

Office of Environmental Management – Grand Junction



Moab UMTRA Project
Ground Water and Surface Water
Monitoring Report January through
June 2013

Revision 0

September 2013



U.S. Department
of Energy

Office of Environmental Management

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Revision History

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Appendix

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Minimums and Maximums Report	
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Acronyms and Abbreviations

ALS	ALS Environmental, Inc.
°C	degrees Centigrade
CCB	continuing calibration blank
CCV	continuing calibration verification
CF	Configuration
CFR	Code of Federal Regulations
COC	chain of custody
CRI	reporting limit verification
DOE	U.S. Department of Energy
EB	equipment blank
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
ICB	initial calibration blank
ICP	inductively coupled plasma
ICV	initial calibration verification
IDL	instrument detection limit
LCS	laboratory control sample
MDL	method detection limit or minimum detection limit
mg/L	milligrams per liter
MS	matrix spike or mass spectroscopy
MSD	matrix spike duplicate
r ²	correlation coefficient
RIN	report identification number
RL	reporting limit
RPD	relative percent difference
SD	serial dilution
SDG	sample data group
UMTRA	Uranium Mill Tailings Remedial Action
USGS	U.S. Geological Survey

1.0 Introduction

1.1 Purpose

The purpose of this semi-annual report is to summarize the results associated with ground water and surface water samples collected from the U.S. Department of Energy (DOE) Moab Uranium Mill Tailings Remedial Action (UMTRA) Project site during the first half of 2013. The results of the data validation process are also presented. One sampling event was completed during May/June 2013, with samples collected from a variety of site-wide ground water and surface water locations. In addition, samples were collected from the eight Configuration (CF) 5 extraction wells at various flow rates to determine what impact the flow rate has on the ammonia and uranium concentrations. All ground water sample locations are shown on Figure 1; surface water locations are shown on Figure 2.

Surface water sampling was conducted to assess surface water quality adjacent to the site compared to the upstream and downstream water quality. Site-wide ground water sampling was conducted to assess any changes and trends in water quality. Thirteen of the upgradient wells typically sampled during the site-wide events were not sampled since the analytical results have consistently been below the detection limits. These particular wells will be sampled again within the year.

1.2 Scope

This document presents the Summary of Sampling Events and Data Assessments, including a summary of the anomalous data generated by the validation process, and results for this event. Sampling and analyses were conducted in accordance with the *Moab UMTRA Project Operations and Maintenance Manual* (DOE-EM/GJTAC1973) and the *Moab UMTRA Project Surface Water/Ground Water Sampling and Analysis Plan* (DOE-EM/GJTAC1830), and all data validation follows the criteria according to the *Moab UMTRA Project Standard Practice for Validation of Laboratory Data* (DOE-EM/GJTAC1855). The trip report is also provided in Appendix A. All Colorado River flow discussed in this document is measured from the U.S. Geological Survey (USGS) Cisco gaging station number 09180500. River elevation data were collected on site.

A Minimums and Maximums Report was generated (by the Sample Management System and the SEEPro database) to determine if the applicable data are within a normal statistical range. The new data set was compared to the historical data to determine if these data fall outside the historical data range. The results are not considered anomalous if: (1) identified low concentrations are the result of low detection limits; (2) the concentration detected is less or more than 50 percent of historical minimum or maximum values; or (3) there were fewer than five historical samples for comparison.

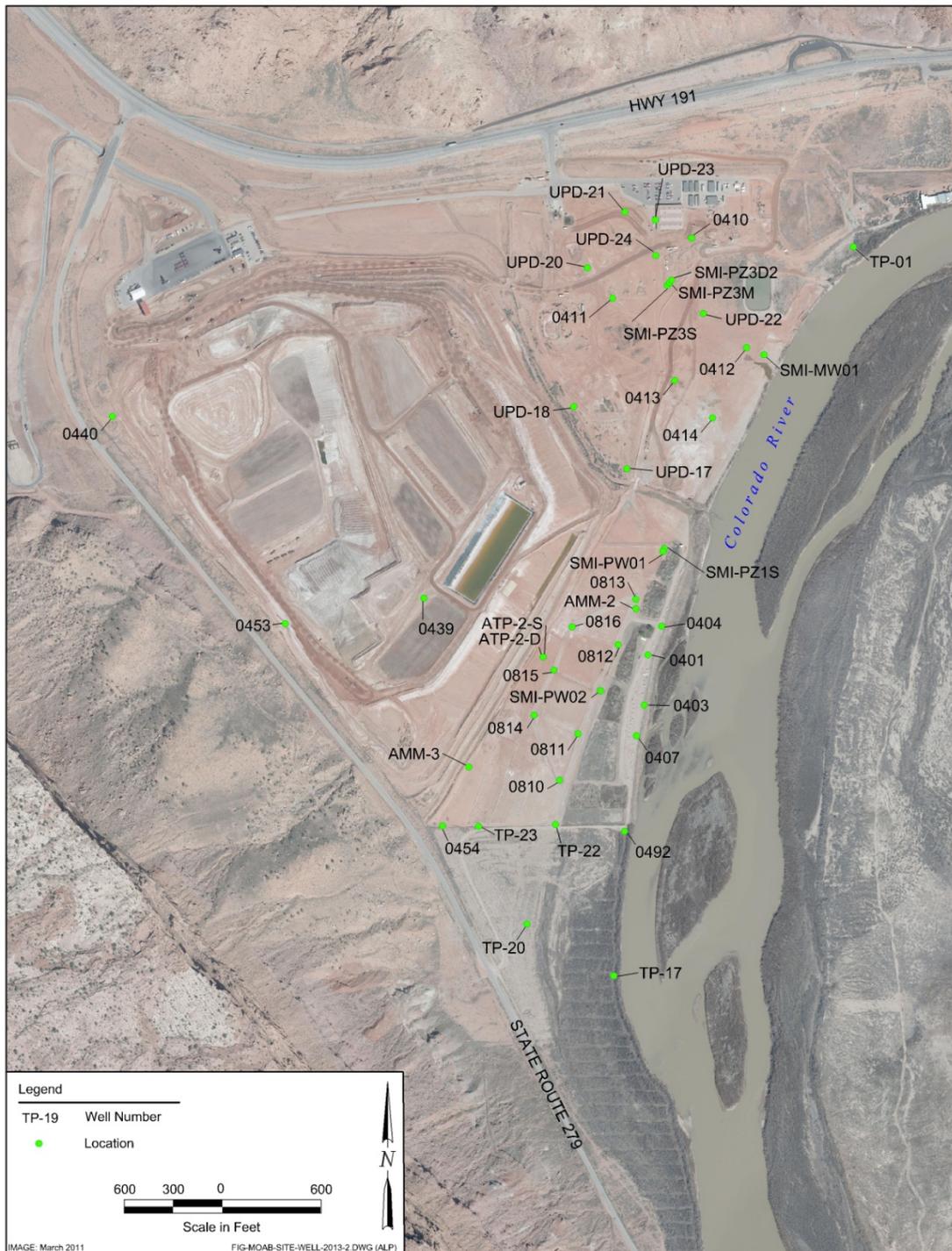


Figure 1. May/June 2013 Site-wide Ground Water Sampling Locations

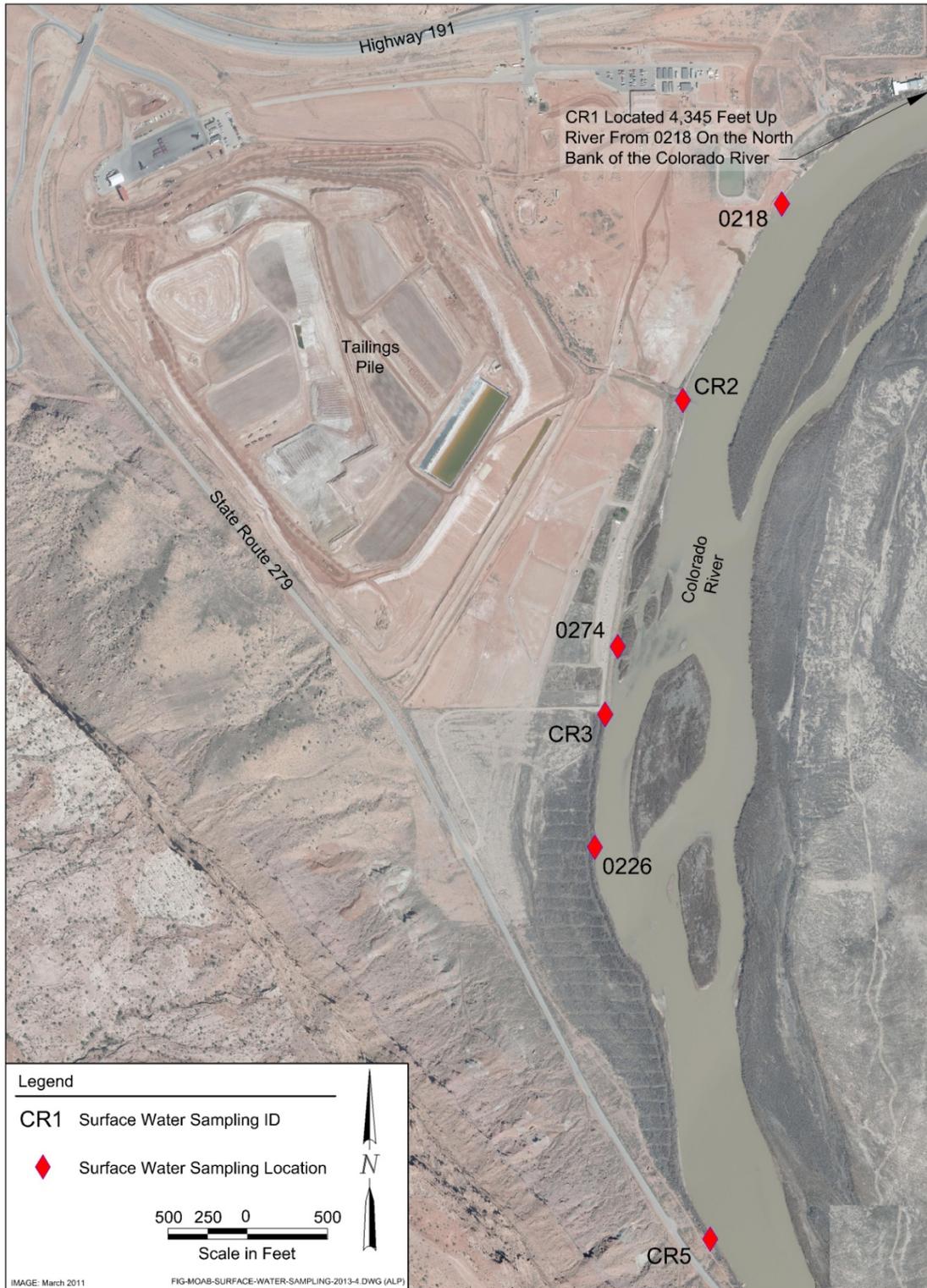


Figure 2. May/June 2013 Site-wide Surface Water Sampling Locations

2.0 Summary of Sampling Event

Forty-two ground water and surface water samples were collected between May 15 and June 6 as part of the site-wide event. This event corresponds to the time frame when the Colorado River flows are generally experiencing spring runoff peak-flow conditions. Twenty-two additional samples were collected from the CF5 extraction wells as part of this event. These samples were collected after each extraction well had been pumping at various flow rates to determine any impacts to the contaminant concentrations.

These ground water samples were collected from a variety of downgradient and cross-gradient locations at various depths. Also included were the locations in the vicinity of the northeastern uranium plume. All samples were analyzed for ammonia using a HACH sension 2 portable pH/ISE probe and meter. Approximately one-half of these samples were also submitted to ALS Environmental, Inc. (ALS), laboratory for ammonia analysis. All samples were analyzed by ALS for uranium. All ground water sample locations are shown on Figure 1.

The seven surface water samples were collected upstream, downstream, and adjacent to the site during this event. These surface water locations are presented on Figure 2.

3.0 Data Assessment

3.1 May/June 2013 Site-wide Sampling Event

3.1.1 Laboratory Performance Assessment

This validation was performed according to *Standard Practice for Validation of Laboratory Data*. The procedure was applied at Level 3, Data Deliverables Examination. All analyses were successfully completed.

