

*Office of Environmental Management – Grand Junction*



# June 2007 Validation Data Package for Routine Ground Water and Surface Water Sampling

## Moab UMTRA Project

July 2008



U.S. Department  
of Energy

# **Office of Environmental Management**

**June 2007 Water Sampling**

**Validation Data Package for  
Routine Ground Water and  
Surface Water Sampling  
Moab, Utah**

**July 2008**

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## **1.0 Sampling Event Summary**

This section contains the Summary Criteria with a sample location map (Section 1.1), an Executive Summary (Section 1.2), and the Sampling and Analyses (Section 1.3) for the June 2007 Routine Sampling event.

## 1.1 Summary Criteria

**Site:** Moab, Utah

**Sampling Period:** June 13-14, 2007

The purpose of this sampling was to collect ground water and surface water samples from the standard routine event sampling locations in order to evaluate the overall water quality. This sampling event represents the second routine sampling event for 2007, during the decreasing portion of the spring runoff hydrograph. Sampling locations are shown on Figure 1.

**1. Did concentrations in water from any domestic well sampled exceed a ground water standard, primary drinking water standard, or health advisory?**

Domestic wells were not sampled during this event.

**2. Were standards exceeded at any point-of-compliance wells?**

Point of compliance wells have not been established at the Moab site.

**3. As a result of this sampling round, is there any indication of unexpected contaminated ground water movement?**

There is no indication of unexpected contaminated ground water movement. Ground water contamination in the shallow alluvial aquifer beneath the tailings pile and former mill-site area flows southeast toward the Colorado River. Contaminant concentrations in June 2007 significantly decreased compared to the concentrations measured in May 2007 in some locations along the river. This trend was also observed during the June 2006 sampling event. Time versus concentration plots for ammonia, total dissolved solids (TDS), and uranium for observation wells TP-02 (northeast portion of the site), 0492 (just south of the well field), and TP-17 and TP-19 (located farther south of the well field) are provided in the Executive Summary.

Locations 0492 and TP-02 exhibit the most significant seasonal variations in contaminant concentration of the wells located along the river bank. These wells are not screened within the brine zone (as TP-17 and TP-19 are) and are more susceptible to changes in the Colorado River stage.

The ammonia concentration of the sample collected from 0492 decreased from 120 to 33 milligrams per liter (mg/L) between May and June 2007, while the uranium concentration dropped from 2.5 to 0.65 mg/L during the same time period. In contrast, the concentration of ammonia in nearby surface water sampling location CR-3 remained consistently low (less than 0.1 mg/L) as did the uranium concentration (less than 0.0025 mg/L).

Samples collected from location TP-02 historically have had less than 1.5 mg/L of ammonia, and the concentration decreased only slightly between May and June 2007 (from 0.59 to 0.43 mg/L). While the ammonia concentrations at this well have historically been low, the uranium concentrations have been elevated due to the proximity of TP-02 to the “wood chip” area. Uranium concentrations slightly increased between May and June 2007 (from 4.8 to 5.1 mg/L), but an overall historical decreasing trend continues.

The surface water location near TP-02 had a uranium concentration of 0.0029 mg/L in June 2007.

Wells that exceeded water quality standards are listed in Table 1. An altered sampling schedule was implemented that was more cost-efficient during 2007. This schedule took into account when some locations, most notably 0401, 0404, and 0405, were sampled as part of monthly sampling events. So while the frequency of the sampling of these locations increased, samples were not always collected at the same time. In order to provide a more complete summary (and provide comparable information to previous routine events), these three locations were added to Table 1 despite the fact that they were not all sampled as part of this routine event. Well 0405 was sampled as part of the June 2007 monthly event, and wells 0401 and 0404 were sampled as part of a subsequent sampling event which took place in August 2007. These locations will be continued to be sampled in future sampling events.

Analyte	Standard (mg/L)	Locations Exceeding Standards
Selenium	0.01	0401 <sup>a</sup> (0.011), 0404 <sup>a</sup> (0.012), 0405 <sup>b</sup> (0.015), 0437 (0.049)
Uranium	0.044	0401 <sup>a</sup> (2.8), 0404 <sup>a</sup> (1.3), 0405 <sup>b</sup> (1.8), 0437 (4.8), 0438 (2.3), 0439 (1.1), 0492 (0.65), TP-02 (5.1)

Notes: a – Location sampled in August 2007

b – Location sampled in June 2007 as part of the monthly sampling event

**4. Is there statistical evidence that contaminants related to the Moab UMTRA Project were detected in a surface body of water in greater concentrations than upstream ambient water quality?**

Since the monitoring of the site began, site contaminants have periodically occurred at elevated concentrations in the Colorado River, primarily adjacent to and just downstream from the tailings pile in isolated pools or slow-moving backwater areas. However, the results from the sampling event in June 2007 indicate that areas sampled are not distinguishable from background, despite the fact that some surface water samples were collected from areas of slow-moving water. These low concentrations may be attributable to either the effectiveness of the interim action or dilution from the higher river stage during the sampling time frame.

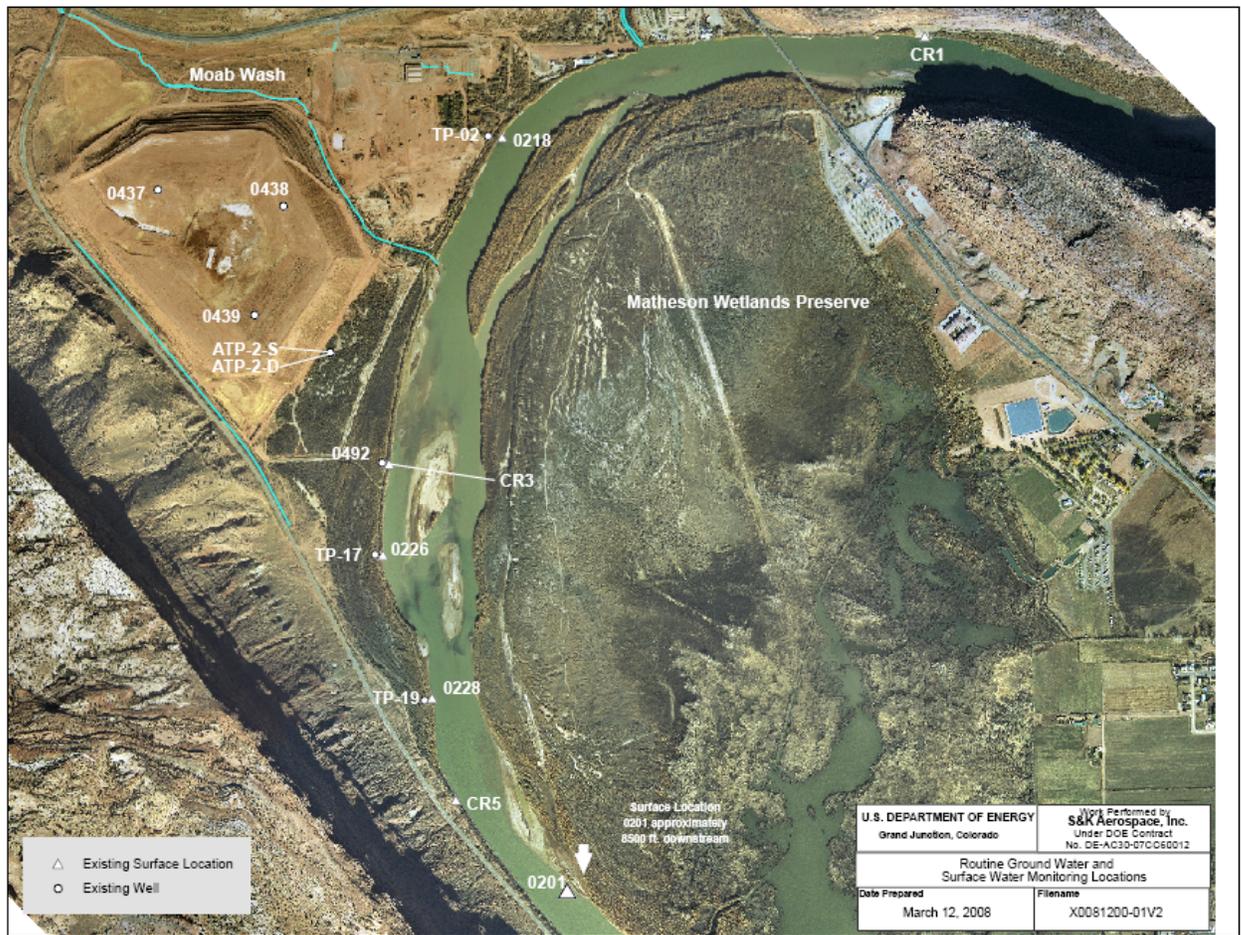


Figure 1. Routine Ground Water and Surface Water Sampling Locations  
(may include locations not sampled)

## 1.2 Executive Summary

This validation data package (VDP) presents the validated data associated with the ground-water and surface-water samples collected during the June 2007 routine 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.

