0001	52	-	52	11000			#	250	
Sulfate	mg/L	0670	WL	05/26/2009	0001	15.9	-	45.9	4000			#	50	
Sulfate	mg/L	0672	WL	05/26/2009	0001	15	-	45	4500			#	100	
Sulfate	mg/L	0674	WL	05/26/2009	0001	15.1	-	45.1	5600			#	100	
Sulfate	mg/L	0676	WL	05/26/2009	0001	15.9	-	45.9	4900			#	100	
Sulfate	mg/L	0678	WL	05/26/2009	0001	16.3	-	46.3	3100			#	50	
Sulfate	mg/L	0683	WL	05/26/2009	0001	27	-	27	7400			#	100	
Sulfate	mg/L	0688	WL	05/26/2009	0001	39	-	39	12000			#	250	
Sulfate	mg/L	0689	WL	05/26/2009	0001	54	-	54	6400			#	500	
Sulfate	mg/L	0730	WL	05/26/2009	0001	18	-	18	1900			#	25	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
 REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	Lab	Data	QA					
Sulfate	mg/L	0733	WL	05/26/2009	0001	18	-	18	1700		#	25	
Sulfate	mg/L	0780	WL	05/27/2009	0001	28	-	28	1100		#	50	
Sulfate	mg/L	0782	WL	05/27/2009	0001	33	-	33	560		#	25	
Sulfate	mg/L	0782	WL	05/27/2009	0002	33	-	33	570		#	25	
Sulfate	mg/L	0786	WL	05/27/2009	0001	28	-	28	250		#	10	
Sulfate	mg/L	0787	WL	05/27/2009	0001	36	-	36	1100		#	50	
Temperature	C	0403	WL	05/27/2009	0001	18	-	18	14.07		#		
Temperature	C	0405	WL	05/26/2009	0001	18	-	18	14.49		#		
Temperature	C	0407	WL	05/27/2009	0001	17	-	17	14.9		#		
Temperature	C	0480	WL	05/27/2009	0001	18	-	18	14.49		#		
Temperature	C	0483	WL	05/27/2009	0001	18	-	18	14.05		#		
Temperature	C	0488	WL	05/26/2009	0001	39	-	39	15.5		#		
Temperature	C	0547	TS	05/28/2009	0001	0	-	0	17.7		#		
Temperature	C	0557	WL	05/27/2009	0001	40	-	40	15.36		#		
Temperature	C	0559	WL	05/27/2009	0001	19	-	19	15.06		#		
Temperature	C	0560	WL	05/27/2009	0001	36	-	36	14.86		#		
Temperature	C	0583	WL	05/27/2009	0001	18	-	18	14.03		#		
Temperature	C	0588	WL	05/27/2009	0001	34	-	34	13.96		#		
Temperature	C	0589	WL	05/27/2009	0001	52	-	52	15.31		#		
Temperature	C	0670	WL	05/26/2009	0001	15.9	-	45.9	14.91		#		
Temperature	C	0672	WL	05/26/2009	0001	15	-	45	14.36		#		
Temperature	C	0674	WL	05/26/2009	0001	15.1	-	45.1	14.47		#		
Temperature	C	0676	WL	05/26/2009	0001	15.9	-	45.9	14.16		#		
Temperature	C	0678	WL	05/26/2009	0001	16.3	-	46.3	14.05		#		
Temperature	C	0683	WL	05/26/2009	0001	27	-	27	15.51		#		
Temperature	C	0688	WL	05/26/2009	0001	39	-	39	15.87		#		
Temperature	C	0688	WL	05/26/2009	0001	31	-	31	16.41		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	(Ft BLS)	Lab	Data		QA			
Temperature	C	0689	WL	05/26/2009	0001	54	-	54	15.95		#		
Temperature	C	0689	WL	05/26/2009	0001	46	-	46	17.67		#		
Temperature	C	0730	WL	05/26/2009	0001	18	-	18	14.98		#		
Temperature	C	0733	WL	05/26/2009	0001	18	-	18	14.59		#		
Temperature	C	0780	WL	05/27/2009	0001	28	-	28	16.59		#		
Temperature	C	0782	WL	05/27/2009	0001	33	-	33	16.15		#		
Temperature	C	0786	WL	05/27/2009	0001	28	-	28	15.16		#		
Temperature	C	0787	WL	05/27/2009	0001	36	-	36	16.64		#		
Total Dissolved Solids	mg/L	0403	WL	05/27/2009	0001	18	-	18	490		#	20	
Total Dissolved Solids	mg/L	0405	WL	05/26/2009	0001	18	-	18	8100		#	200	
Total Dissolved Solids	mg/L	0407	WL	05/27/2009	0001	17	-	17	360		#	20	
Total Dissolved Solids	mg/L	0407	WL	05/27/2009	0002	17	-	17	360		#	20	
Total Dissolved Solids	mg/L	0480	WL	05/27/2009	0001	18	-	18	1300		#	40	
Total Dissolved Solids	mg/L	0483	WL	05/27/2009	0001	18	-	18	770		#	40	
Total Dissolved Solids	mg/L	0488	WL	05/26/2009	0001	39	-	39	11000		#	200	
Total Dissolved Solids	mg/L	0547	TS	05/28/2009	0001	0	-	0	14000		#	400	
Total Dissolved Solids	mg/L	0557	WL	05/27/2009	0001	40	-	40	19000		#	400	
Total Dissolved Solids	mg/L	0559	WL	05/27/2009	0001	19	-	19	890		#	20	
Total Dissolved Solids	mg/L	0560	WL	05/27/2009	0001	36	-	36	21000		#	400	
Total Dissolved Solids	mg/L	0583	WL	05/27/2009	0001	18	-	18	1900		#	40	
Total Dissolved Solids	mg/L	0588	WL	05/27/2009	0001	34	-	34	810		#	40	
Total Dissolved Solids	mg/L	0589	WL	05/27/2009	0001	52	-	52	34000		#	1000	
Total Dissolved Solids	mg/L	0670	WL	05/26/2009	0001	15.9	-	45.9	9000		#	200	
Total Dissolved Solids	mg/L	0672	WL	05/26/2009	0001	15	-	45	16000		#	400	
Total Dissolved Solids	mg/L	0674	WL	05/26/2009	0001	15.1	-	45.1	19000		#	400	
Total Dissolved Solids	mg/L	0676	WL	05/26/2009	0001	15.9	-	45.9	11000		#	200	
Total Dissolved Solids	mg/L	0678	WL	05/26/2009	0001	16.3	-	46.3	6600		#	200	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/15/2009