General Information and Validation Results

Report Identification Number (RIN) 1305066
Laboratory: ALS, Fort Collins, Colorado
Sample Date Group (SDG) Numbers: 1305470, 1306091
Analysis: Inorganics and Metals
Validator: Elizabeth Moran
Review Date: September 4, 2013

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

Table 1. May/June 2013 Site-wide Sampling Analytes and Methods

Analyte	Preparation Method	Analytical Method
Ammonia as N	EPA 350.1	EPA 350.1
Uranium	SW-846 3005A	SW-846 6020A

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

Table 2. May/June 2013 Site-wide Sampling Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1305470-1 through 1305470-39 and 1306091-1 through 1306091-29	All in SDG 1305470 and all in SDG 1306091	Uranium	J	MS-1
1305470-1 through 1305470-39	All in SDG 1305470	Ammonia	J	MS-2

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

Table 3. May/June 2013 Site-wide Sampling Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Non-Detects)	Explanation
MS-1	J	U	Results for the affected analyte(s) are regarded as estimated (J) because the matrix spike sample was (a) from another client, (b) of dissimilar matrix, (c) a field blank or equipment blank, or (d) not analyzed at the proper frequency as stated in the appropriate analytical method.
MS-2	J	U	Results for the affected analyte is regarded as estimated because no matrix spike duplicate was analyzed.

Sample Shipping/Receiving

ALS, in Fort Collins, Colorado, received a total of 68 samples for RIN 1305066 in two shipments of two coolers each. SDG 1305470 consisted of 39 uranium and 33 ammonia samples and arrived on May 31, 2013 (UPS tracking numbers 1Z5W1Y510196907580 and 1Z5W1Y540195806397). SDG 1306091 consisted of 29 uranium and 18 ammonia samples and arrived on June 7, 2013 (UPS tracking numbers 1Z5W1Y510195787211 and 1Z5W1Y510199461603). Both of the SDGs were accompanied by a chain-of-custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents, including the COC forms and the sample tickets, had no errors or omissions.

Preservation and Holding Times

SDG 1305470, packed in two coolers, was received intact with temperatures of 3.4 degrees Centigrade (°C) and 2.2°C. SDG 1306091 was also packed in two coolers and was received intact with temperatures of 0.6 and 1.2 °C, which complies with all 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 results were found to be within quality-control procedures except for the following.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates 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 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.

Calibration standards were prepared from independent sources. In addition, for inductively coupled plasma (ICP) analytes (uranium), reporting limit verifications (CRIs) verify the linearity of the calibration curve near the reporting limit (RL). For ICP-mass spectrometry (MS) analytes (uranium), instrument tuning and performance criteria are checked for mass calibration and resolution verifications. And also for ICP-MS analyte uranium, internal standards are analyzed to indicate stability of the instruments.

Method SW-846 6020A, Uranium

The calibration for the uranium analyses for SDG 1305470 was performed on June 5, 2013, and the calibration for SDG 1306091 was performed on June 10, 2013. The initial calibrations were both performed using five calibration standards and one blank, resulting in calibration curves with correlation coefficient (r^2) values greater than 0.995. The values of the calibration curve intercepts for uranium were positive and less than three times the instrument detection limit (IDL).

Initial calibration verification (ICV) and continuing calibration verification (CCV) checks were made at the required frequency. All calibration checks met the acceptance criteria. CRIs were made at the required frequency to verify the linearity of the calibration curve near the RL. The CRIs were within the acceptance criteria range for all SDGs. 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 EPA 350.1, Ammonia as N

Initial calibrations for ammonia as N (for both SDG 1305470 and 1306091) were performed using four calibration standards and a blank on June 5 and June 10, 2013. The calibration curve had an r^2 value greater than 0.995 and an intercept less than three times the MDL. ICV and CCV checks were made at the required frequency. All calibration check results for all SDGs were within the acceptance criteria.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Both initial calibration blanks (ICBs) and continuing calibration blanks (CCBs) are analyzed to assess instrument contamination before and during sample analysis.

Detected sample results associated with blanks results greater than the minimum detectable limit (MDL) or IDL (depending on method requirements) were "U"-qualified when the detections were less than five times the blank concentration. Non-detects were not qualified.

All of the uranium CCBs were less than the IDL on both of the SDGs. No results had to be qualified. One ammonia CCB had a result that was greater than the ammonia MDL (CCB3 on SDG 130691). None of the associated ammonia results were less than five times the highest blank value, so none of the data needed to be qualified.

Equipment Blanks

An equipment blank (EB) is a sample of analyte-free media collected from a rinse of non-dedicated sampling equipment used to sample surface water. EBs are collected to document adequate decontamination of non-dedicated equipment. One EB should be prepared with each preparation batch. Dedicated sampling equipment was used on all locations, so no EBs were collected and analyzed.

Matrix Spike Analysis

Matrix spike (MS) samples were prepared and analyzed for all analytes as a measure of method performance in the sample matrix. Laboratory spike standards are prepared from independent sources. The spike recoveries met the recovery and precision criteria for all analytes.

MS recovery could not be evaluated for uranium in SDG 1305470 (1305470-21 MS and matrix spike duplicate [MSD]) or SDG 1306091 (1306091-1 MS and MSD) because the concentration of the analyte in the native samples was greater than four times the concentration of matrix spike added; therefore, this data was flagged “J” for reason MS-1.

For ammonia as N analysis in SDG 1305470, only one MS was analyzed for the 33 total ammonia samples. Method 350.1 requires MSs to be analyzed for at least 10 percent of the samples, therefore all of the ammonia samples from SDG 1305470 have been flagged J for reason MS-2.

Laboratory Replicate Analysis

The laboratory replicate results demonstrate acceptable laboratory precision. The relative percent difference (RPD) values for the reported MSD results for all other analytes should be less than 20 percent for results greater than five times the RL.

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 locations 0492 (1305470-8), UPD-24 (1306091-29), 0414 (1306091-8), and 0401 (1306091-1). The duplicate results met the U.S. Environmental Protection Agency (EPA) recommended laboratory duplicate criteria of less than 20 RPD for results that are greater than five times the RL.

Laboratory Control Sample

Laboratory control samples (LCSs) provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. LCS results were acceptable for ammonia analyses. LCSs were not reported for uranium. In accordance with national environmental laboratory accreditation requirements provided by the NELAC Institute, an MS may be used in place of an LCS provided the acceptance criteria are as stringent.

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. ICP-MS SD data are evaluated when the concentration of the undiluted sample is greater than 100 times the RL. All evaluated SD data were acceptable and thus were not flagged.

Detection Limits/Dilutions

Dilutions were prepared in a consistent and acceptable manner when dilutions were required. The required detection limits 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 Files

The electronic data deliverable files arrived on June 14 and June 24. The contents of the files were manually examined to ensure all and only the requested data were delivered in compliance with requirements and that the sample results accurately reflected the data contained in the sample data package.

3.1.2 Minimums and Maximums Report and Anomalous Data Review

The Minimums and Maximums Report for this sampling event is located in Appendix A. Based on the results, there was one anomalous data point associated with this event. The uranium concentration detected in the sample collected from well 0411 was slightly more than 50 percent below the historical minimum, as shown in Table 4.

Table 4. Anomalous Data Associated With the May/June 2013 Sampling Event

Location	Sample Date	Analyte	Concentration (mg/L)	Historical Minimum (mg/L)	Historical Maximum (mg/L)	Disposition
0411	5/29/2013	Uranium	1.7	3.5	NA	Concentration has steadily decreased since November 2011.

mg/L = milligrams per liter

4.0 Results

As previously mentioned, all samples collected during this event were analyzed for uranium, and approximately one-half were analyzed for ammonia by ALS. Table 5 presents the site-wide locations (excluding CF5 extraction wells) and associated concentrations that exceeded the 0.044 milligrams per liter (mg/L) uranium ground water standard. All samples collected from the CF5 extraction wells exceed this uranium standard, which is based on Table 1 in Title 40 Code of Federal Regulations Part 192, Subpart A (40 CFR 192A), "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings and Uranium In Situ Leaching Processing Facilities," assuming uranium-234 and uranium-238 activities are in equilibrium.

Table 5. May/June 2013 Site-wide Locations Exceeding the 0.044 mg/L Uranium Ground Water Standard

Well Number	Date	Location	Sample Depth (ft bgs)	Uranium Concentration (mg/L)
0401	6/6/13	CF2 Vicinity	18	2.1
0403	6/6/13	CF1 Vicinity	18	1.4
0404	6/6/13	CF3 Vicinity	18	1.5
0407	6/6/13	CF1 Vicinity	17	0.67
0410	5/29/13	NE Uranium Plume Area	27	0.48
0411	5/29/13	NE Uranium Plume Area	9.5	1.7
0412	6/4/13	NE Uranium Plume Area	10.5	2.4
0413	6/4/13	NE Uranium Plume Area	11.5	3.8
0414	6/5/13	NE Uranium Plume Area	13	4.2
0439	5/29/13	NE Uranium Plume Area	118	0.81
0453	5/29/13	Along SW Site Boundary	80	2.1
0454	6/4/13	Along S Site Boundary	13	2.1
0492	5/30/13	Along S Site Boundary	18	0.56
AMM-2	6/4/13	Near Base of Tailings Pile	48	1.9
AMM-3	6/5/13	Near Base of Tailings Pile	48	2.5
SMI-MW01	6/4/13	NE Uranium Plume Area	16	4.2
SMI-PZ1S	6/6/13	CF5 Vicinity	18	1.0
SMI-PZ3D2	6/3/13	NE Uranium Plume Area	78	1.4
SMI-PZ3M	6/3/13	NE Uranium Plume Area	59	0.6
SMI-PZ3S	6/3/13	NE Uranium Plume Area	25	1.0
TP-01	5/28/13	NE Uranium Plume Area	22	0.075
TP-22	6/4/13	NE Uranium Plume Area	17	0.21
TP-23	6/4/13	NE Uranium Plume Area	25	3.4
UPD-17	6/3/13	NE Uranium Plume Area	14	1.3
UPD-18	5/29/13	NE Uranium Plume Area	13	1.1
UPD-20	6/3/13	NE Uranium Plume Area	17	0.08
UPD-21	6/3/13	NE Uranium Plume Area	25	5.0
UPD-22	6/4/13	NE Uranium Plume Area	9	3.9
UPD-23	6/5/13	NE Uranium Plume Area	26	0.74
UPD-24	6/3/13	NE Uranium Plume Area	27	7.9

CF = Configuration; ft bgs = feet below ground surface, S = southern; SW = southwestern; NE = northeastern

4.1 CF5 Extraction Rates and Associated Analytical Results

Samples were collected from all eight CF5 extraction wells to determine if contaminant concentrations were impacted by flow rates. Each well was pumped at a rate of approximately 15, 25, and 40 gallons per minute (gpm) for a minimum of 24 hours before sampling. It was not possible for well 0811 to maintain a flow rate of 40 gpm; therefore, samples were collected from only two different flow rates. Likewise, samples were collected from only two different flow rates from well PW-02 because the pump installed in this well was not able to maintain a steady flow less than 20 gpm.

As displayed in this table, there was no significant difference between the flow rates and the resulting contaminant concentration for any of the CF5 extraction wells. This suggests that the wells do not need to be operated at a specific flow rate to maximize the contaminant mass removed.

4.2 Ground Water Quality Trends

To present the trends observed in the water chemistry for the site-wide locations, the site was divided into six areas. These include the northeastern base of the tailings pile, northeastern uranium plume (which includes the PW03 cluster), the southeastern base of the tailings pile, along the southwestern boundary, along the Colorado River bank, and south of the site. All results are also plotted against the Colorado River flow to determine if the river stage may impact the concentrations. Results based on analysis using the ammonia probe are also displayed.