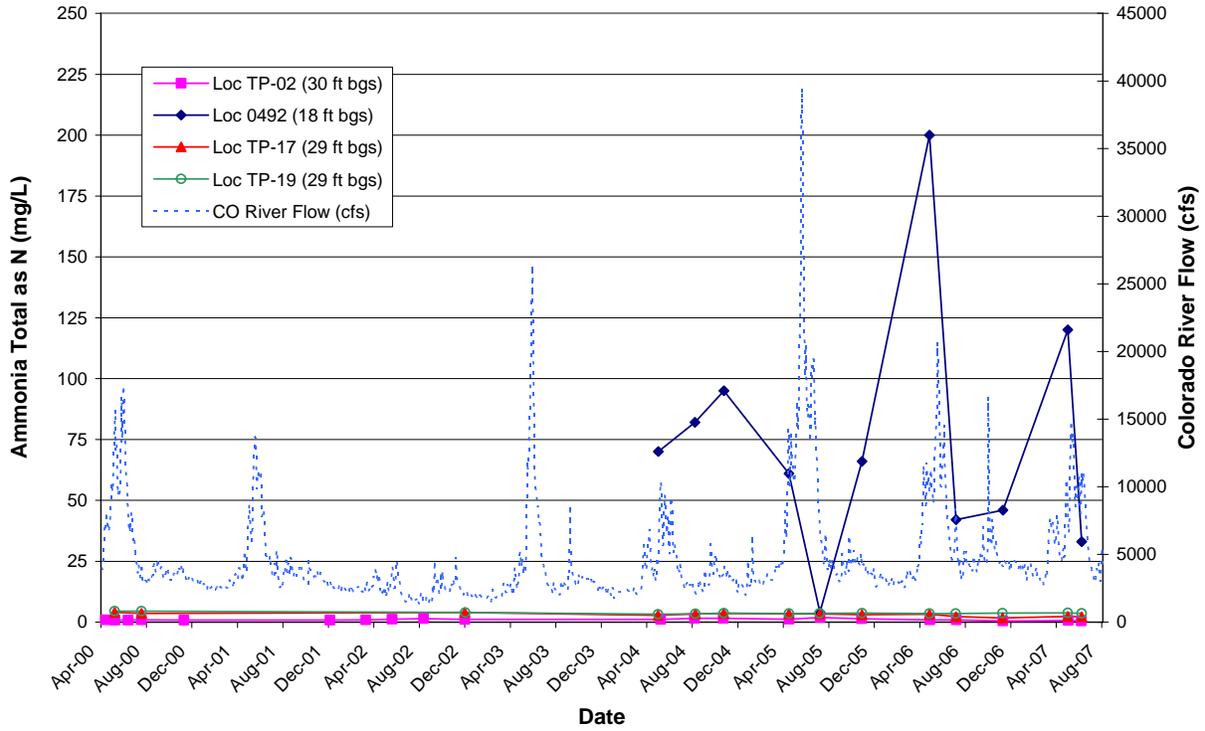
A list of flagged data is presented in Table 2 in Section 2.2. A minimums and maximums report (presented in Section 3.1) was generated to determine if the data are within a normal statistical range. Twelve copper samples were qualified as unusable (flagged “R”) as a result of this validation. Any anomalous data, based on the results of the minimums and maximums report, are presented in Section 3.2.

While independent of the data-validation process, a brief summary of the most recent concentration trends based on the June 2007 data is provided for the wells located in the floodplain (along the bank of the Colorado River) and on top of the tailings pile. Time versus concentration (ammonia, TDS, and uranium) plots for selected monitoring wells are presented to display historical trends exhibited by the data. Colorado River flows over the same time frame are also plotted to determine whether the magnitude of river flows influences analyte concentrations.