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	05/26/2009	0001	27	-	27	13000		#	200	
Total Dissolved Solids	mg/L	0688	WL	05/26/2009	0001	39	-	39	42000		#	1000	
Total Dissolved Solids	mg/L	0689	WL	05/26/2009	0001	54	-	54	82000		#	2000	
Total Dissolved Solids	mg/L	0730	WL	05/26/2009	0001	18	-	18	3500		#	80	
Total Dissolved Solids	mg/L	0733	WL	05/26/2009	0001	18	-	18	3800		#	80	
Total Dissolved Solids	mg/L	0780	WL	05/27/2009	0001	28	-	28	3600		#	80	
Total Dissolved Solids	mg/L	0782	WL	05/27/2009	0001	33	-	33	1800		#	40	
Total Dissolved Solids	mg/L	0782	WL	05/27/2009	0002	33	-	33	1800		#	40	
Total Dissolved Solids	mg/L	0786	WL	05/27/2009	0001	28	-	28	950		#	40	
Total Dissolved Solids	mg/L	0787	WL	05/27/2009	0001	36	-	36	3900		#	80	
Turbidity	NTU	0403	WL	05/27/2009	0001	18	-	18	1.24		#		
Turbidity	NTU	0405	WL	05/26/2009	0001	18	-	18	3.23		#		
Turbidity	NTU	0407	WL	05/27/2009	0001	17	-	17	2.34		#		
Turbidity	NTU	0480	WL	05/27/2009	0001	18	-	18	1.26		#		
Turbidity	NTU	0483	WL	05/27/2009	0001	18	-	18	1.9		#		
Turbidity	NTU	0488	WL	05/26/2009	0001	39	-	39	3.07		#		
Turbidity	NTU	0547	TS	05/28/2009	0001	0	-	0	111.2		#		
Turbidity	NTU	0557	WL	05/27/2009	0001	40	-	40	2.05		#		
Turbidity	NTU	0559	WL	05/27/2009	0001	19	-	19	1.13		#		
Turbidity	NTU	0560	WL	05/27/2009	0001	36	-	36	3.98		#		
Turbidity	NTU	0583	WL	05/27/2009	0001	18	-	18	1.7		#		
Turbidity	NTU	0588	WL	05/27/2009	0001	34	-	34	2.46		#		
Turbidity	NTU	0589	WL	05/27/2009	0001	52	-	52	2.17		#		
Turbidity	NTU	0670	WL	05/26/2009	0001	15.9	-	45.9	4.76		#		
Turbidity	NTU	0672	WL	05/26/2009	0001	15	-	45	1.46		#		
Turbidity	NTU	0674	WL	05/26/2009	0001	15.1	-	45.1	1.64		#		
Turbidity	NTU	0676	WL	05/26/2009	0001	15.9	-	45.9	7.39		#		