Table 6. CF5 Sampling Results and Flow Rates, May/June 2013

Well Number	Date	Flow Rate (gpm)	Ammonia Concentration (mg/L)	Uranium Concentration (mg/L)
0810	5/15/13	12.9	340	3.0
	5/16/13	25.2	330	3.0
	5/21/13	38.8	330	3.0
0811	5/15/13	13.7	380	2.6
	5/16/13	23.1	400	2.5
0812	5/21/13	15.9	430	2.0
	5/16/13	25.9	400	1.9
	5/24/13	39.8	410	1.9
0813	5/21/13	15.2	340	1.4
	5/22/13	25.2	340	1.4
	5/24/13	43.6	340	1.4
0814	5/15/13	19.6	200	2.6
	5/16/13	31	200	2.5
	5/22/13	38.6	240	2.5
0815	5/15/13	13.2	300	2.5
	5/16/13	32.8	290	3.0
	5/24/13	42.8	310	2.8
0816	5/21/13	15	180	2.9
	5/22/13	25.4	190	2.3
	5/24/13	46.7	200	2.5
PW02	5/21/13	26.1	480	2.8
	5/22/13	40.8	490	2.7

4.2.1 Northeastern Base of the Tailings Pile

Wells UPD-17 through UPD-19 were installed in the vicinity of the northeastern base of the tailings pile in spring 2011 and were first sampled in October 2011. Figures 3 and 4 are time versus ammonia and uranium concentration plots, respectively, for these locations. It was not possible to collect a sample from Well UPD-19 during the May/June 2013 event.

The ammonia concentrations in samples collected from UPD-17 and -18 remain between 200 and 300 mg/L (Figure 3), and uranium concentrations were below 1.5 mg/L (Figure 4). There are too few data points to determine if clear trends are evident.

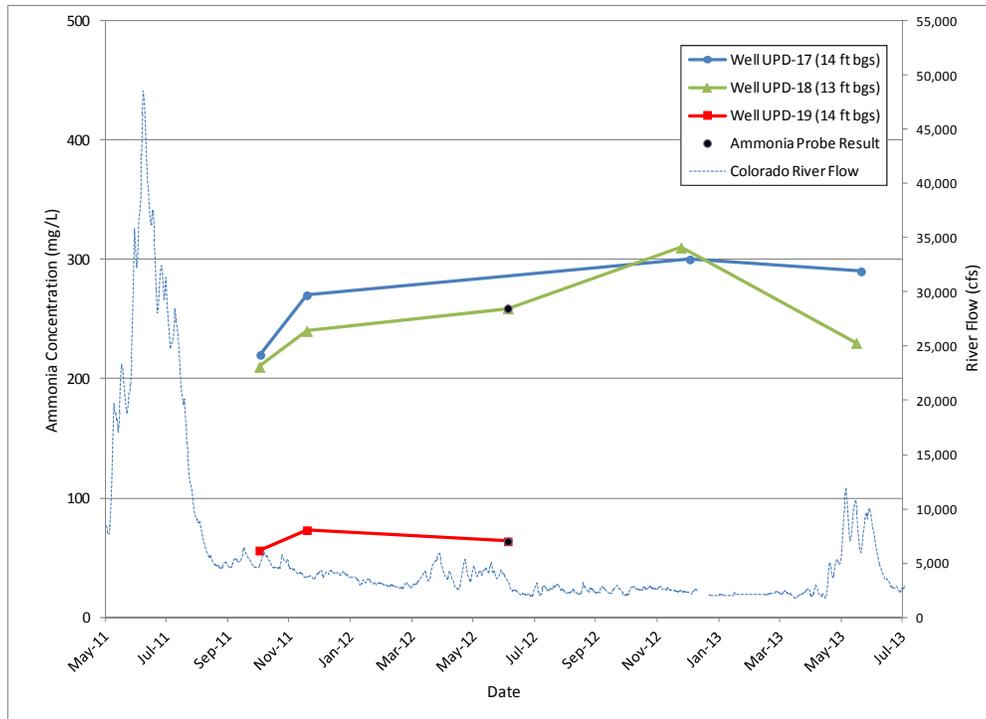


Figure 3. Wells UPD-17, UPD-18, and UPD-19 Time Versus Ammonia Concentration Plot

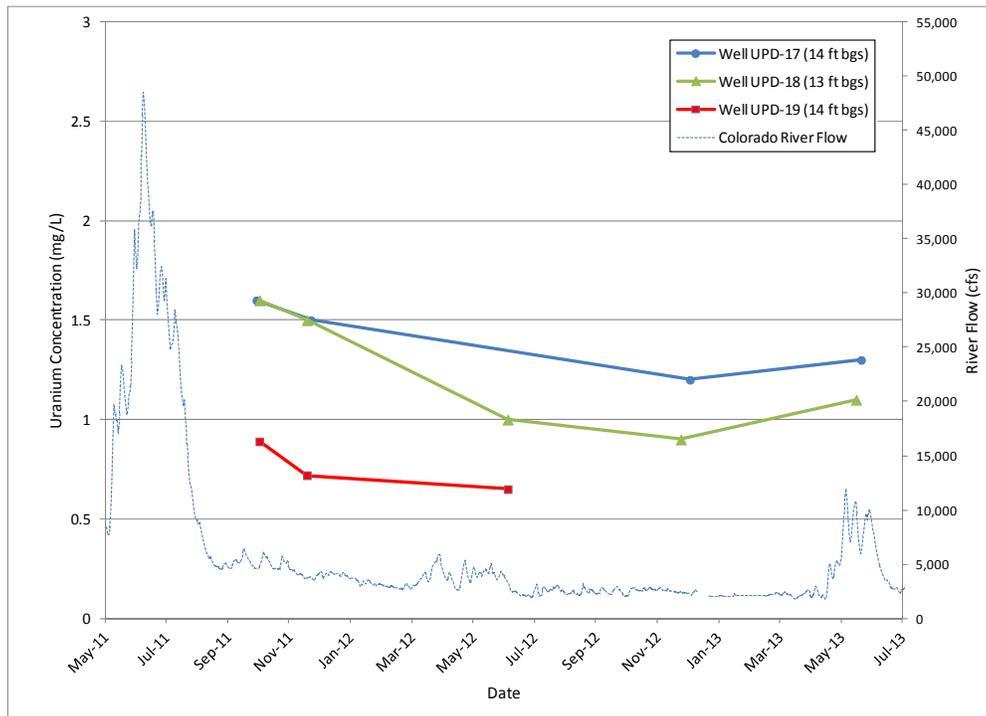


Figure 4. Wells UPD-17, UPD-18, and UPD-19 Time Versus Uranium Concentration Plot

4.2.2 Northeastern Uranium Plume Area

Due to the number of wells associated with the northeastern uranium plume, this area of the site was further divided into three subareas: the center of the plume, the vicinity of the Atlas building, and the northeastern edge of the plume area.

4.2.3 Center of the Northeastern Uranium Plume Area

Figures 5 and 6 are the time versus ammonia and uranium concentration plots, respectively, for the center of the northeastern uranium plume area, which includes locations 0411, 0413, 0414, and UPD-20. As displayed in Figure 5, the ammonia concentrations have remained consistently below 5 mg/L in the samples collected from wells UPD-20 and 0411 and have decreased since the November/December 2012 event in the samples collected from 0413 and 0414. Subsequent events will determine if these downward trends will continue.

As displayed in Figure 6, the uranium concentrations have not significantly changed in the samples collected from wells 0413, 0414, and UPD-20. Over the past year, the uranium concentration has decreased in the samples collected from well 0411 from 3.5 to 1.7 mg/L.

4.2.4 Atlas Building Vicinity

The ammonia and uranium concentrations associated with samples collected from locations in the vicinity of the Atlas building are displayed in Figures 7 and 8, respectively. These wells include 0410, UPD-21, UPD-23, and UPD-24. Wells UPD-23 and UPD-24 were installed in the winter of 2012 to better define the extent of the elevated uranium concentrations detected in the samples collected from well UPD-21. This sampling event represents the second time these new wells were sampled.

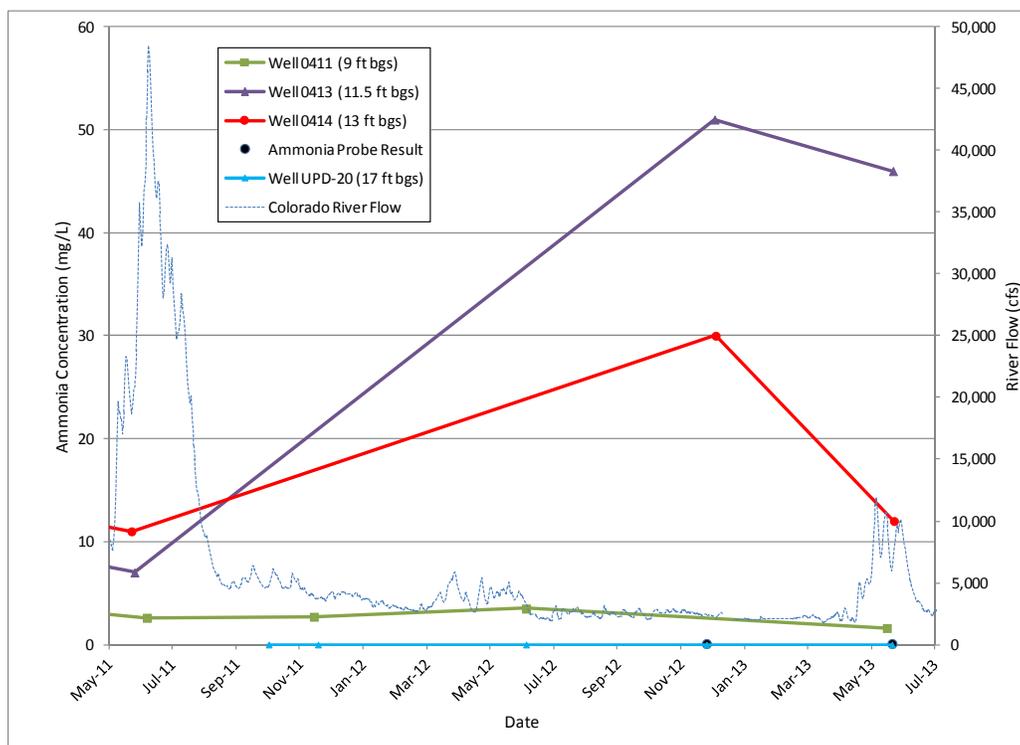


Figure 5. Center of the Northeastern Uranium Plume Area Observation Wells 0411, 0413, 0414, and UPD-20 Time Versus Ammonia Concentration Plot

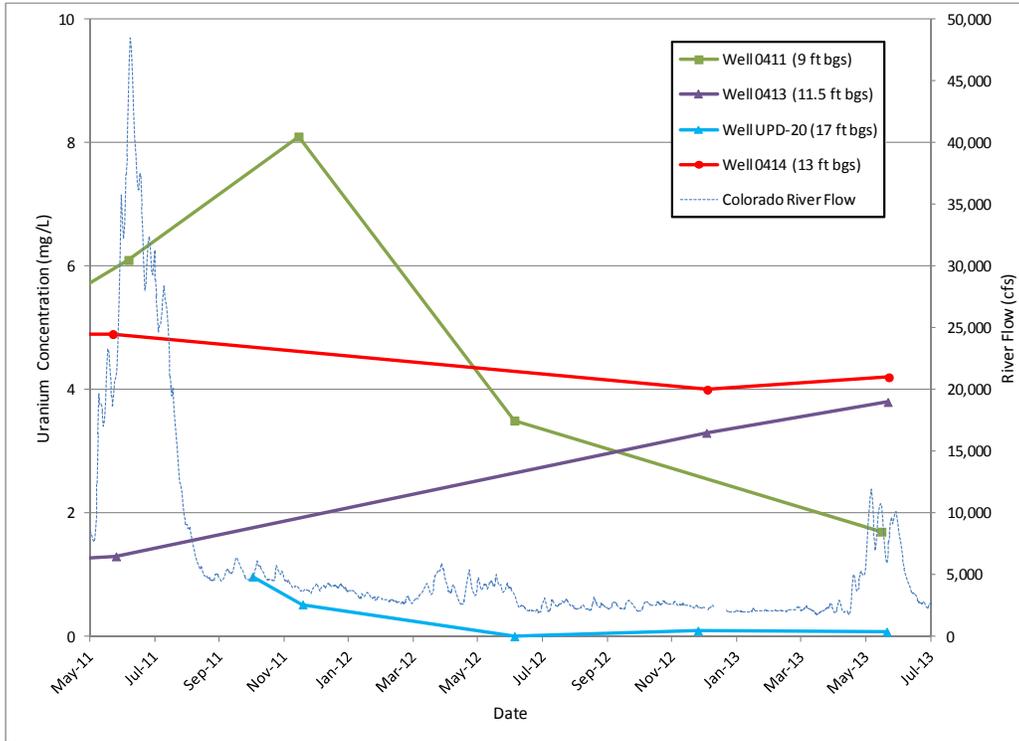


Figure 6. Center of the Northeastern Uranium Plume Area Observation Wells 0411, 0413, 0414, and UPD-20 Time Versus Uranium Concentration Plot