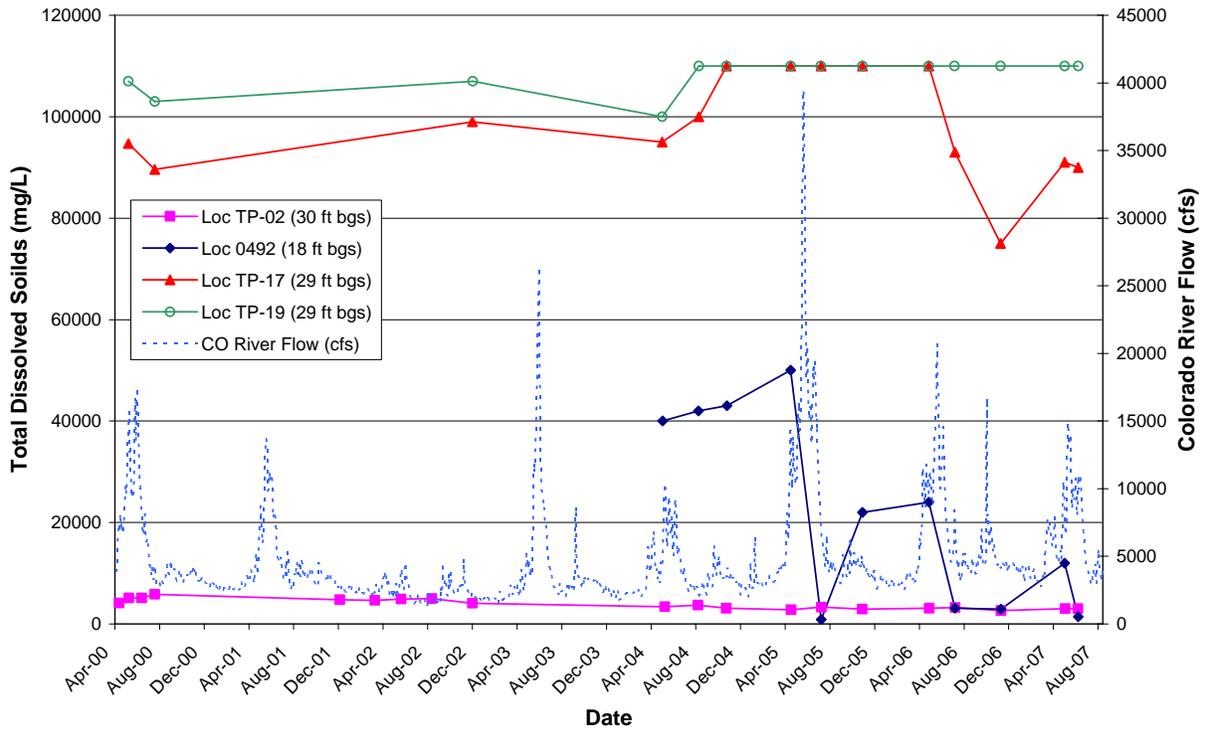
### Flood Plain Wells

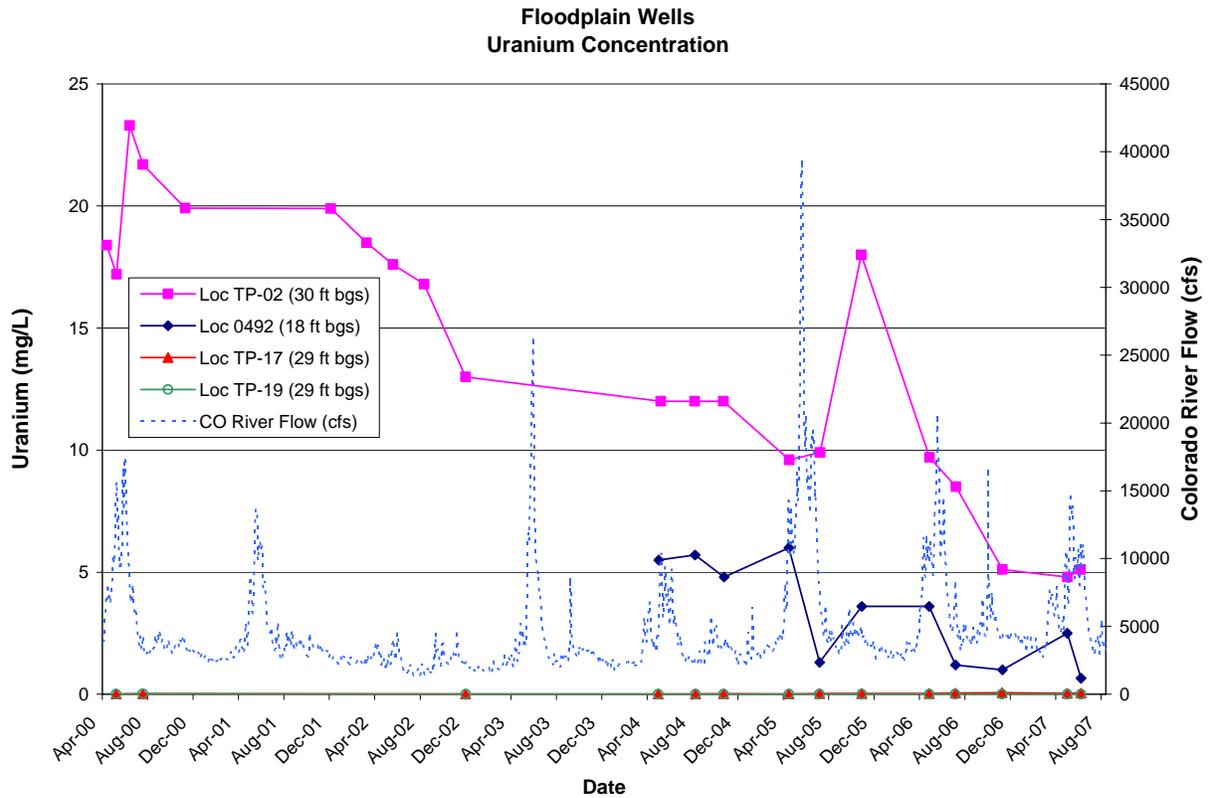
Time concentration plots were generated for observation wells TP-02, 0492, TP-17, and TP-19 (from north to south). These plots exhibit that samples collected from wells TP-02, TP-17, and TP-19 have historically contained low (below 5 mg/L) ammonia concentrations, while the concentration detected from well 0492 have fluctuated between 4 and 200 mg/L. When compared to the river flow, the concentrations appear to respond to changes in the river stage, with concentrations consistently decreasing during the post peak sampling round in June 2007. The TDS plot graphically shows that locations TP-17 and TP-19 are screened within the brine, and the brine interface (35,000 mg/L TDS) has at times been within the screened interval of 0492. Well TP-02 has historically contained less than 6,000 mg/L TDS. Uranium concentrations have steadily declined in samples collected from wells TP-02 and 0492. Typical of wells screened within the brine, uranium concentrations in wells TP-17 and TP-19 are considerably lower compared to TP-02 and 0492, with the sample collected from TP-17 containing uranium concentrations just above or just below the 0.044 mg/L standard since July 2006.

**Floodplain Wells  
Ammonia Total as N Concentration**



**Floodplain Wells  
Total Dissolved Solids Concentration**

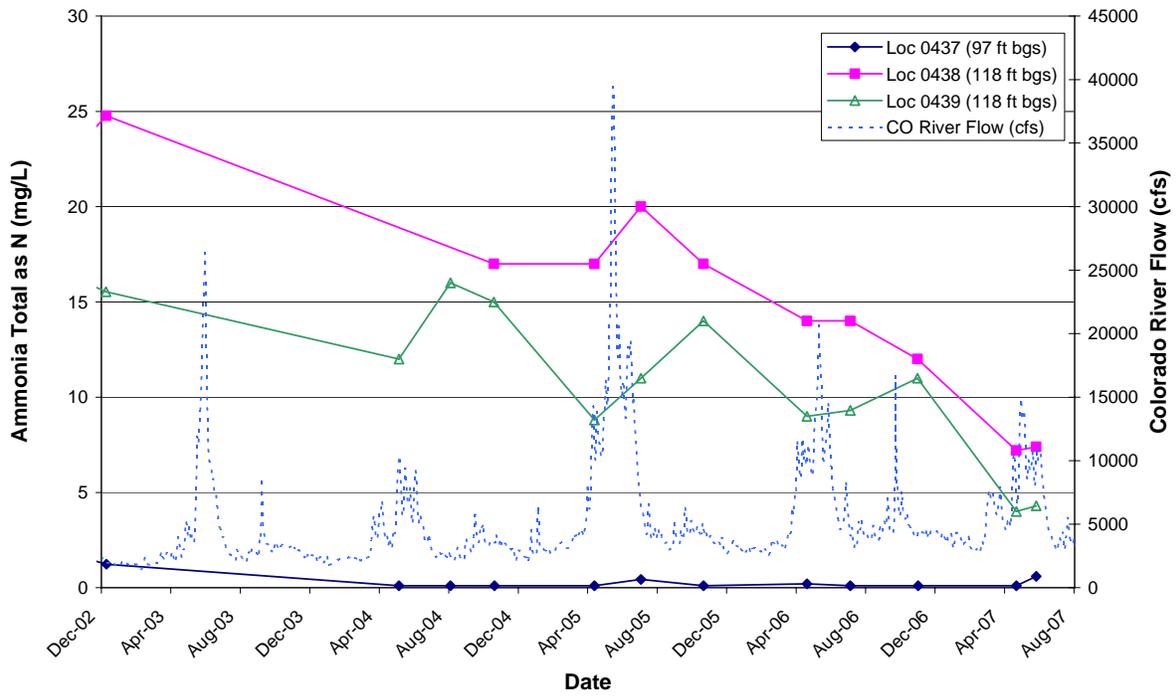




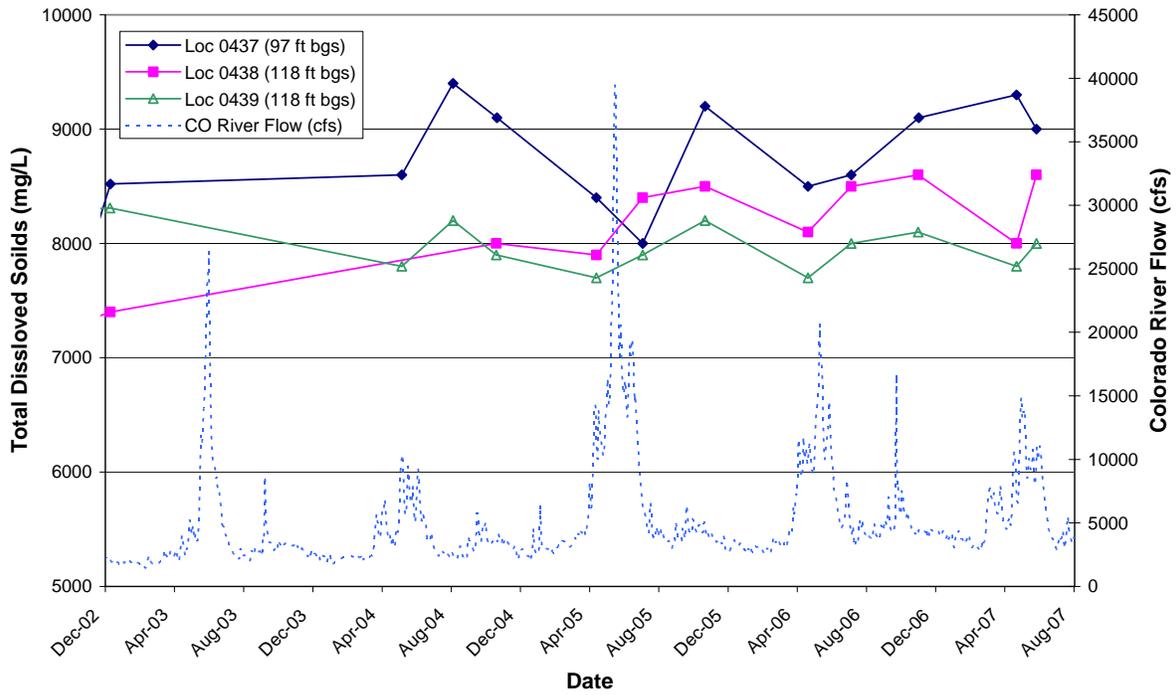
### Tailings Pile Wells

The observation wells located on the tailings pile are all screened within the alluvial material underlying the tailings. Ammonia concentrations continue the decreasing trend in wells 0438 and 0439. In well 0437, which is located upgradient of 0438 and 0439, ammonia concentrations remain below 1 mg/L. The TDS time concentration plot displays that all three wells are screened within the same fresh-water unit in the aquifer (all three had concentrations between 8,000 and 9,000 mg/L). The uranium time concentration plots indicate the uranium concentrations have remained stable since mid-2005.