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID					Lab	Data QA		
Turbidity	NTU	0678	WL	05/26/2009	0001	16.3	-	46.3	0.83		#		
Turbidity	NTU	0683	WL	05/26/2009	0001	27	-	27	1.63		#		
Turbidity	NTU	0688	WL	05/26/2009	0001	31	-	31	1.37		#		
Turbidity	NTU	0688	WL	05/26/2009	0001	39	-	39	3.75		#		
Turbidity	NTU	0689	WL	05/26/2009	0001	46	-	46	2.17		#		
Turbidity	NTU	0689	WL	05/26/2009	0001	54	-	54	4.38		#		
Turbidity	NTU	0730	WL	05/26/2009	0001	18	-	18	4.17		#		
Turbidity	NTU	0733	WL	05/26/2009	0001	18	-	18	8.81		#		
Turbidity	NTU	0780	WL	05/27/2009	0001	28	-	28	5.57		#		
Turbidity	NTU	0782	WL	05/27/2009	0001	33	-	33	4.33		#		
Turbidity	NTU	0786	WL	05/27/2009	0001	28	-	28	2.16		#		
Turbidity	NTU	0787	WL	05/27/2009	0001	36	-	36	1.54		#		
Uranium	mg/L	0403	WL	05/27/2009	0001	18	-	18	0.13		#	2.2E-005	
Uranium	mg/L	0405	WL	05/26/2009	0001	18	-	18	1.8		#	0.00022	
Uranium	mg/L	0407	WL	05/27/2009	0001	17	-	17	0.086		#	4.5E-006	
Uranium	mg/L	0407	WL	05/27/2009	0002	17	-	17	0.082		#	4.5E-006	
Uranium	mg/L	0480	WL	05/27/2009	0001	18	-	18	0.34		#	4.5E-005	
Uranium	mg/L	0483	WL	05/27/2009	0001	18	-	18	0.37		#	4.5E-005	
Uranium	mg/L	0488	WL	05/26/2009	0001	39	-	39	1.8		#	0.00022	
Uranium	mg/L	0547	TS	05/28/2009	0001	0	-	0	1.4		#	0.00022	
Uranium	mg/L	0557	WL	05/27/2009	0001	40	-	40	2.7		#	0.00022	
Uranium	mg/L	0559	WL	05/27/2009	0001	19	-	19	0.17		#	2.2E-005	
Uranium	mg/L	0560	WL	05/27/2009	0001	36	-	36	1.8		#	9.E-005	
Uranium	mg/L	0583	WL	05/27/2009	0001	18	-	18	0.45		#	4.5E-005	
Uranium	mg/L	0588	WL	05/27/2009	0001	34	-	34	0.2		#	2.2E-005	
Uranium	mg/L	0589	WL	05/27/2009	0001	52	-	52	2.6		#	0.00022	
Uranium	mg/L	0670	WL	05/26/2009	0001	15.9	-	45.9	1		#	0.00022	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Parameter (USEE205) FOR SITE MOA01, Moab Site
REPORT DATE: 7/15/2009