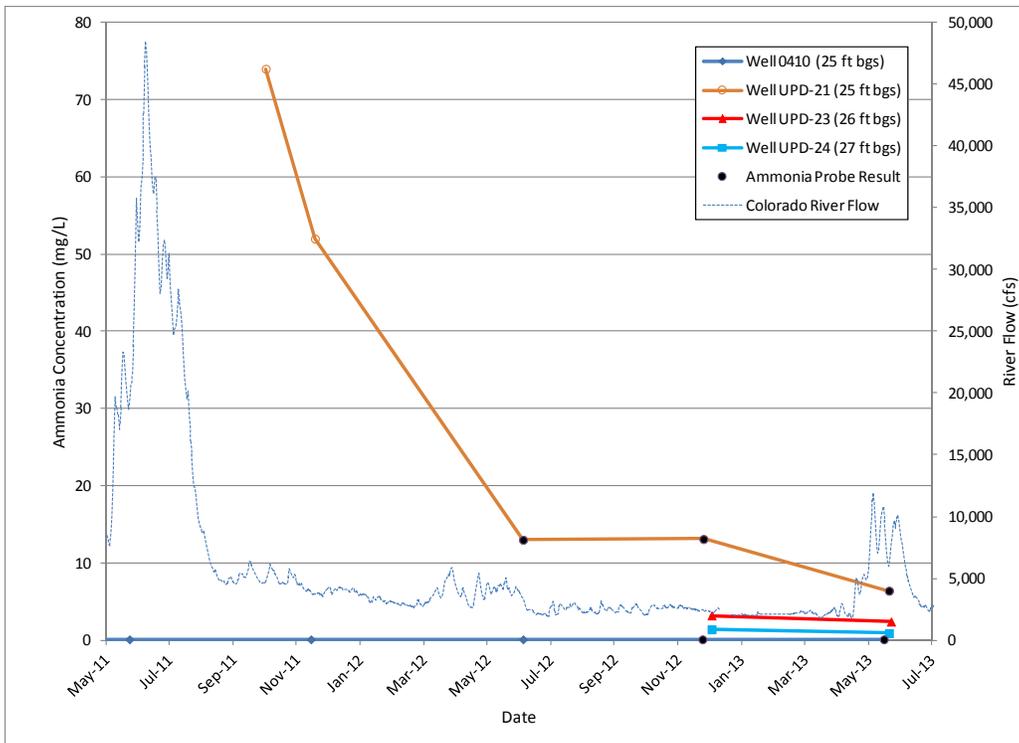


Figure 7. Vicinity of the Atlas Building Observation Wells 0410, UPD-21, UPD-23, and UPD-24 Time Versus Ammonia Concentration Plot

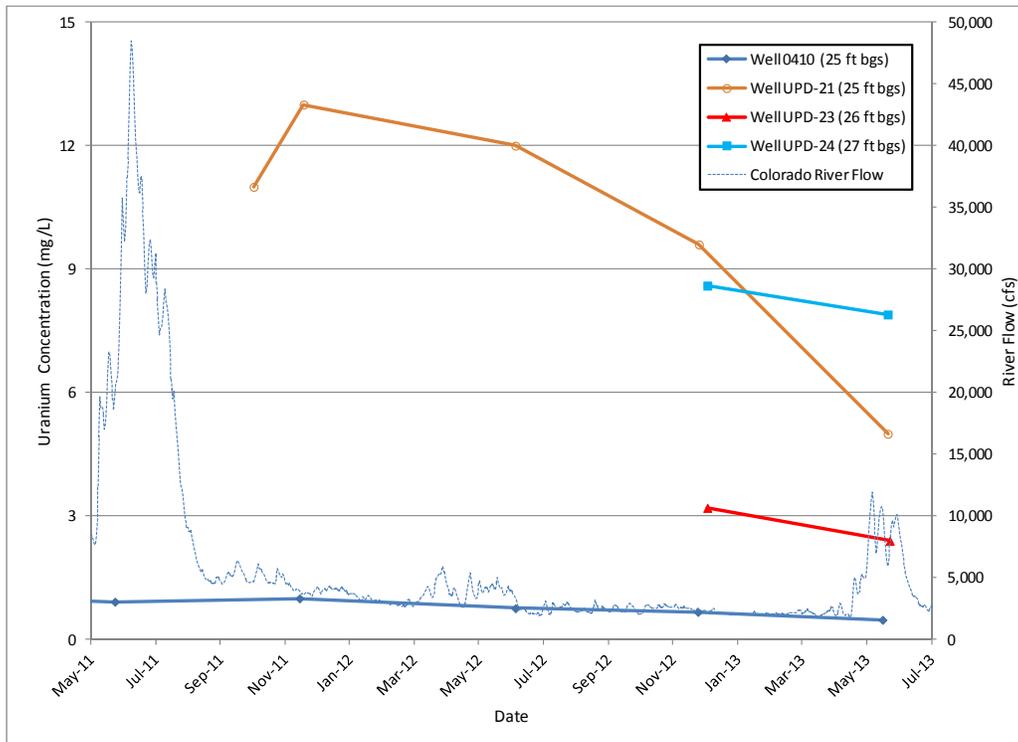


Figure 8. Vicinity of the Atlas Building Observation Wells 0410, UPD-21, UPD-23, and UPD-24 Time Versus Uranium Concentration Plot

As shown in Figure 7, the ammonia concentrations in the samples collected from wells 0410, UPD-23, and UPD-24 were all less than 5 mg/L, and the concentration in the samples collected from UPD-21 continue to gradually decrease. Figure 8 displays that the uranium concentrations in samples collected from well 0410 remain below 1 mg/L, while the sample collected from well UPD-21 has also continued to gradually decrease since November 2011 (from 13 to 5 mg/L). The samples collected from wells UPD-23 and UPD-24 indicate the concentrations have not significantly changed since November/December 2012. At this time, it is difficult to determine the cause of the decreasing contaminant concentrations associated with well UPD-21. Monitoring of this location will be ongoing to see if this trend continues.

4.2.5 Northeastern Edge of the Uranium Plume Area

Figures 9 and 10 display comparable data for the wells located in the vicinity of the northeastern edge of the plume area (wells 0412, UPD-22, SMI-MW01, and SMI-PZ3S). As Figure 9 exhibits, the ammonia concentrations have rebounded to May/June 2012 levels for the samples collected from wells UPD-22, SMI-MW01, and SMI-PZ3S, and are all below 5 mg/L. The concentrations measured in the sample collected from well 0412 remain below the detection limit.

The uranium concentrations (Figure 10) in general have slightly increased in the samples collected from wells SMI-MW01 and UPD-22, and slightly decreased in the samples collected from wells 0412 and SMI-PZ3S since November/December 2012.

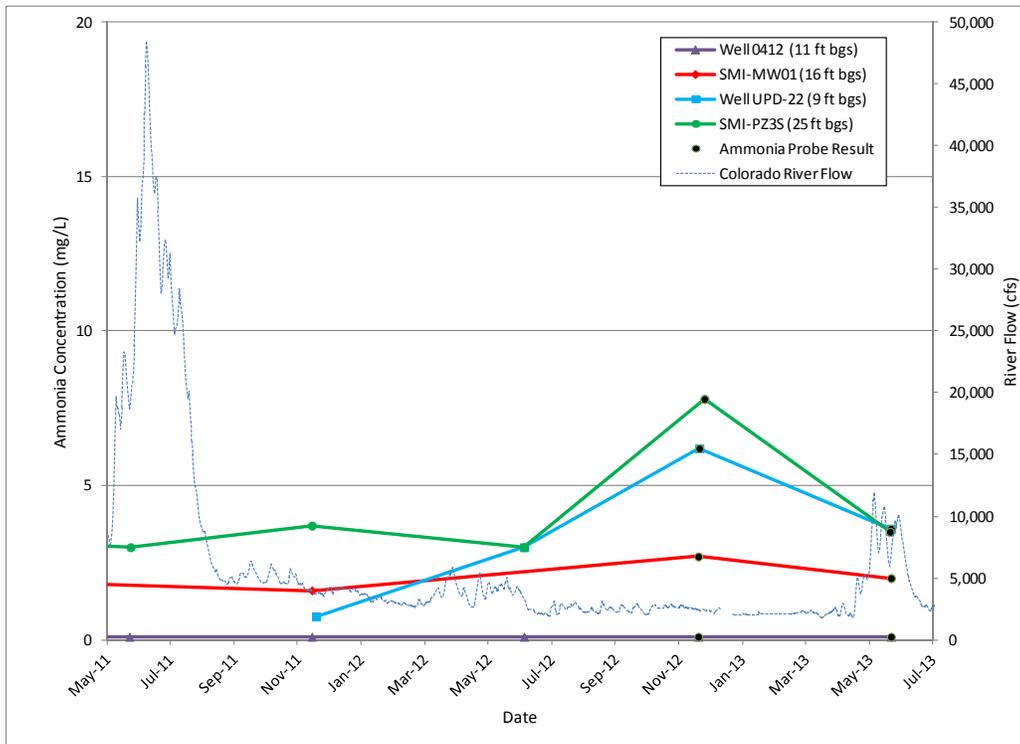


Figure 9. Northeastern Edge of the Uranium Area Observation Wells 0412, SMI-MW01, SMI-PZ3S, and UPD-22 Time Versus Ammonia Concentration Plot

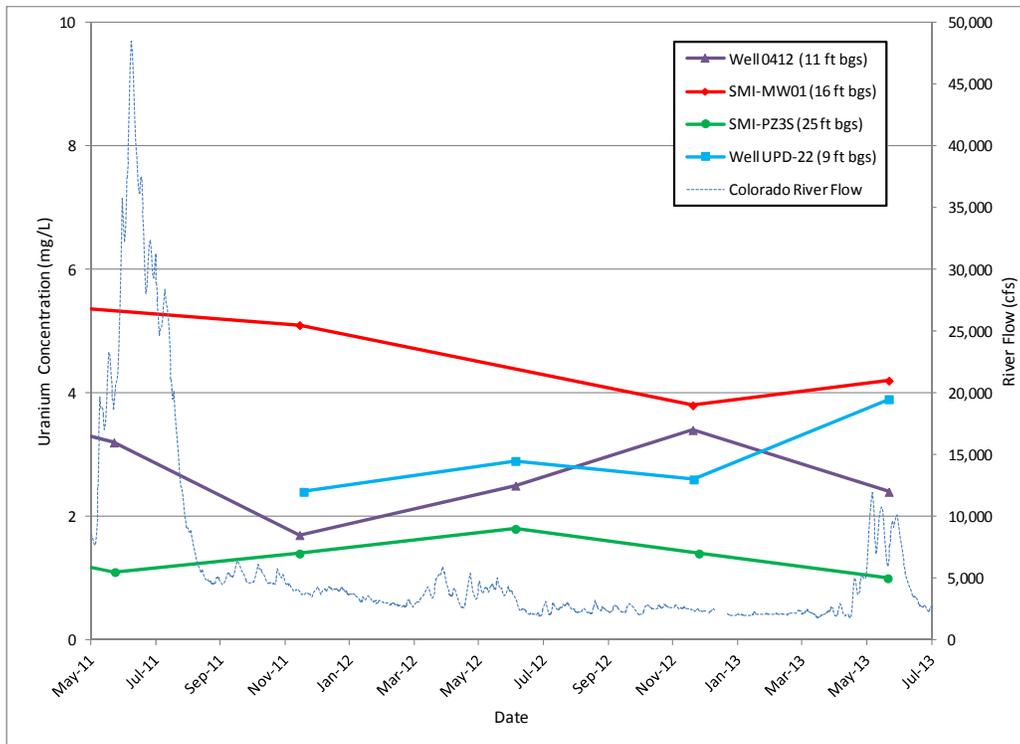


Figure 10. Northeastern Edge of the Uranium Area Observation Wells 0412, SMI-MW01, SMI-PZ3S, and UPD-22 Time Versus Uranium Concentration Plot

4.2.6 Base of the Tailings Pile

The time versus ammonia and uranium concentration plots for the area near the base of the tailings pile are presented in Figures 11 and 12. As Figure 11 exhibits, the ammonia concentrations have generally fluctuated independently of the river flow in the samples collected from wells AMM-3, ATP-2-S, ATP-2-D, and AMM-2 (listed from south to north). The data suggest the ammonia concentrations have not significantly changed in this area of the site since November 2011. Uranium concentrations (Figure 12) have also been consistent since November 2011, with the exception of the uranium concentration measured in the sample collected from well AMM-3, which increased from 1.2 to 2.5 mg/L since November/December 2012.