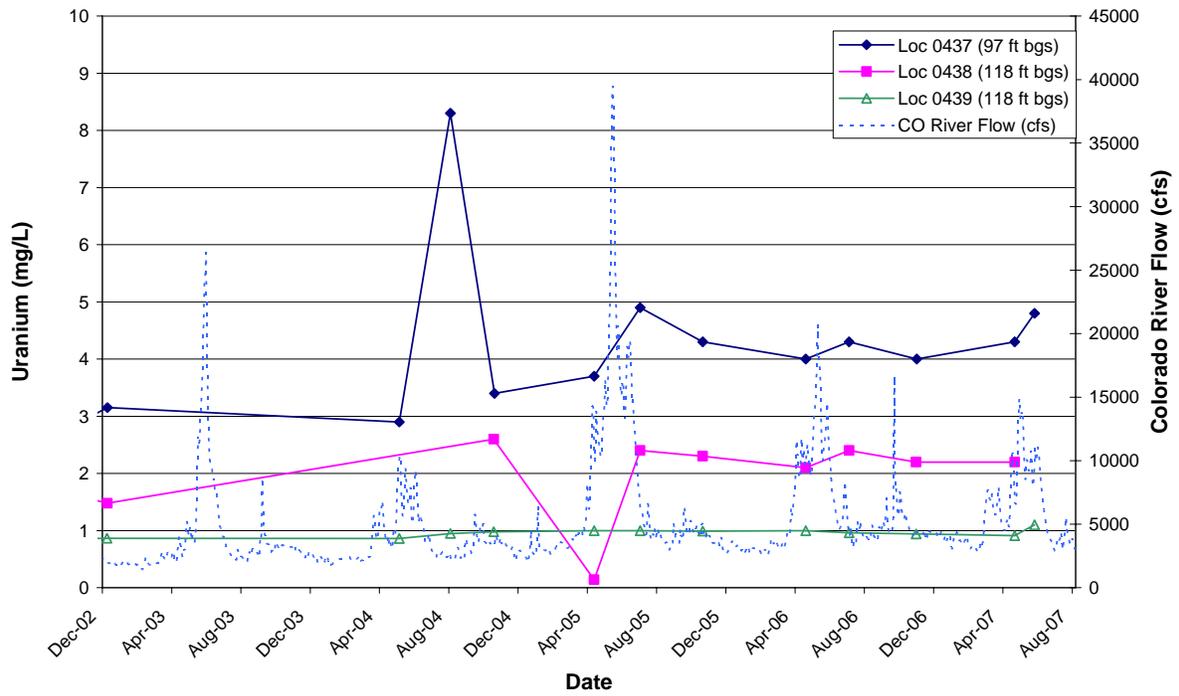
**Observation Wells Screened Under Tailings Pile  
Ammonia Total as N Concentrations**



**Observation Wells Screened Under Tailings Pile  
Total Dissolved Solids Concentrations**



**Observation Wells Screened Under Tailings Pile  
Uranium Concentrations**



### 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* (DOE-EM/GJ1220-2008, Revision 4, April 2008). Please refer to the attached trip report (Attachment 1) for specific sampled locations.

The data validations indicate that the data meet the quality-control criteria specified for this project. An adequate number of equipment blanks and duplicates were collected, and all holding times were met. No significant discrepancies were noted regarding sample shipping and receiving, preservation times, instrument calibration, method blanks, or matrix spikes, except as qualified or noted in the Laboratory Performance Assessment (Section 2.2). Twelve copper samples were "R" qualified (unusable result). There were no anomalous data points associated with this sampling event.

According to the U.S. Geological Survey (USGS) Cisco Gaging Station, the mean daily Colorado River flow rates varied between 9,860 and 11,000 cubic feet per second (cfs) during this sampling period.

Ken Pill

Ken Pill  
Ground Water Lead

7/29/08

Date

## **2.0 Data Assessment Summary**

This section contains the Water Sampling Field Activities Verification (Section 2.1), the Laboratory Performance Assessments (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 following checklist. As the checklist exhibits, all sampling was conducted following the applicable procedures.

## Water Sampling Field Activities Verification Checklist

<b>Sampling Event / RIN</b>	Routine Event / 07060957	<b>Date(s) of Water Sampling</b>	June 13 and 14, 2007
<b>Date(s) of Verification</b>	February 13, 2008	<b>Name of Verifier</b>	Ken Pill

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List other documents, standard operating procedures, instructions.	Yes	
	NA	
2. Were the sampling locations specified in the planning documents sampled?	Yes	See trip report for explanation.
3. Was a pre-trip calibration conducted as specified in the aforementioned documents?	Yes	Calibration completed at GJ office, documentation missing
4. Was an operational check of the field equipment conducted twice daily? Did the operational checks meet criteria?	Yes	
	Yes	
5. Were the number and types (alkalinity, temperature, electrical conductivity, pH, turbidity, dissolved oxygen, oxidation reduction potential) of field measurements taken as specified?	Yes	
6. Was the category of the well documented?	Yes	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements stabilize prior to sampling? Was the flow rate less than 500 milliliters per minute (mL/min)? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	Yes	
	Yes	
	Yes	Problems meeting turbidity criteria in various locations as noted in field book
	Yes	
	NA	

## Water Sampling Field Activities Verification Checklist

8. Were the following conditions met when purging a Category II well:
- Was the flow rate less than 500 mL/min? Yes
- Was one pump/tubing volume removed prior to sampling? Yes
9. Were duplicates taken at a frequency of one per 20 samples? Yes
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment? NA      Dedicated equipment used at each location
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 chain-of-custody (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

## 2.2 Laboratory Performance Assessment

### General Information

Requisition No. (RIN): 07060957  
 Sample Event:  
 Site(s): Moab, Utah; Interim Action  
 Laboratory: Paragon Analytics, Fort Collins, Colorado  
 Work Order No.: 0706093  
 Analysis: Metals and Inorganics  
 Validator: Rebecca Hollis  
 Review Date: February 22, 2008

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

*Table 1. Analytes and Methods*

Analyte	Line Item Code	Prep Method	Analytical Method
Ammonia as N, NH <sub>3</sub> -N	WCH-A-005	MCAWW 350.1	MCAWW 350.1
Bromide, BR	MIS-A-038	SW-846 9056	SW-846 9056
Chloride, Cl	MIS-A-039	SW-846 9056	SW-846 9056
Copper, Cu	MET-A-020	SW-846 3005A	SW-846 6010B
Manganese, Mn	GJO-17	SW-846 3005A	SW-846 6010B
Selenium, Se	GJO-14	SW-846 3005A	SW-846 6020A
Sulfate, SO <sub>4</sub>	MIS-A-044	SW-846 9056	SW-846 9056
Total Dissolved Solids, TDS	WCH-A-033	MCAWW 160.1	MCAWW 160.1
Uranium, U	GJO-01	SW-846 3005A	SW-846 6020A

## Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

*Table 2. Data Qualifiers*

Sample Number	Location	Analyte	Flag	Reason
All	All	Ammonia Total as N	J	RPD for Field Blank > 20%
All	All	Chloride	J	Concentration in MS and MSD above analytical range
All	All	Uranium	J	No ICSA results, No Matrix Spike Performed, No Replicate, No LCS
All	All	Copper	J	No LCS
0706093-1	0201	Copper	R	Nondetect less than 5xPQL
0706093-3	0226	Copper	R	Nondetect less than 5xPQL
0706093-5 - 11	0437-0439, 0492, 2514, ATP-2-D, ATP-2-S	Copper	R	Nondetect less than 5xPQL
0706093-15 - 17	TP-02, TP- 17, TP-19	Copper	R	Nondetect less than 5xPQL
0706093-2	0218	Copper	J	Result less than 5xPQL, Elevated ICSA & result>MDL
0706093-4	0228	Copper	J	Result less than 5xPQL, Elevated ICSA & result>MDL
0706093-12- 14	CR1, CR3, CR5	Copper	J	Result less than 5xPQL, Elevated ICSA & result>MDL
All	All	Manganese	J	Elevated ICSA & result>MDL, No LCS
All	All	Selenium	J	No Matrix Spike Performed, No Replicate
0706095-5 - 9	0437-0439, 0492, 2514	Uranium	J	No Serial Dilutions and results> 100xPQL
0706095-11	ATP-2-S	Uranium	J	No Serial Dilutions and results> 100xPQL
0706095-15	TP-02	Uranium	J	No Serial Dilutions and results> 100xPQL

Note: J = estimated value; R = Unusable result; U = Analytical Result Below Detection Limit

## Sample Shipping/Receiving

Paragon Analytics in Fort Collins, Colorado, received 17 samples on June 15, 2007, under Airbill number 8604 9605 0065, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents, including the COC form and the sample tickets, had no errors or omissions.