Parameter	Units	Location ID	Location Type	Sample		Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
				Date	ID	Lab	Data		QA			
Uranium	mg/L	0672	WL	05/26/2009	0001	15	- 45	1.1		#	9.E-005	
Uranium	mg/L	0674	WL	05/26/2009	0001	15.1	- 45.1	1.4		#	0.00022	
Uranium	mg/L	0676	WL	05/26/2009	0001	15.9	- 45.9	1.3		#	9.E-005	
Uranium	mg/L	0678	WL	05/26/2009	0001	16.3	- 46.3	0.92		#	9.E-005	
Uranium	mg/L	0683	WL	05/26/2009	0001	27	- 27	2		#	0.00022	
Uranium	mg/L	0688	WL	05/26/2009	0001	39	- 39	2.4		#	0.00022	
Uranium	mg/L	0689	WL	05/26/2009	0001	54	- 54	0.68		#	4.5E-005	
Uranium	mg/L	0730	WL	05/26/2009	0001	18	- 18	0.7		#	4.5E-005	
Uranium	mg/L	0733	WL	05/26/2009	0001	18	- 18	0.77		#	4.5E-005	
Uranium	mg/L	0780	WL	05/27/2009	0001	28	- 28	0.62		#	4.5E-005	
Uranium	mg/L	0782	WL	05/27/2009	0001	33	- 33	0.31		#	4.5E-005	
Uranium	mg/L	0782	WL	05/27/2009	0002	33	- 33	0.3		#	2.2E-005	
Uranium	mg/L	0786	WL	05/27/2009	0001	28	- 28	0.13		#	2.2E-005	
Uranium	mg/L	0787	WL	05/27/2009	0001	36	- 36	0.4		#	4.5E-005	

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

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

LAB QUALIFIERS:

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

Appendix C. Water Quality Data (continued)

DATA QUALIFIERS:

F Low-flow sampling method used.

L Less than three bore volumes purged prior to sampling.

U Parameter analyzed for but was not detected.

G Possible grout contamination; pH > 9.

Q Qualitative result due to sampling technique.

X Location is undefined.

J Estimated value.

R Unusable result.

QA QUALIFIER:

Validated according to quality assurance guidelines.

Appendix D.
Water Level Data

Appendix D. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site
REPORT DATE: 7/15/2009

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	05/27/2009		7.51	3961.44	
0405	O	3968.47	05/26/2009		7.54	3960.93	
0407	O	3969.09	05/27/2009		7.89	3961.2	
0480		3968.65	05/27/2009		7.62	3961.03	
0483		3968.9	05/27/2009		7.72	3961.18	
0488		3968.48	05/26/2009		7.59	3960.89	
0557		3968.85	05/27/2009		9.02	3959.83	
0559		3969.92	05/27/2009		8.36	3961.56	
0560		3968.77	05/27/2009		8.4	3960.37	
0583		3969.64	05/27/2009		8.59	3961.05	
0588		3968.82	05/27/2009		8.03	3960.79	
0589		3968.87	05/27/2009		8.32	3960.55	
0670		3969.54	05/26/2009		9.92	3959.62	
0672		3969.57	05/26/2009		10.89	3958.68	
0674		3969.49	05/26/2009		11.11	3958.38	
0676		3969.69	05/26/2009		10.41	3959.28	
0678		3969.65	05/26/2009		9.99	3959.66	
0683		3970.73	05/26/2009		11.28	3959.45	
0688		3968.66	05/26/2009		9.38	3959.28	
0689		3968.66	05/26/2009		9.48	3959.18	
0730		3967.6	05/26/2009		6.76	3960.84	
0733		3968.5	05/26/2009		7.42	3961.08	
0780		3968.45	05/27/2009		7.63	3960.82	
0782		3968.46	05/27/2009		7.65	3960.81	
0786		3968.14	05/27/2009		7.08	3961.06	
0787		3968.43	05/27/2009		7.68	3960.75	

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

Attachment 1.
IA Well Field Monthly Sampling Trip Report

Attachment 1.
IA Well Field Monthly Sampling Trip Report



DATE: May 28, 2009
TO: K. Pill, M. Mullis
FROM: J. Ritchey
SUBJECT: May 2009 Monthly Sampling Trip Report
Site: Moab, Utah

Date of Sampling Event: May 26-28, 2009

Team Members: James Ritchey, Elizabeth Glowiak

RIN Number Assigned: All samples were assigned to RIN 0905031.