4.2.7 Southwestern Boundary

Figures 13 and 14 display the time versus concentration plots for the locations along the southwestern boundary (Figure 2), presented in the upgradient to downgradient direction. Ammonia concentrations in the sample collected from well 0453 continued to increase compared to the previous event, while the concentration measured in the sample from well 0454 decreased from 270 to 220 mg/L over this same time frame. Uranium concentrations in samples collected from both 0453 and 0454 decreased from 2.6 to 2.1 mg/L since November/December 2012. The sample collected from well 0440 continued having ammonia concentrations below the detection limit and uranium concentrations below the 0.044 mg/L UMTRA standard.

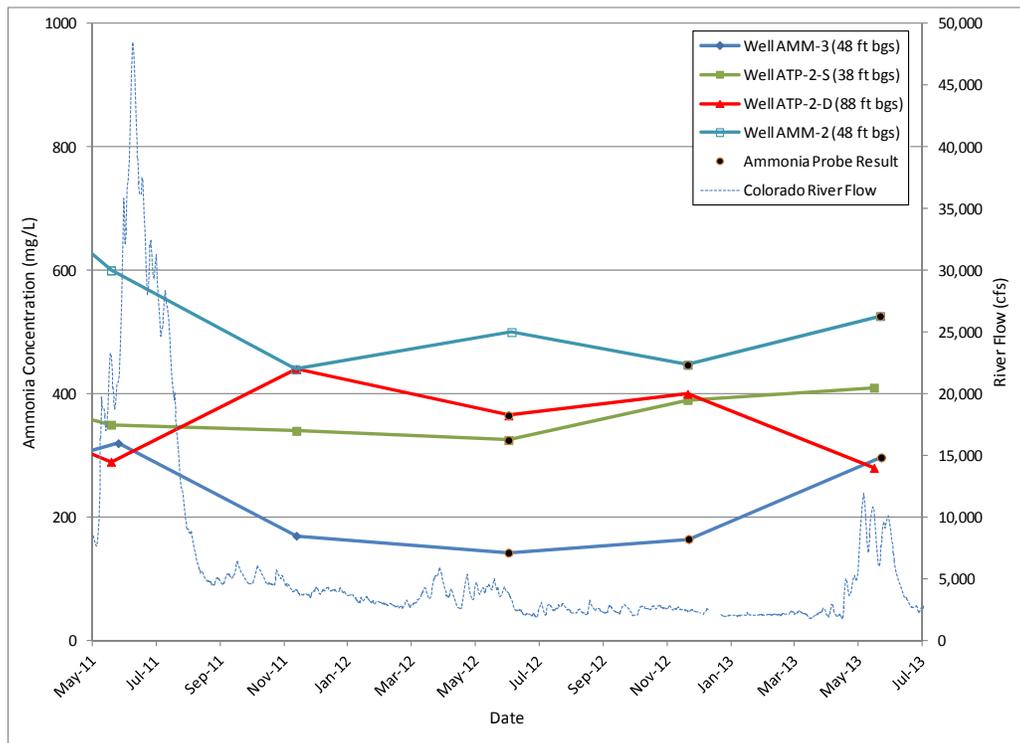


Figure 11. Base of Tailings Pile Observation Wells AMM-3, ATP-2-S, ATP-2-D, and AMM-2 Time Versus Ammonia Concentration Plot

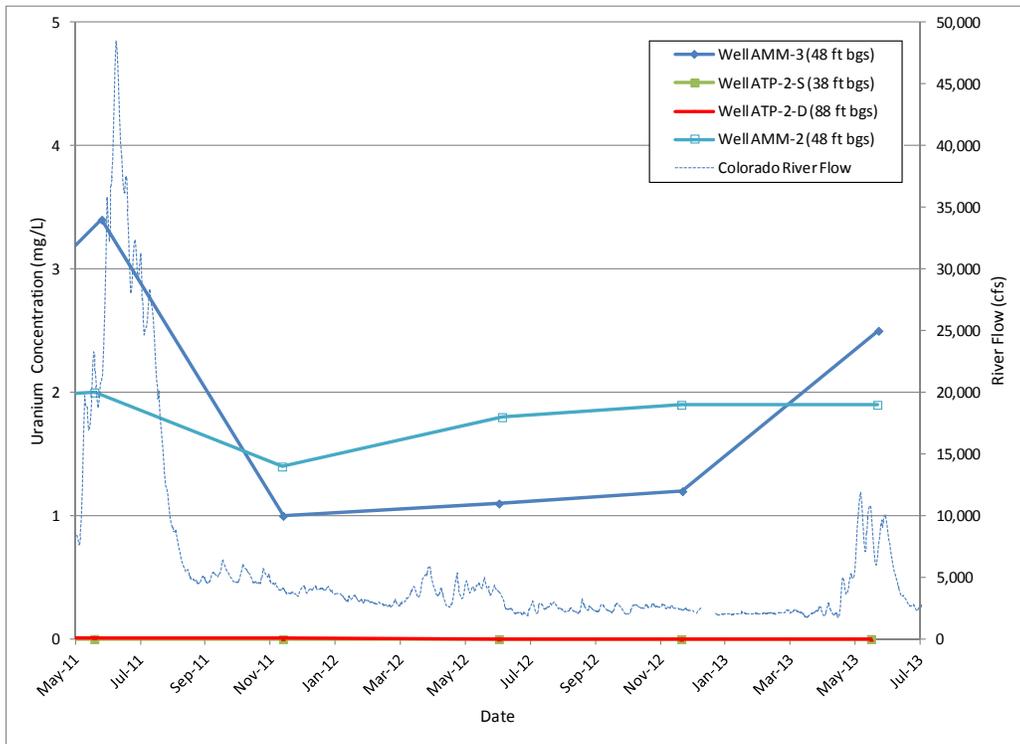


Figure 12. Base of Tailings Pile Observation Wells AMM-3, ATP-2-S, ATP-2-D, and AMM-2 Time Versus Uranium Concentration Plot

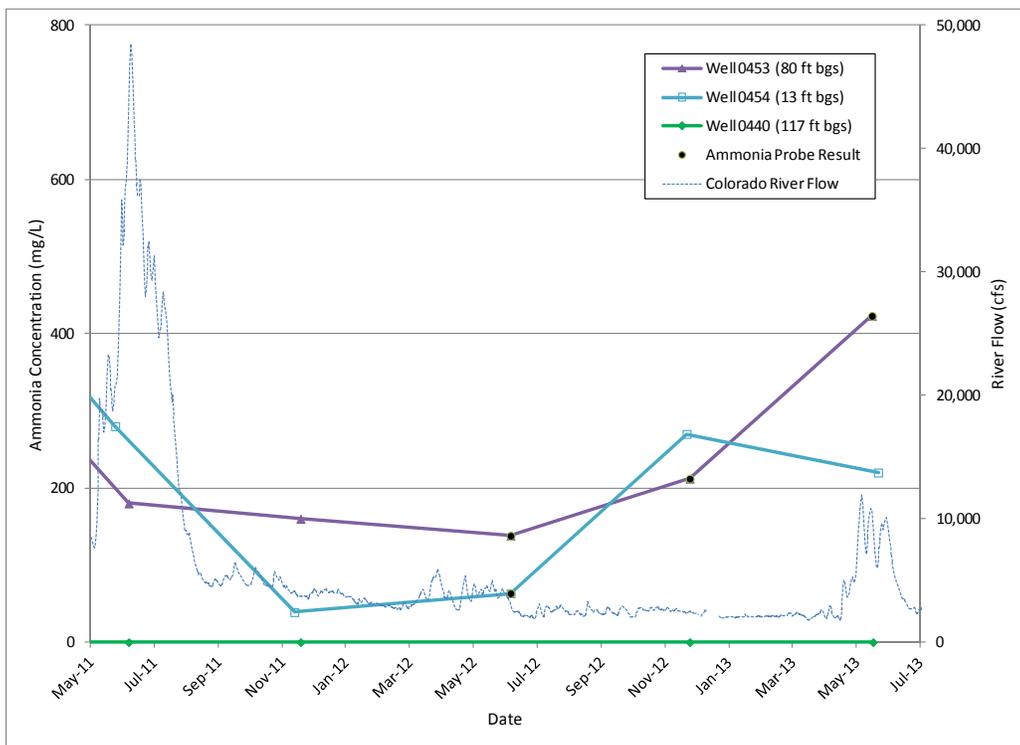


Figure 13. Southwestern Boundary Observation Wells 0453, 0454, and 0440 Time Versus Ammonia Concentration Plot

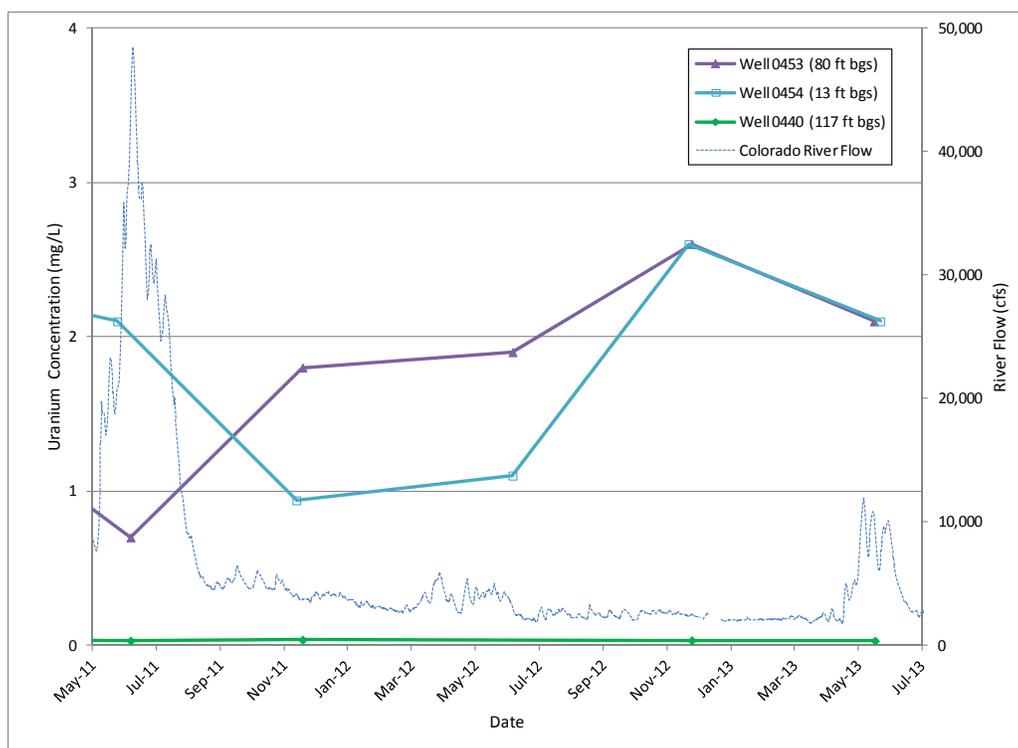


Figure 14. Southwestern Boundary Observation Wells 0453, 0454, and 0440 Time Versus Uranium Concentration Plot

4.2.8 Riverbank Area

Figures 15 and 16 are the time versus ammonia and uranium concentration plots, respectively, for the locations sampled along the riverbank, presented from south to north. Ammonia concentrations are low at the southern and northern ends of the site and increase near the middle. This plot also demonstrates how significant an impact the higher river flows result in lower ground water concentrations, as expected. As of May/June 2013, ammonia concentrations have not significantly changed in samples collected from wells 0401 and 0404 since November 2011. Uranium concentrations (Figure 16) have remained consistent in wells 0401 and TP-01, have fluctuated between 0.2 and 2.1 mg/L, and have gradually increased since November 2011 in the samples collected from well 0492. During the same time period, the uranium concentration has fluctuated between 0.8 and 1.6 mg/L in the samples collected from well 0404.