### Preservation and Holding Times

The sample shipments were received intact with the temperatures within the cooler at 1.0 °C, which complies 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.

### Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods.

#### *Method SW-846 6020A, Uranium and Selenium*

Calibrations for uranium were performed on June 20, 2007, and for selenium on June 25 and June 26, 2007. The initial calibrations were performed using seven calibration standards, resulting in calibration curves with correlation coefficient ( $r^2$ ) values greater than 0.995. The absolute values of the calibration curve intercepts were less than three times the minimum detection limit (MDL). Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification (ICV and CCV) checks were made at the required frequency, resulting in 11 CCVs for uranium and 19 CCVs for selenium. All calibration checks met the acceptance criteria. A reporting limit verification check (CRI) was made at the required frequency to verify the linearity of the calibration curve near the PQL. The CRI checks were within the acceptance criteria range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries were stable and within acceptable ranges.

#### *Method SW-846 6010B, Manganese and Copper*

Calibrations for manganese and copper were performed on June 21, 2007, using three calibration standards. Calibration and laboratory spike standards were prepared from independent sources. ICV and CCV checks were made at the required frequency, resulting in 12 CCVs. All calibration checks met the acceptance criteria. CRIs were made at the required frequency to verify the linearity of the calibration curve near the PQL. The CRI results were within the acceptance range.

#### *Method MCAWW 350.1, Ammonia as N*

Initial calibration for ammonia as N was performed using six calibration standards on June 25, 2007, resulting in a calibration curve with a correlation coefficient value greater than 0.995 and an intercept less than three times the MDL. ICV and CCV checks were made at the required frequency resulting in 11 CCVs. All calibration check results were within the acceptance criteria.

#### *Method SW-846 9056, Bromide, Chloride, and Sulfate*

Initial calibrations for bromide, chloride, and sulfate were performed using five calibration standards on June 7, 2007. The calibration curve  $r^2$  values were greater than 0.995, and intercepts were less than three times the MDL. Initial calibration and calibration check standards were prepared from independent sources. ICV and CCV checks were made at the required frequency, resulting in eight CCVs. All calibration checks met the acceptance criteria.

#### *Method MCAWW160.1, Total Dissolved Solids (TDS)*

There is no initial or continuing calibration requirement associated with the determination of TDS.

#### Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All initial and continuing calibration blank (ICB and CCB) results were below the PQLs, with the exception of four manganese, one chloride, and 11 uranium CCBs. All sample results associated with these CCBs were sufficiently large to be unaffected.

Samples associated with method blank or CCB results greater than the PQL were “J” qualified (for estimated value) and nondetects were “R” qualified (for unusable results) when the sample results were less than five times the PQL concentration. Twelve copper samples were rejected (“R” qualified), and five copper samples were “J” qualified based on this criterion.

#### Inductively Coupled Plasma Interference Check Sample Analysis

Inductively Coupled Plasma (ICP) interference check samples (ICS)A and ICSAB were analyzed at the required frequency to verify the instrument interelement and background correction factors. ICESA values for calcium, magnesium, aluminum, and iron were not provided for verification of the instrument’s interelement and background correction factors for uranium and selenium analyses. Therefore all uranium sample were qualified “J”. The selenium samples were not qualified because all the results were below the MDL. Seven copper and all manganese samples were qualified “J” because of elevated concentrations of calcium and magnesium that could lead to interference. All other check sample results met the acceptance criteria.

### Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) pairs were analyzed for bromide, chloride, ammonia as N, copper, and manganese as a measure of method performance in the sample matrix. The selenium and uranium MS and MSD samples were not the selected quality control samples for their analytical run. Consequently, all selenium and uranium detects were qualified as “J” and all nondetects as “UJ”. The spike recoveries met the recovery and precision criteria for all other analytes evaluated with the following exception: matrix spike recoveries could not be evaluated for the chloride samples because the analyte concentrations in the native sample were above the analytical range. Samples associated with this matrix spike were qualified “J” for detects and “UJ” for nondetects.

### Laboratory Replicate Analysis

The laboratory replicate results demonstrate acceptable laboratory precision. The relative percent difference (RPD) values for the reported laboratory replicate sample and the MS duplicate sample results for all analytes were less than 20 percent relative difference for results greater than five times the PQL with the following exceptions: no MSDs were analyzed for selenium and uranium, so no RPDs could be determined for these analytes; and the RPD could not be determined for the chloride duplicate because the analyte concentration in the native sample was above the analytical range. Therefore all detects for selenium, uranium, and chloride were qualified as “J” and all nondetects as “UJ.”

### Laboratory Control Sample

The laboratory control samples (LCS) were prepared for ammonia, TDS, bromide, chloride, sulfate, and selenium and analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The results were acceptable for all samples of these analytes. LCSs were not analyzed for copper, manganese, or uranium as these samples were field filtered and acidified and run directly on the instrument without any additional sample preparation. Therefore detected results for copper, manganese, and uranium were qualified as “J” and nondetects as “UJ.”

### Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. ICP-MS serial dilution data are evaluated when the concentration of the undiluted sample is greater than 100 times the PQL. ICP serial dilution data are evaluated when the concentration of the undiluted sample is greater than 50 times the PQL. All evaluated serial dilution data were acceptable with the following exception: no serial dilutions were analyzed for selenium or uranium samples. All sample results greater than 100 times the PQL were qualified “J,” resulting in seven uranium samples greater than the acceptance criteria.

### Detection Limits/Dilutions

Dilutions were prepared in a consistent and acceptable manner when dilutions were required. Numerous samples were diluted prior to analysis of ammonia, bromide, chloride, sulfate, copper, manganese, uranium, and selenium to reduce interferences. The required detection limits (RDLs) were achieved for all analytes.

### 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) file arrived on July 2, 2007. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

### Equipment Blank

No equipment blank was provided for analysis for these samples.

### 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 duplicates, which measure only laboratory performance. Duplicate samples were collected from locations 0437 on June 5, 2007. The duplicate results met the U.S. Environmental Protection Agency (EPA) recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than five times the PQL with the following exception. The ammonia as N RPD was great than 20 percent. All ammonia detects were qualified as "J" and nondetects as "UJ."

Report Prepared By: \_\_\_\_\_

*Rebecca Hollis*

Rebecca Hollis

### 2.3 Field Analyses/Activities

The following information summarizes the field analyses and activities for this sampling event period.

#### Field Activities

All observation wells were purged and sampled using the low-flow sampling method; this method was not used at extraction wells. No equipment blanks were collected. One duplicate sample was 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  $\pm 20$  RPD and are considered acceptable.

### 2.4 Certification

Results were reported in correct units for all analytes requested. Appropriate contract-required laboratory qualifiers and target analyte lists were used. The RDLs were met when possible, or an explanation of why they were not met was given in the laboratory case narrative. All analytical quality-control criteria were met except as qualified on the Ground Water Quality Data by Parameter, Surface Water Quality by Parameter, or equipment/trip blank database printouts. The meaning of data qualifiers is defined on the database printouts or defined in the EPA *Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media Multi-Concentration*, Document Number ILMO2.0, 1991. All data in this package are considered validated and may be treated as final results.

Laboratory Validation Lead:	<u>Rebecca Hollis</u>	<u>7/29/03</u>
	Rebecca Hollis	Date
Ground Water Lead:	<u>Ken Pill</u>	<u>7/29/03</u>
	Ken Pill	Date

### **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 is generated by the Sample Management System (SMS) used to query the SEEPro database. The DataVal program compares the new data set with historical data and lists all new data that fall outside the historical data range. Values listed in the report are further screened, and the results are not considered anomalous if: (1) identified low concentrations are the result of low detection limits; (2) the concentration detected is within 50 percent of historical minimum or maximum values; or (3) there were fewer than five historical samples for comparison.

**Data Validation Minimums and Maximums Report - No Field Parameters**

Laboratory: PARAGON (Fort Collins, CO)

RIN: 07060957

Comparison: All Historical Data

Report Date: 7/8/2008

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	0438	06/13/2007	Selenium	0.00083	J	0.0116	QJ	0.0011	B F	6	0
MOA01	0492	06/14/2007	Uranium	0.65	J	6	F	1	F	11	0
MOA01	CR1	06/14/2007	Manganese	0.0024	B J	0.076		0.0031	B U	13	6
MOA01	CR5	06/14/2007	Manganese	0.0032	B J	0.11		0.0056	B	15	5
MOA01	TP-02	06/13/2007	Ammonia Total as N	0.43	J	4		0.44	FQ	24	3
MOA01	TP-02	06/13/2007	Selenium	0.00039	J	0.0076	F	0.00049		12	4

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.