Sample Shipment: All samples were shipped in a cooler overnight UPS to ALS Laboratory Group from Moab, Utah, on May 28, 2009 (Tracking No. 396625210).

May 2009 CF1 Sampling

Number of Locations Sampled: Seven observation wells (0403, 0407, 0480, 0483, 0557, 0559, and 0560), and one evaporation pond (0547) location was sampled. Including one duplicate, a total of nine samples were collected during the May 2009 monthly sampling event.

Locations Not Sampled: CF1 extraction wells (0470, 0472, 0474, 0476, 0478, and SMI-PW02) were not sampled as the wells required maintenance and were not in operation.

Field Variance: None.

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2000	0407	Duplicate from 17 ft bgs	Ground Water	MAY 023

ID = identification

Attachment 1.
IA 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)
0403	05/27/2009	08:58	7.51	18
0407	05/27/2009	13:46	7.89	17
0480	05/27/2009	09:34	7.62	18
0483	05/27/2009	09:51	7.72	18
0557	05/27/2009	09:16	9.02	40
0559	05/27/2009	11:18	8.36	19
0560	05/27/2009	10:58	8.40	36

btoc = below top of casing

May 2009 CF2 Sampling

Number of Locations Sampled: A total of three observation wells (0583, 0588, and 0589), were sampled during the May 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	05/27/2009	08:01	8.59	18
0588	05/27/2009	08:17	8.03	34
0589	05/27/2009	08:38	8.32	52

btoc = below top of casing

May 2009 CF3 Sampling

Number of Locations Sampled: Five remediation wells (0671, 0674, 0675, 0676, and 0678) and three observation wells (0683, 0688-39, and 0689-54) were sampled. A total of eight locations were sampled during the May 2009 monthly sampling event.

Field Variance: None.

Locations in Which Field Parameters Were Measured Only: Parameters were measured at locations 0688 at 31 ft and 0689 at 46 ft.

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

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	05/26/2009	14:14	31	9.38	16.41	29,258	0.61	6.8 1	83	1.37
0689	03/25/2009	14:42	46	9.48	17.67	103,252	0.53	6.7 2	109	2.17

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

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)
0670	05/26/2009	13:48	9.92	35
0672	05/26/2009	11:44	10.89	35
0674	05/26/2009	11:34	11.11	35
0676	05/26/2009	11:24	10.41	35
0678	05/26/2009	11:14	9.99	35

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	05/26/2009	14:53	11.28	27
0688-39	05/26/2009	13:59	9.38	39
0689-54	05/26/2009	14:27	9.48	54

btoc = below top of casing

May 2009 CF4 Sampling

Number of Locations Sampled: Four observation wells (0780, 0782, 0786, and 0787), were sampled. Including one duplicate, a total of five samples were collected during the May 2009 monthly sampling event.

Locations Not Sampled: None.

Field Variance: None.

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

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2001	0782	Duplicate from 33 ft bgs	Ground Water	MAY 026

ID = identification

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	05/27/2009	16:07	7.63	28
0782	05/27/2009	15:44	7.65	33
0786	05/27/2009	14:15	7.08	28
0787	05/27/2009	14:38	7.68	36

btoc = below top of casing

May 2009 Baseline Sampling

Number of Locations Sampled: Two observation wells (0405 and 0488) during the May 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)
0405	05/26/2009	10:37	7.54	18
0488	05/26/2009	10:53	7.59	39

btoc = below top of casing

May 2009 Infiltration Trench Sampling

Number of Locations Sampled: Two observation wells (0730 and 0733) were sampled during the May 2009 monthly sampling event.

Field Variance: None.

Attachment 1.
IA 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 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)
0730	05/26/2009	10:14	6.76	18
0733	05/26/2009	09:35	7.42	18

btoc = below top of casing

Well Inspection Summary: A well inspection was not conducted.

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

Date	Daily Mean Flow (cfs)
05/26/2009	31,000
05/27/2009	28,100
05/28/2009	24,500

Equipment Issues: None.

Corrective Action Required/Taken: None.