4.2.9 Southern and Off-site Areas

Figures 17 and 18 are the plots for the three locations sampled to the south of the site. Wells TP-17 and TP-19 are located along the riverbank, and TP-20 is located approximately 600 feet off the bank. Due to access issues, it was not possible to collect a sample from location TP-19 during this sampling event.

Ammonia concentrations (Figure 17) in samples collected from TP-17 and TP-20 have decreased back to below 4 mg/L after increasing in November/December 2012. The uranium concentrations (Figure 18) have consistently been below the 0.044 mg/L UMTRA standard over the past 2 years.

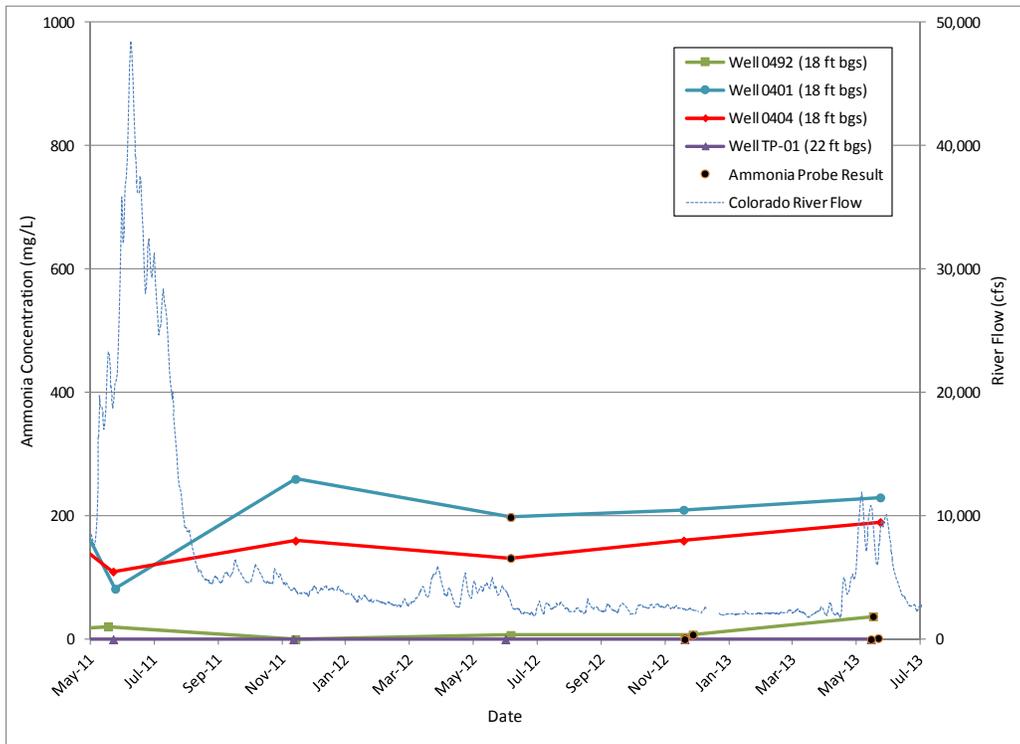


Figure 15. Riverbank Observation Wells 0492, 0401, 0404, and TP-01 Time Versus Ammonia Concentration Plot

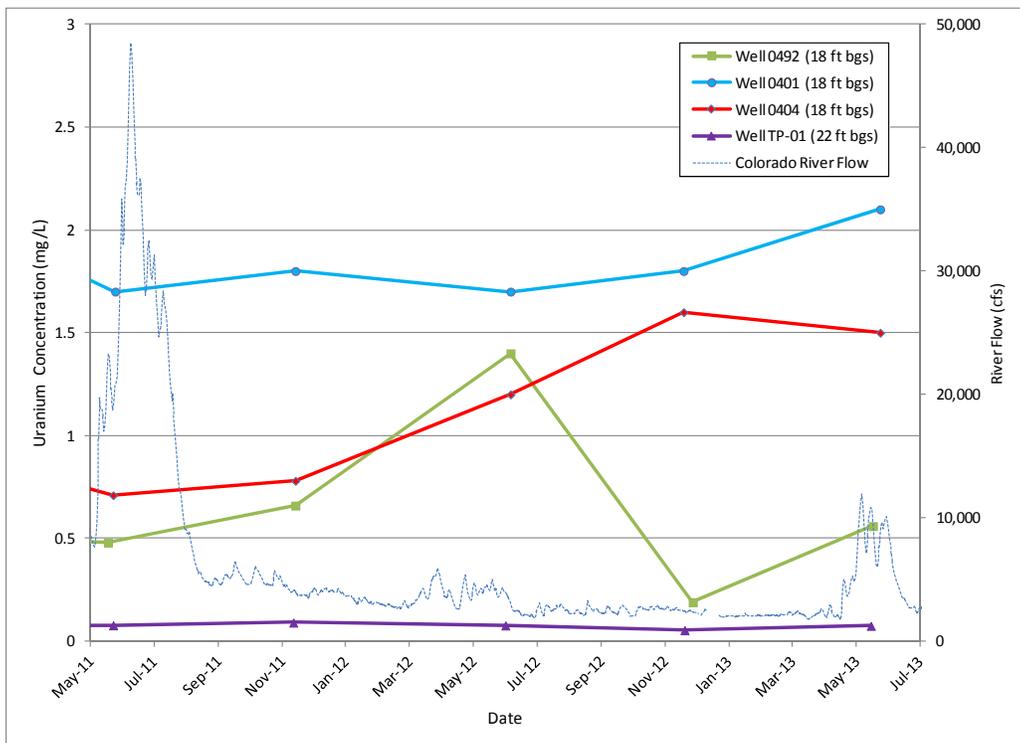


Figure 16. Riverbank Observation Wells 0492, 0401, 0404, and TP-01 Time Versus Uranium Concentration Plot

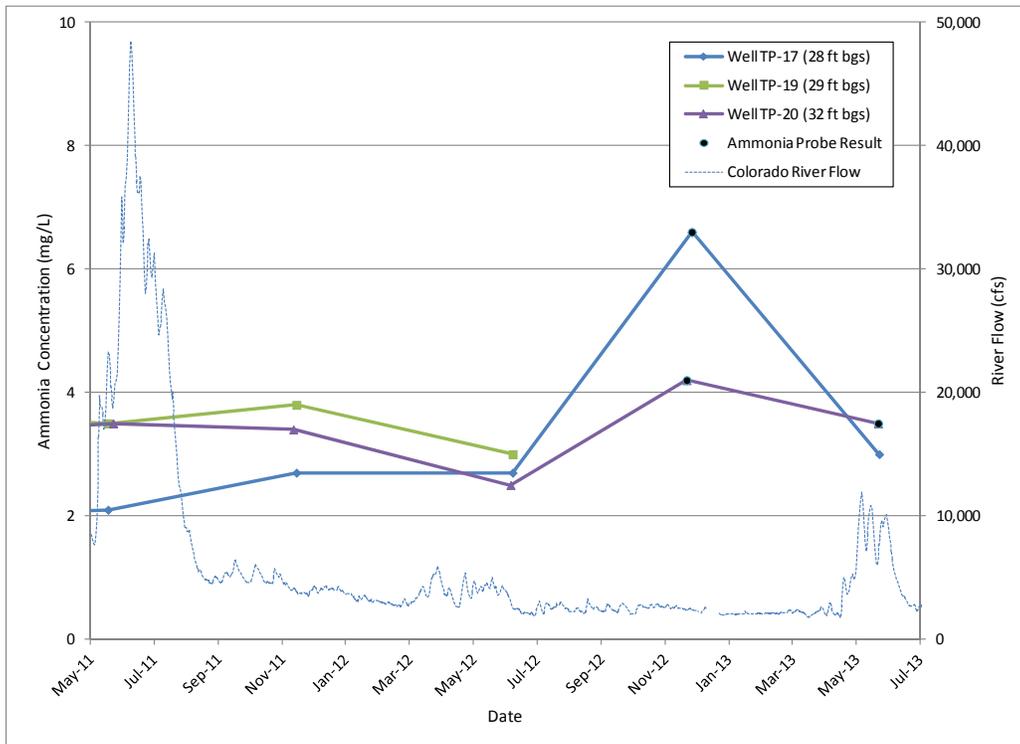


Figure 17. South of the Site Observation Wells TP-17, TP-19, and TP-20 Time Versus Ammonia Concentration Plot

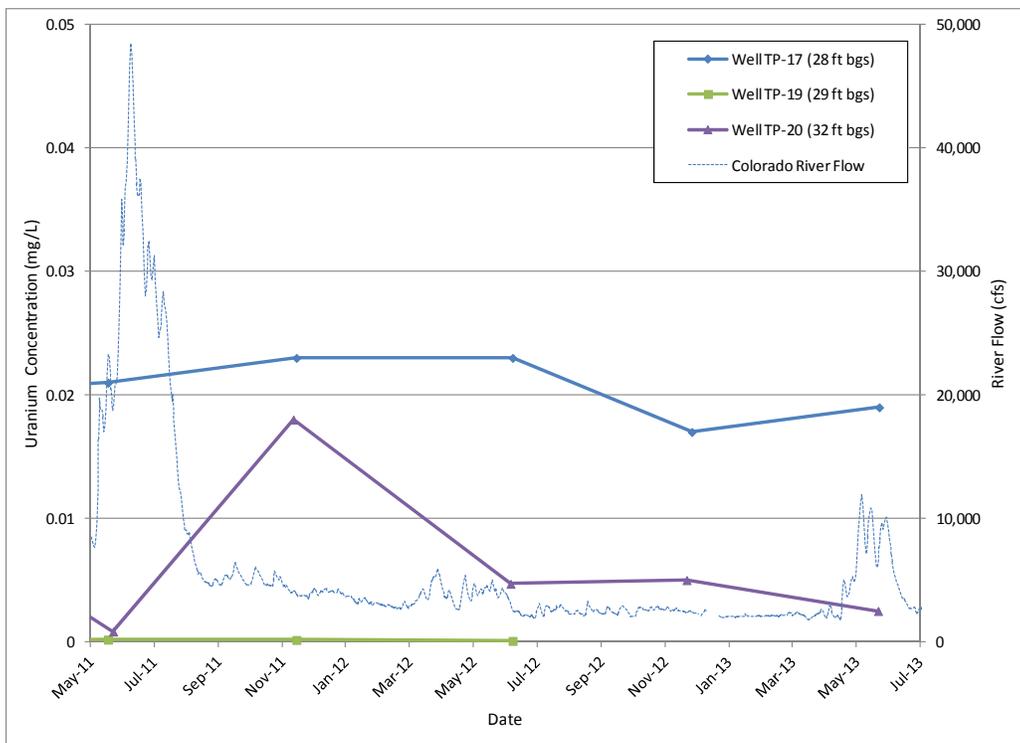


Figure 18. South of the Site Observation Wells TP-17, TP-19, and TP-20 Time Versus Uranium Concentration Plot

4.3 Surface Water Sampling

Table 7 presents the ammonia results from the surface water sampling conducted in May/June 2013 from locations 0218, 0226, 0274, CR1, CR2, CR3, and CR5 (as shown on Figure 2). The ammonia concentrations and comparisons to the applicable state of Utah and federal criteria for both acute and chronic concentrations (along with the temperature and pH data used to calculate these concentrations) are shown in Table 7.

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

Location	Date	Temp (°C)	pH	Ammonia as N (mg/L)	State/Federal AWQC-Acute Total as N (mg/L) ¹	State/Federal AWQC-Chronic Total as N (mg/L) ²
0218	5/30/13	16.01	7.68	<0.1	9.65	3.25
0226	5/30/13	16.40	8.24	<0.1	3.83	1.63
0274	5/30/13	16.55	8.18	<0.1	3.83	1.63
CR1	5/28/13	17.29	7.33	<0.1	17.5	4.06
CR2	5/30/13	17.31	8.14	<0.1	4.64	1.68
CR3	5/30/13	18.13	8.37	0.4	2.59	1.03
CR5	5/28/13	18.32	7.96	<0.1	5.62	1.94

Loc = location, Temp = temperature, AWQC = ambient water quality criteria

Notes:

- (1) State of Utah, Standards of Quality for Waters of the State (Effective May 1, 2008), Rule R317-2, Table 2.14.2, 1-Hour Average (Acute) Concentration of Total Ammonia as N (mg/L)
- (2) State of Utah, Standards of Quality for Waters of the State (Effective May 1, 2008), Rule R317-2, Table 2.14.2, 30-Day Average (Chronic) Concentration of Total Ammonia as N (mg/L), Fish Early Life Stages Present

As shown in the table, all seven of the samples collected had ammonia concentrations that were below both the acute and chronic criteria.