### 3.2 Anomalous Data Review Checksheet

There were no anomalous data based on the criteria described in Section 3.1 associated with this sampling event.

Site: Moab UMTRA Site Sampling Date: June 13-14, 2007

Reviewer: Rachel Cowan *[Signature]* 7/29/08  
Name Signature Date

Site Lead: Joe Ritchey *[Signature]* 7/29/08  
Name Signature Date

### 3.3 Water Quality Data

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Alkalinity, Total (As CaCO3	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	110	#	-	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	130	#	-	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	116	#	-	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	122	#	-	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	634	#	-	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	828	#	-	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	760	#	-	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	576	#	-	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	96	#	-	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	198	#	-	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	109	#	-	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	107	#	-	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	112	#	-	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	512	#	-	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	144	#	-	-
Ammonia Total as N	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.1	J #	0.1	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	0.1	U J #	0.1	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.1	U J #	0.1	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.1	U J #	0.1	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	0.6	J #	0.1	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	0.79	J #	0.1	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	7.4	J #	0.2	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	4.3	J #	0.1	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	33	J #	1	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	430	J #	20	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	440	J #	20	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	SAMPLE: ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Ammonia Total as N	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.1	U J #	0.1	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.1	U J #	0.1	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.1	U J #	0.1	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	0.43	J #	0.1	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	2.2	J #	0.1	-
	mg/L	TP-19	WL	06/14/2007	0001	29.00 - 29.00	3.6	J #	0.1	-
Bromide	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.2	U #	0.2	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	0.2	U #	0.2	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.2	U #	0.2	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.2	U #	0.2	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	2	U #	2	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	2	U #	2	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	2	U #	2	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	2	U #	2	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	0.4	U #	0.4	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	20	U #	20	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	4	U #	4	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.2	U #	0.2	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.2	U #	0.2	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.2	U #	0.2	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	1	U #	1	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	20	U #	20	-
	mg/L	TP-19	WL	06/14/2007	0001	29.00 - 29.00	20	U #	20	-
Chloride	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	45	J #	2	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	44	J #	2	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	41	J #	2	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY
				DATE	ID			LAB	DATA	QA		
Chloride	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	41	J	#		2	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	1200	J	#		20	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	1200	J	#		20	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	970	J	#		20	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	1300	J	#		20	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	110	J	#		4	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	49000	J	#		1000	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	2500	J	#		40	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	41	J	#		2	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	40	J	#		2	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	40	J	#		2	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	450	J	#		10	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	50000	J	#		1000	-
	mg/L	TP-19	WL	06/14/2007	0001	29.00 - 29.00	64000	J	#		1000	-
Copper	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	0.00055	B	J	#	0.00035	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.00066	B	J	#	0.00035	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.00066	B	J	#	0.00035	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.001	B	J	#	0.00035	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.00085	B	J	#	0.00035	-
Dissolved Oxygen	mg/L	0201	SL, RIV	06/14/2007	N001	0.00 - 0.00	0.98			#	-	-
	mg/L	0218	SL, RIV	06/13/2007	N001	0.00 - 0.00	15.15			#	-	-
	mg/L	0228-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	10.54			#	-	-
	mg/L	0228-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	15.1			#	-	-
	mg/L	0437	WL	06/13/2007	N001	97.00 - 97.00	0.57			#	-	-
	mg/L	0438	WL	06/13/2007	N001	118.00 - 118.00	0.31			#	-	-
	mg/L	0439	WL	06/13/2007	N001	118.00 - 118.00	1.00			#	-	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	SAMPLE: ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Dissolved Oxygen	mg/L	0492	WL	06/14/2007	N001	18.00 - 18.00	1.43	#	-	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	N001	88.00 - 88.00	0.42	#	-	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	N001	36.00 - 36.00	0.85	#	-	-
	mg/L	CR1	SL, RIV	06/14/2007	N001	0.00 - 0.00	12.5	#	-	-
	mg/L	CR3-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	10.40	#	-	-
	mg/L	CR5	SL, RIV	06/14/2007	N001	0.00 - 0.00	6.61	#	-	-
	mg/L	TP-02	WL	06/13/2007	N001	30.00 - 30.00	1.83	#	-	-
	mg/L	TP-17	WL	06/14/2007	N001	28.00 - 28.00	0.40	#	-	-
	mg/L	TP-19	WL	06/14/2007	N001	29.00 - 29.00	0.14	#	-	-
Manganese	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.110	J #	8.4E-05	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	0.0018	B J #	8.4E-05	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0059	J #	8.4E-05	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0031	B J #	8.4E-05	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	0.800	J #	0.00042	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	0.810	J #	0.00042	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	3.200	J #	0.00042	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	2.100	J #	0.00042	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	0.280	J #	8.4E-05	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	1.800	J #	0.0042	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	0.220	J #	0.00084	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0024	B J #	8.4E-05	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.004	B J #	8.4E-05	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0032	B J #	8.4E-05	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	0.690	J #	0.00017	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	3.900	J #	0.0042	-
	mg/L	TP-19	WL	06/14/2007	0001	29.00 - 29.00	0.046	B J #	0.0042	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Oxidation Reduction Potent	mV	0201	SL, RIV	06/14/2007	N001	0.00 - 0.00	14.0	#	-	-
	mV	0218	SL, RIV	06/13/2007	N001	0.00 - 0.00	48	#	-	-
	mV	0226-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	-3.3	#	-	-
	mV	0228-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	37.6	#	-	-
	mV	0437	WL	06/13/2007	N001	97.00 - 97.00	165	#	-	-
	mV	0438	WL	06/13/2007	N001	118.00 - 118.00	168	#	-	-
	mV	0439	WL	06/13/2007	N001	118.00 - 118.00	170	#	-	-
	mV	0492	WL	06/14/2007	N001	18.00 - 18.00	-80	#	-	-
	mV	ATP-2-D	WL, PZ	06/13/2007	N001	88.00 - 88.00	-209	#	-	-
	mV	ATP-2-S	WL, PZ	06/13/2007	N001	36.00 - 36.00	125	#	-	-
	mV	CR1	SL, RIV	06/14/2007	N001	0.00 - 0.00	151.2	#	-	-
	mV	CR3-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	120	#	-	-
	mV	CR5	SL, RIV	06/14/2007	N001	0.00 - 0.00	54	#	-	-
	mV	TP-02	WL	06/13/2007	N001	30.00 - 30.00	-121	#	-	-
	mV	TP-17	WL	06/14/2007	N001	28.00 - 28.00	-117	#	-	-
mV	TP-19	WL	06/14/2007	N001	29.00 - 29.00	-244	#	-	-	