4.4 Ammonia Probe Analysis Results

All site-wide samples collected were analyzed for ammonia using a portable HACH ammonia probe meter. For approximately one-half of the samples, sample splits were collected and submitted to ALS for ammonia analysis to determine how the measured concentrations compare to each other. Table 8 provides the results measured by both ALS and the field method. As the table displays, the results are comparable.

Ammonia concentrations were also measured using both the field probe and submitting samples to the analytical laboratory for the CF5 sampling. Table 9 presents the ammonia field probe associated with the CF5 sampling.

Figure 19 is a graphical representation displaying the comparison between the ammonia results generated from the analytical laboratory and the ammonia probe. As shown, the analytical laboratory and the ammonia probe provide nearly identical results with the trendline having an r^2 value of 0.986, which confirms the ammonia probe does generate reliable results.

Table 8. Site-Wide Ammonia Field Analysis Results Compared to Analytical Laboratory Results

Well Number	Date	Ammonia Concentration (mg/L)	
		Analytical Laboratory Results	Field Results
0401	6/6/2013	230	226
0403	6/6/2013	55	48.1
0404	6/6/2013	190	178.6
0407	6/6/2013	47	42.5
0410	5/29/2013	NA	<1
0411	5/29/2013	1.6	2.14
0412	6/4/2013	NA	<1
0413	6/4/2013	46	45.3
0414	6/5/2013	12	11.6
0439	5/29/2013	NA	6.6
0440	5/30/2013	0.1	<1
0453	5/29/2013	NA	423
0454	6/4/2013	220	228
0492	5/30/2013	NA	37.3
AMM-2	6/4/2013	NA	526
AMM-3	6/5/2013	NA	297
ATP-2-D	5/29/2013	280	245
ATP-2-S	5/29/2013	410	379
SMI-MW01	6/4/2013	NA	2.0
SMI-PZ1S	6/6/2013	130	126
SMI-PZ3D2	6/3/2013	450	434
SMI-PZ3M	6/3/2013	NA	34
SMI-PZ3S	6/3/2013	NA	3.5
TP-01	5/28/2013	NA	<1
TP-17	6/5/2013	NA	3.0
TP-20	6/4/2013	NA	3.5
TP-22	6/4/2013	NA	<1
TP-23	6/4/2013	190	167.5
UPD-17	6/3/2013	290	242
UPD-18	5/29/2013	230	201
UPD-20	6/3/2013	NA	<1
UPD-21	6/3/2013	NA	6.4
UPD-22	6/4/2013	NA	3.6
UPD-23	6/5/2013	2.4	2.5
UPD-24	6/3/2013	0.9	0.9

NA = not applicable (sample not analyzed)

Field results measured using HACH sension 2 portable pH/ISE probe and meter.

Analytical laboratory results provided by ALS.

Table 9. CF5 Ammonia Field Analysis Results Compared to Analytical Laboratory Results

Well Number	Date	Flow Rate (gpm)	Ammonia Concentration (mg/L)	
			Analytical Laboratory Results	Field Results
0810	5/15/13	12.9	340	313
	5/16/13	25.2	330	315
	5/21/13	38.8	330	309
0811	5/15/13	13.7	380	392
	5/16/13	23.1	400	378
0812	5/21/13	15.9	430	395
	5/16/13	25.9	400	404
	5/24/13	39.8	410	443
0813	5/21/13	15.2	340	337
	5/22/13	25.2	340	348
	5/24/13	43.6	340	341
0814	5/15/13	19.6	200	203
	5/16/13	31	200	211
	5/22/13	38.6	240	223
0815	5/15/13	13.2	300	310
	5/16/13	32.8	290	308
	5/24/13	42.8	310	294
0816	5/21/13	15	180	173
	5/22/13	25.4	190	177
	5/24/13	46.7	200	190
PW02	5/21/13	26.1	480	451
	5/22/13	40.8	490	473

4.5 Ground Water Surface

Figure 20 is a ground water surface contour map for the site in May/June 2013. Even though the spring runoff peak flow was approximately one-half of the average, there was evidence that the river was considered to be under losing conditions during this event as shown by the mounding in the vicinity of the well field and just north of the site. All water-level data were collected from the alluvial soils screened across the vadose zone and saturated zone interface and exhibit an overall ground water flow direction towards the Colorado River.

4.6 Contaminant Distribution

Figures 21 and 22 are maps showing shallow ground water ammonia and uranium plumes (respectively) using data collected during the May/June 2013 site-wide event. Contaminant distribution is generally comparable to previous plume maps generated using data collected during the past 2 years. While Figure 22 displays the result associated with well ATP-2-S, this concentration was not taken into consideration for the contour line location. This well is screened over a deeper interval in this shallow zone and is not representative of the uranium concentration in the most shallow ground water. The contour lines were based on the concentration measured in extraction well 0815, located within 50 feet southeast of ATP-2-S.

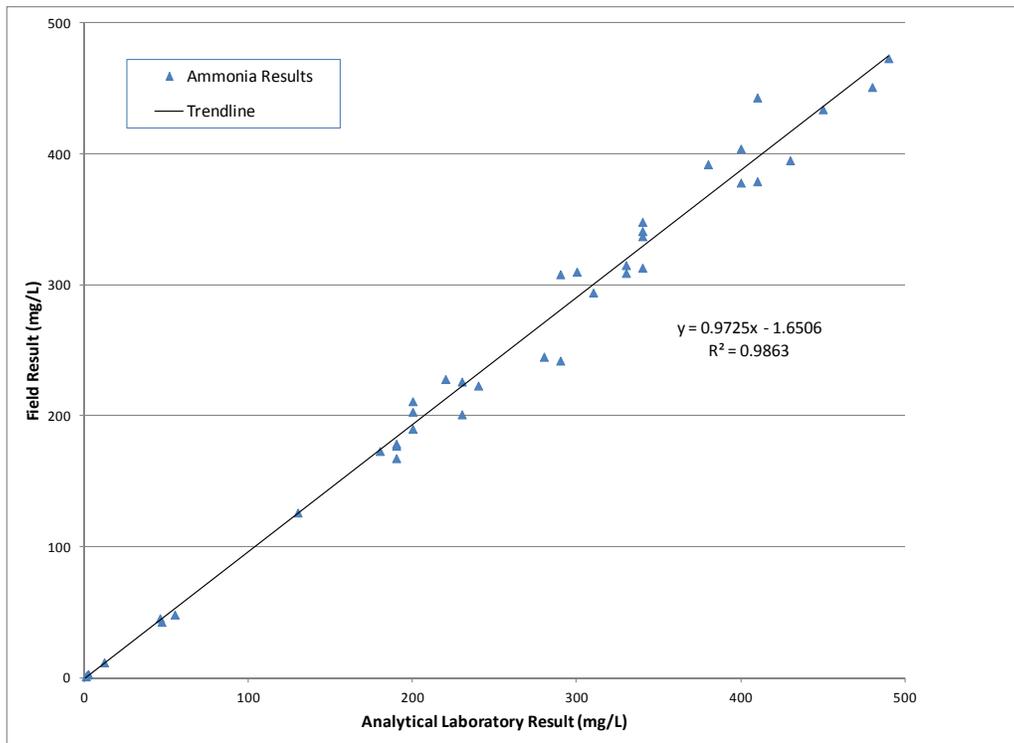


Figure 19. Graphical Comparison of the Ammonia Results Generated from the Analytical Laboratory and the Ammonia Field Analyses