pH	s.u.	0201	SL, RIV	06/14/2007	N001	0.00 - 0.00	8.13	#	-	-
	s.u.	0218	SL, RIV	06/13/2007	N001	0.00 - 0.00	8.21	#	-	-
	s.u.	0226-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	8.48	#	-	-
	s.u.	0228-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	8.32	#	-	-
	s.u.	0437	WL	06/13/2007	N001	97.00 - 97.00	7.20	#	-	-
	s.u.	0438	WL	06/13/2007	N001	118.00 - 118.00	6.85	#	-	-
	s.u.	0439	WL	06/13/2007	N001	118.00 - 118.00	7.00	#	-	-
	s.u.	0492	WL	06/14/2007	N001	18.00 - 18.00	7.96	#	-	-
	s.u.	ATP-2-D	WL, PZ	06/13/2007	N001	88.00 - 88.00	7.70	#	-	-
	s.u.	ATP-2-S	WL, PZ	06/13/2007	N001	36.00 - 36.00	8.50	#	-	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
pH	s.u.	CR1	SL, RIV	06/14/2007	N001	0.00 - 0.00	8.24	#	-	-
	s.u.	CR3-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	8.22	#	-	-
	s.u.	CR5	SL, RIV	06/14/2007	N001	0.00 - 0.00	8.28	#	-	-
	s.u.	TP-02	WL	06/13/2007	N001	30.00 - 30.00	7.04	#	-	-
	s.u.	TP-17	WL	06/14/2007	N001	28.00 - 28.00	7.20	#	-	-
	s.u.	TP-19	WL	06/14/2007	N001	29.00 - 29.00	7.04	#	-	-
Selenium	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0018	J #	3.8E-05	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	0.0021	J #	3.8E-05	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0018	J #	3.8E-05	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0018	J #	3.8E-05	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	0.049	J #	0.00038	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	0.047	J #	0.00038	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	0.00083	J #	3.8E-05	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	0.0021	J #	3.8E-05	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	0.00035	J #	3.8E-05	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	0.0016	J #	0.00038	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	0.009	J #	3.8E-05	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0017	J #	3.8E-05	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0015	J #	3.8E-05	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0017	J #	3.8E-05	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	0.00039	J #	3.8E-05	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	0.0012	J #	0.00038	-
	mg/L	TP-19	WL	06/14/2007	0001	29.00 - 29.00	0.00038	U J #	0.00038	-
	Specific Conductance	umhos/cm	0201	SL, RIV	06/14/2007	N001	0.00 - 0.00	600	#	-
umhos/cm		0218	SL, RIV	06/13/2007	N001	0.00 - 0.00	711	#	-	-
umhos/cm		0226-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	611	#	-	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Specific Conductance	umhos/cm	0228-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	605	#	-	-
	umhos/cm	0437	WL	06/13/2007	N001	97.00 - 97.00	11237	#	-	-
	umhos/cm	0438	WL	06/13/2007	N001	118.00 - 118.00	9343	#	-	-
	umhos/cm	0439	WL	06/13/2007	N001	118.00 - 118.00	9437	#	-	-
	umhos/cm	0492	WL	06/14/2007	N001	18.00 - 18.00	2361	#	-	-
	umhos/cm	ATP-2-D	WL, PZ	06/13/2007	N001	88.00 - 88.00	122773	#	-	-
	umhos/cm	ATP-2-S	WL, PZ	06/13/2007	N001	36.00 - 36.00	18164	#	-	-
	umhos/cm	CR1	SL, RIV	06/14/2007	N001	0.00 - 0.00	605	#	-	-
	umhos/cm	CR3-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	629	#	-	-
	umhos/cm	CR5	SL, RIV	06/14/2007	N001	0.00 - 0.00	642	#	-	-
	umhos/cm	TP-02	WL	06/13/2007	N001	30.00 - 30.00	3998	#	-	-
	umhos/cm	TP-17	WL	06/14/2007	N001	28.00 - 28.00	114610	#	-	-
	umhos/cm	TP-19	WL	06/14/2007	N001	29.00 - 29.00	135082	#	-	-
Sulfate	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	130	#	5	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	180	#	5	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	130	#	5	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	130	#	5	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	4300	#	50	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	4300	#	50	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	4000	#	50	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	3400	#	50	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	560	#	10	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	5000	#	50	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	7800	#	100	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	130	#	5	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	130	#	5	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Sulfate	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	130	#	5	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	1100	#	25	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	5500	#	50	-
	mg/L	TP-19	WL	06/14/2007	0001	29.00 - 29.00	4900	#	50	-
Temperature	C	0201	SL, RIV	06/14/2007	N001	0.00 - 0.00	20.10	#	-	-
	C	0218	SL, RIV	06/13/2007	N001	0.00 - 0.00	21.07	#	-	-
	C	0226-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	19.75	#	-	-
	C	0228-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	19.45	#	-	-
	C	0437	WL	06/13/2007	N001	97.00 - 97.00	18.55	#	-	-
	C	0438	WL	06/13/2007	N001	118.00 - 118.00	17.94	#	-	-
	C	0439	WL	06/13/2007	N001	118.00 - 118.00	19.45	#	-	-
	C	0492	WL	06/14/2007	N001	18.00 - 18.00	17.19	#	-	-
	C	ATP-2-D	WL, PZ	06/13/2007	N001	88.00 - 88.00	21.85	#	-	-
	C	ATP-2-S	WL, PZ	06/13/2007	N001	36.00 - 36.00	20.65	#	-	-
	C	CR1	SL, RIV	06/14/2007	N001	0.00 - 0.00	18.84	#	-	-
	C	CR3-010	SL, RIV	06/14/2007	N001	0.00 - 0.00	21.15	#	-	-
	C	CR5	SL, RIV	06/14/2007	N001	0.00 - 0.00	20.50	#	-	-
	C	TP-02	WL	06/13/2007	N001	30.00 - 30.00	19.49	#	-	-
	C	TP-17	WL	06/14/2007	N001	28.00 - 28.00	14.79	#	-	-
C	TP-19	WL	06/14/2007	N001	29.00 - 29.00	16.29	#	-	-	
Total Dissolved Solids	mg/L	0201	SL, RIV	06/14/2007	0001	0.00 - 0.00	380	#	20	-
	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	470	#	20	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	390	#	20	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	380	#	20	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	9000	#	200	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	8800	#	200	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Total Dissolved Solids	mg/L	0438	WL	08/13/2007	0001	118.00 - 118.00	8600	#	200	-
	mg/L	0439	WL	08/13/2007	0001	118.00 - 118.00	8000	#	200	-
	mg/L	0492	WL	08/14/2007	0001	18.00 - 18.00	1400	#	40	-
	mg/L	ATP-2-D	WL, PZ	08/13/2007	0001	88.00 - 88.00	96000	#	2000	-
	mg/L	ATP-2-S	WL, PZ	08/13/2007	0001	36.00 - 36.00	14000	#	400	-
	mg/L	CR1	SL, RIV	08/14/2007	0001	0.00 - 0.00	380	#	20	-
	mg/L	CR3-010	SL, RIV	08/14/2007	0001	0.00 - 0.00	380	#	20	-
	mg/L	CR5	SL, RIV	08/14/2007	0001	0.00 - 0.00	380	#	20	-
	mg/L	TP-02	WL	08/13/2007	0001	30.00 - 30.00	3000	#	80	-
	mg/L	TP-17	WL	08/14/2007	0001	28.00 - 28.00	90000	#	2000	-
	mg/L	TP-19	WL	08/14/2007	0001	29.00 - 29.00	110000	#	2000	-
Turbidity	NTU	0226-010	SL, RIV	08/14/2007	N001	0.00 - 0.00	305	#	-	-
	NTU	0228-010	SL, RIV	08/14/2007	N001	0.00 - 0.00	169	#	-	-
	NTU	0437	WL	08/13/2007	N001	97.00 - 97.00	4.48	#	-	-
	NTU	0438	WL	08/13/2007	N001	118.00 - 118.00	1.74	#	-	-
	NTU	0439	WL	08/13/2007	N001	118.00 - 118.00	4.05	#	-	-
	NTU	0492	WL	08/14/2007	N001	18.00 - 18.00	7.82	#	-	-
	NTU	ATP-2-D	WL, PZ	08/13/2007	N001	88.00 - 88.00	28.2	#	-	-
	NTU	ATP-2-S	WL, PZ	08/13/2007	N001	36.00 - 36.00	10.1	#	-	-
	NTU	CR1	SL, RIV	08/14/2007	N001	0.00 - 0.00	120	#	-	-
	NTU	CR3-010	SL, RIV	08/14/2007	N001	0.00 - 0.00	129	#	-	-
	NTU	CR5	SL, RIV	08/14/2007	N001	0.00 - 0.00	263	#	-	-
	NTU	TP-02	WL	08/13/2007	N001	30.00 - 30.00	74.0	#	-	-
	NTU	TP-17	WL	08/14/2007	N001	28.00 - 28.00	7.98	#	-	-
	NTU	TP-19	WL	08/14/2007	N001	29.00 - 29.00	9.28	#	-	-
Uranium	mg/L	0201	SL, RIV	08/14/2007	0001	0.00 - 0.00	0.0026	J #	4.6E-06	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	SAMPLE: ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Uranium	mg/L	0218	SL, RIV	06/13/2007	0001	0.00 - 0.00	0.0029	J #	4.6E-06	-
	mg/L	0226-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0025	J #	4.6E-06	-
	mg/L	0228-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0025	J #	4.6E-06	-
	mg/L	0437	WL	06/13/2007	0001	97.00 - 97.00	4.800	J #	0.00046	-
	mg/L	0437	WL	06/13/2007	0002	97.00 - 97.00	4.700	J #	0.00046	-
	mg/L	0438	WL	06/13/2007	0001	118.00 - 118.00	2.300	J #	0.00023	-
	mg/L	0439	WL	06/13/2007	0001	118.00 - 118.00	1.100	J #	9.3E-05	-
	mg/L	0492	WL	06/14/2007	0001	18.00 - 18.00	0.650	J #	9.3E-05	-
	mg/L	ATP-2-D	WL, PZ	06/13/2007	0001	88.00 - 88.00	0.013	J #	4.6E-05	-
	mg/L	ATP-2-S	WL, PZ	06/13/2007	0001	36.00 - 36.00	0.030	J #	4.6E-06	-
	mg/L	CR1	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0025	J #	4.6E-06	-
	mg/L	CR3-010	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0025	J #	4.6E-06	-
	mg/L	CR5	SL, RIV	06/14/2007	0001	0.00 - 0.00	0.0025	J #	4.6E-06	-
	mg/L	TP-02	WL	06/13/2007	0001	30.00 - 30.00	5.100	J #	0.00046	-
	mg/L	TP-17	WL	06/14/2007	0001	28.00 - 28.00	0.048	J #	4.6E-05	-
	mg/L	TP-19	WL	06/14/2007	0001	29.00 - 29.00	0.00056 B	J #	4.6E-05	-

GENERAL WATER QUALITY DATA BY PARAMETER (USEE205) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:22 pm

PARAMETER	UNITS	LOCATION ID	LOC TYPE, SUBTYPE	SAMPLE: DATE	SAMPLE: ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
RECORDS: SELECTED FROM USEE200 WHERE site_code='MOA01' AND location_code in('ATP-2-D','ATP-2-S','TP-02','TP-17','TP-19','0437','0438','0439','0492','0201','0218','0226-010','0228-010','CR1','CR3-010','CR5') AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%N%' AND data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND DATE_SAMPLED between #6/13/2007# and #6/14/2007#										
SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.										
LOCATION TYPES: SL SURFACE LOCATION WL WELL										
LOCATION SUBTYPES: PZ Piezometer RIV River										
LAB QUALIFIERS:										
* Replicate analysis not within control limits.										
+ Correlation coefficient for MSA < 0.995.										
> Result above upper detection limit.										
A TIC is a suspected aldol-condensation product.										
B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: 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										
M GFAA duplicate injection precision not met.										
N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).										
P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.										
S Result determined by method of standard addition (MSA).										
U Analytical result below detection limit.										
W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.										
X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.										
Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.										
Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.										
DATA QUALIFIERS:										
F Low flow sampling method used.										
G Possible grout contamination, pH > 9.										
J Estimated value.										
L Less than 3 bore volumes purged prior to sampling.										
N Presumptive evidence that analyte is present. The analyte is "tentatively identified".										
O 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.										

## 3.4 Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site  
 REPORT DATE: 7/9/2008 3:18 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0437	O	4048.25	06/13/2007	09:17	89.12	3959.13	
0438	O	4054.22	06/13/2007	10:12	96.25	3957.97	
0439	O	4055.27	06/13/2007	10:55	97.58	3957.69	
0492		3967.64	06/14/2007	13:12	12.65	3954.99	
ATP-2-D	O	3967.05	06/13/2007	14:05	13.68	3953.37	
ATP-2-S	O	3967.04	06/13/2007	13:45	11.22	3955.82	
TP-02	O	3975.55	06/13/2007	15:06	18.91	3956.64	
TP-17	D	3963.69	06/14/2007	09:18	9.60	3954.09	
TP-19	D	3962.17	06/14/2007	10:45	7.71	3954.46	

RECORDS: SELECTED FROM USEE700 WHERE site\_code='MOA01' AND location\_code in('ATP-2-D','ATP-2-S','TP-02','TP-17','TP-19','0437','0438','0439','0492') AND LOG\_DATE between #6/13/2007# and #6/14/2007#

FLOW CODES: D DOWN GRADIENT O ON-SITE

WATER LEVEL FLAGS:

### **3.5 Blanks Report**

The requirements for collecting equipment blanks were provided to the previous Contractor samplers. Despite the current Contractor's best efforts to communicate the importance of the collection of equipment blanks, unfortunately the samplers did not follow protocol and no field blanks were collected. As a result, there is no corresponding report.

# **Attachment 1**

## **Trip Report**



Date: July 3, 2007  
To: Ken Pill  
From: E.M. Glowiak  
Subject: Routine Sampling Trip Report

**Site:** Moab – Ground Water and Surface Water Sampling Event –June 2007

**Date of Sampling Event:** June 13-14, 2007

**Team Members:** K. Pill, E. Bettez

**RIN Number Assigned:** All samples were assigned to RIN 07060957.

**Sample Shipment:** The coolers were shipped overnight FEDEX to Paragon Analytics, Inc. from Moab, Utah, on June 14, 2007 (Airbill No. 8604 9605 0065).

**Number of Locations Sampled:** The June routine sampling was conducting during the descending limb of the hydrograph after spring peak run-off. Nine monitor wells and seven surface water locations were sampled during the June 2007 Routine sampling event. Including 1 duplicate, a total of 17 samples were collected.

The number of sample locations was reduced from previous routine sampling events since many of the routine sample locations were sampled during the June monthly sampling event (RIN 07060933).

**Locations Not Sampled/Reason:** None.

**Field Variance:** None.

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

False ID	True ID	Sample Type	Associated matrix	Ticket Number
2514	0437	Duplicate from 97 ft bgs	Ground Water	NFK 779

**Location Specific Information:** Wells 0437, 0438, and 0439 were sampled using dedicated bladder pumps. All other remaining monitor wells were sampled using a peristaltic pump and dedicated tubing. Each surface water sample was collected using a peristaltic pump and hose reel. The table below provides additional information:

Sample ID	Location	Date	Sample Depth	Comments
NFK 784	CR-1	06/14/2007	6 in. bgs	Sampled off of the main river channel, very turbid, high flow velocity.
NFK 791	0492	06/14/2007	18	Developed well after sampling, removed sand off of the bottom
NFK 790	CR3-010	06/14/2007	Unknown	Sample collected off of the main river channel, very turbid, high flow velocity
NFK 785	TP-17	06/14/2007	28 ft bgs	
NFK 787	0226-010	06/14/2007	Unknown	Sample collected off of the main river channel, very turbid, high flow velocity
NFK 789	TP-19	06/14/2007	29	Strong sulfur odor
NFK 788	0228-010	06/14/2007	Unknown	Sample collected off of the main river channel, very turbid, high flow velocity
NFK 782	TP-02	06/13/2007	30	High turbidity
NFK 783	0218-010	06/13/2007	Unknown	Sample collected off of the main river channel, very turbid, moderate flow velocity
NFK 780	ATP-2-S	06/13/2007	36 ft bgs	Type II well
NFK 781	ATP-2-D	06/13/2007	88 ft bgs	Type I well, high turbidity
NFK 793	CR5	06/14/2007	Unknown	Sample collected off of the main river channel, very turbid, high flow velocity
NFK 792	0201	06/14/2007	Unknown	Sampled collected off of the main river channel, very turbid, high flow velocity
NFK 776	0437	06/13/2007	97 ft bgs	Sampled using dedicated bladder pump
NFK 777	0438	06/13/2007	118 ft bgs	Sampled using dedicated bladder pump
NFK 778	0439	06/13/2007	118 ft bgs	Sampled using dedicated bladder pump

Notes: ft bws = feet below water surface, ft bgs = feet below ground surface

**Water Level Measurements:** Water level data are provided in the table below. These data represent depth to water measurements or feet below top of casing (ft btoc).

Well No.	Date	Time	Depth to Water (ft btoc)
ATP-2-S	06/13/2007	13:45	11.22
ATP-2-D	06/13/2007	14:05	13.68
0437	06/13/2007	09:17	89.12
0438	06/13/2007	10:12	96.25
0439	06/13/2007	10:55	97.58
0492	06/14/2007	13:12	12.65
TP-02	06/13/2007	15:06	18.91
TP-17	06/14/2007	09:18	9.60
TP-19	06/14/2007	10:45	7.71

**Well Inspection Summary:** A well inspection was not conducted.

**Equipment:** No issues.

**Regulatory:** None.

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

Date	Daily Mean Flow (cfs)
06/13/2007	9,860
06/14/2007	11,000

**Corrective Action Required/Taken:** None

cc: E.M. Glowiak, P2S  
M. Mullis, S&K  
K.G. Pill, P2S  
J.D. Ritchey, P2S  
Document Control

# **Attachment 2**

## **Acronyms and Abbreviations**

## Acronyms and Abbreviations

CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
cfs	Cubic Feet per Second
COC	Chain of Custody
CRI	Reporting Limit Verification Check
DO	Dissolved Oxygen
EDD	Electronic Data Deliverable
EPA	Environment Protection Agency
ft bgs	Feet Below Ground Surface
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Standard
ICV	Initial Calibration Verification
LCS	Laboratory Control Samples
MDL	Minimum Detection Limit
mg/L	Milligram per Liter
mL/m	Milliliter per Minute
MS	Matrix Spike
MSD	Matrix Spike Duplicate
µs/cm	Micro Siemens per Centimeter
mV	Millivolt
ORP	Oxygen Reduction Potential
PQL	Practical Quantitation Limit
RDL	Required Detection Limit
RPD	Relative Percent Difference
SMS	Sample Management System
SU	Standard Unit
UMTRA	Uranium Mill Tailings Remedial Action
USGS	U.S. Geological Survey
VDP	Validation Data Package