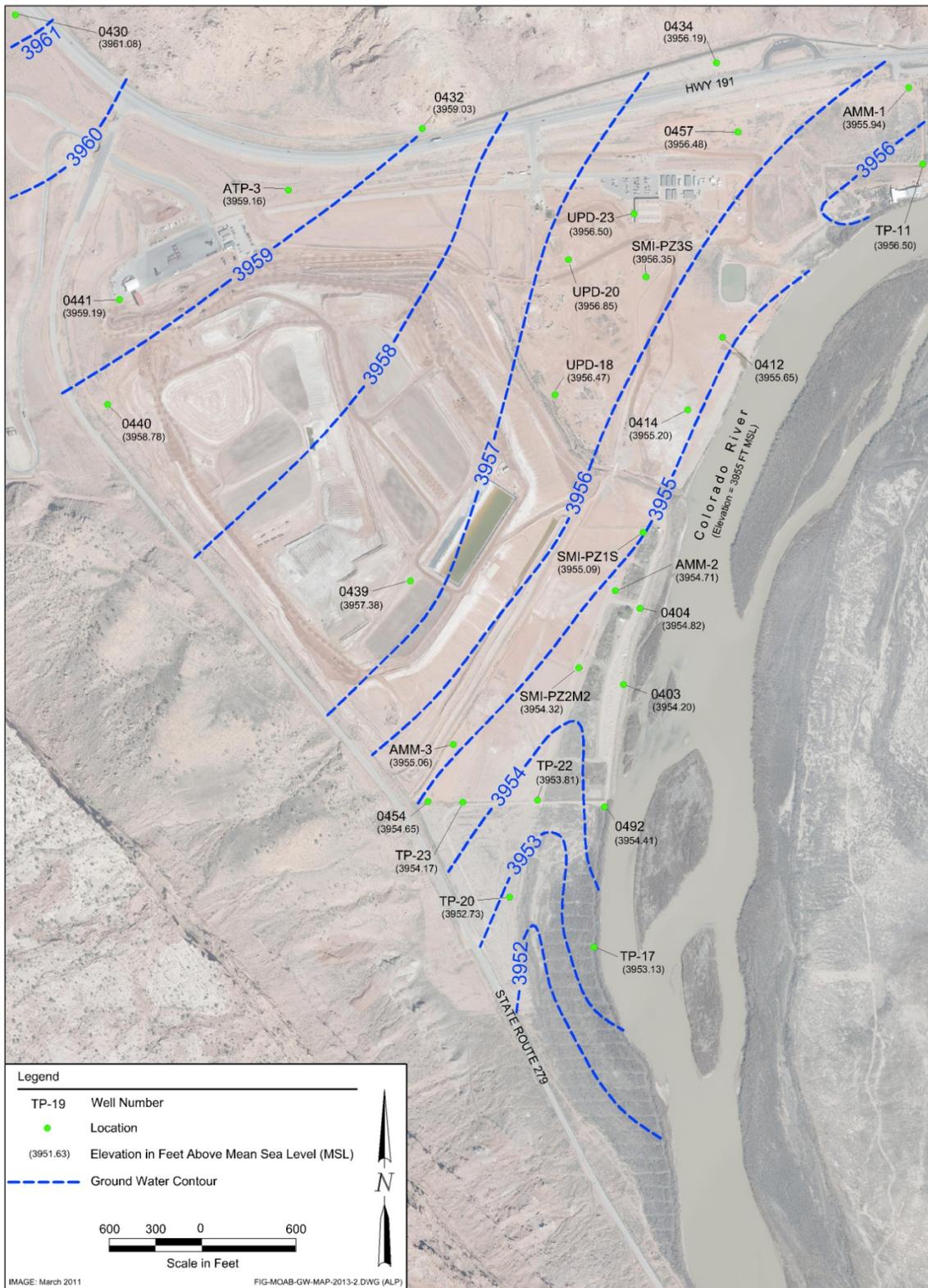


Figure 20. Site-wide Ground Water Surface Contour Map, May/June 2013

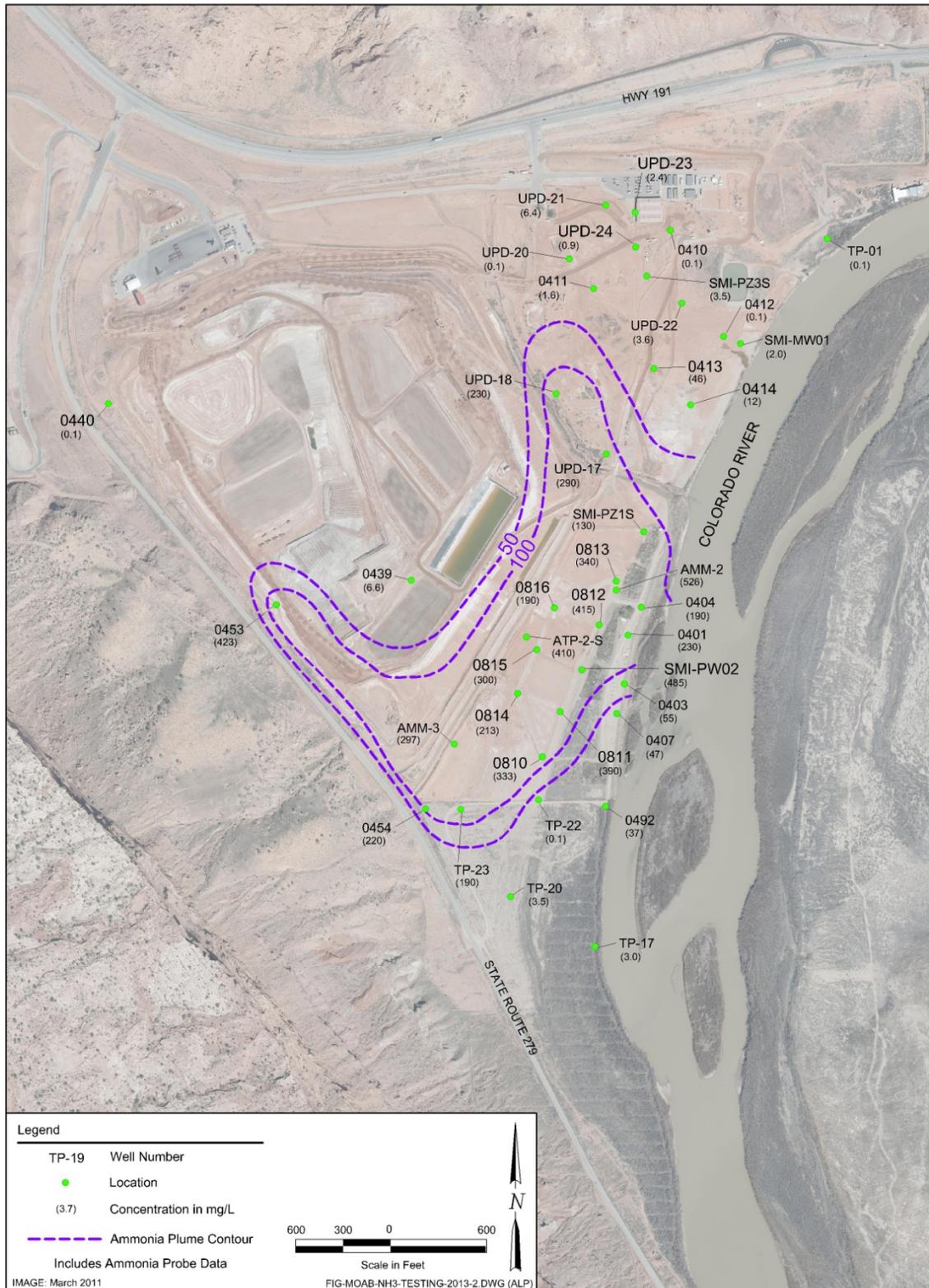


Figure 21. Location of Ammonia Plume in Shallow Ground Water, May/June 2013

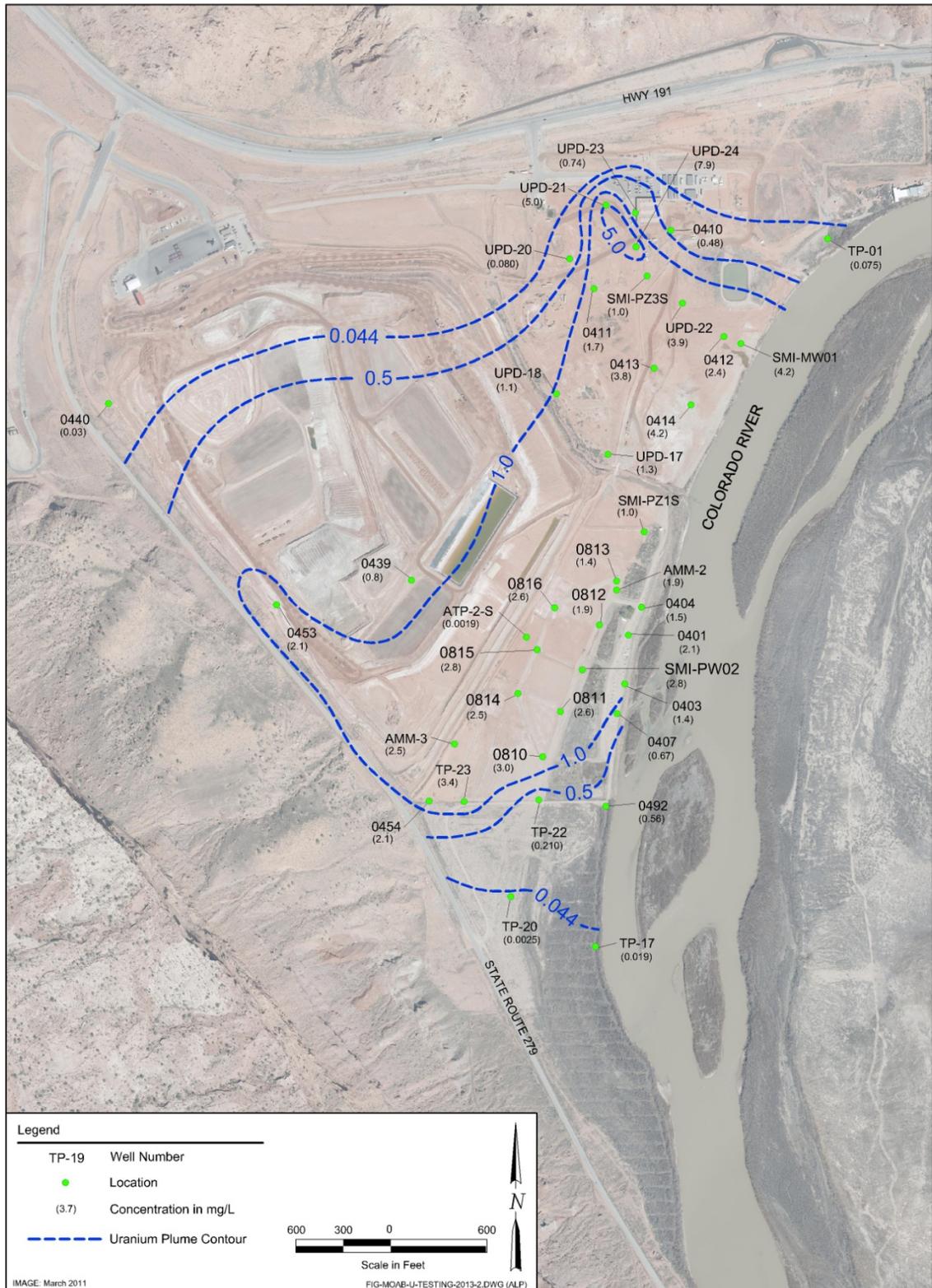


Figure 22. Location of Uranium Plume in Shallow Ground Water, May/June 2013

5.0 Conclusions

The rationale for conducting the May/June 2013 site-wide sampling event was to collect data from the site when the Colorado River typically experiences the spring runoff peak flows and to assess any changes and trends in the ground water system water chemistry. Surface water sampling was also conducted to assess surface water quality adjacent to the site compared to the upstream and downstream water quality. The following conclusions can be made from the May/June 2013 site-wide sampling event:

- In general, the ammonia and uranium concentrations did not significantly change since the previous site-wide sampling event in November/December 2012. As expected, concentrations associated with locations impacted by the river stage in particular were diluted to some degree despite the fact that the 2013 runoff peak flows were approximately one-half of average.
- With the exception of the uranium concentration detected in well 0411, all ammonia and uranium concentrations in the site-wide wells were within 50 percent of historical ranges during this sampling event.
- All surface water samples collected during this sampling event had ammonia concentrations that were below the applicable state of Utah and federal criteria for both acute and chronic concentrations.

6.0 References

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

DOE (U.S. Department of Energy), *Moab UMTRA Project Operations and Maintenance Manual* (DOE-EM/GJTAC1973), October 2012.

DOE (U.S. Department of Energy), *Moab UMTRA Project Surface Water/Ground Water Sampling and Analysis Plan* (DOE-EM/GJTAC1830), July 2012.

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

Appendix A.
May/June 2013 Site-wide Sampling Event
Water Sampling Field Activities Verification
Minimums and Maximums Report
Water Quality Data
Water Level Data
Trip Report

Appendix A. Water Sampling Field Activities Verification

Sampling Event/RIN	May/June 2013 Site-wide Sampling Event/1305066	Date(s) of Water Sampling	May 15 through June 6, 2013
Date(s) of Verification	September 3, 2013	Name of Verifier	Ken Pill
		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?	No	The following wells were not sampled: UPD-19 (well damaged) and TP-19 (could not be safely accessed).
3.	Was a pre-trip calibration conducted as specified in the aforementioned documents?	Yes	
4.	Was an operational check of the field equipment conducted twice daily? Did the operational checks meet criteria?	No	The instrument was checked twice daily only when samples were collected in both the morning and afternoon for a particular day.
		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	Field measurements for temperature, pH, turbidity, dissolved oxygen, oxidation reduction potential, and conductivity were collected.
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 before sampling? Did the water level stabilize before sampling? Did pH, specific conductance, and turbidity measurements stabilize before sampling? Was the flow rate less than 500 milliliters per minute? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	Yes	
		Yes	
		Yes	
		NA	
		NA	
8.	Were the following conditions met when purging a Category II well: Was the flow rate less than 500 milliliters per minute? Was one pump/tubing volume removed before sampling?	Yes	
		Yes	
9.	Were duplicates taken at a frequency of one per 20 samples?	Yes	Four duplicates were collected for 68 samples.
10.	Were EBs taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	All samples were collected on dedicated equipment.

Appendix A. Water Sampling Field Activities Verification (continued)

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?	NA
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?	NA
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?	NA

NA = not applicable

Appendix A. Minimums and Maximums Report

Data Validation Minimums and Maximums Report - No Field Parameters
 Laboratory: ALS
 RIN: 1305066
 Comparison: All Historical Data
 Report Date: 9/9/2013

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	0411	05/29/2013	Ammonia Total as N	1.6		9.1		2			7	0	
MOA01	0411	05/29/2013	Uranium	1.7		19		3.5			7	0	
MOA01	0413	06/04/2013	Uranium	3.8		3.3		1.1			11	0	
MOA01	0814	05/15/2013	Ammonia Total as N	200		900	J	210			11	0	
MOA01	0815	05/15/2013	Uranium	2.5		4.6		3			9	0	
MOA01	ATP-2-D	05/29/2013	Ammonia Total as N	280		710		290			31	0	
MOA01	ATP-2-D	05/29/2013	Uranium	0.0029		8.64		0.0031			60	0	
MOA01	SMI-PZ3M	06/03/2013	Uranium	0.6		1.9	J	0.672		F	13	0	
MOA01	SMI-PZ3S	06/03/2013	Uranium	1		3.24		1.1	F		15	0	
MOA01	UPD-21	06/03/2013	Uranium	5		13		9.6			5	0	

Analyte concentrations presented in blue text represent the historical minimum or maximum value exceeded by the concentration presented in red, which is associated with this current sampling event.

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

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.

Appendix A. Minimums and Maximums Report

LAB QUALIFIERS (*continued*):

- 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 two columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance <50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

Appendix A. Water Quality Data

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0218 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/30/2013	0001	0 - 0	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/30/2013	0001	0 - 0	93.8			#		
pH	s.u.	05/30/2013	0001	0 - 0	7.68			#		
Specific Conductance	umhos/cm	05/30/2013	0001	0 - 0	711			#		
Temperature	C	05/30/2013	0001	0 - 0	16.01			#		
Turbidity	NTU	05/30/2013	0001	0 - 0	294			#		
Uranium	mg/L	05/30/2013	0001	0 - 0	0.0017		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0226 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/30/2013	0001	0 - 0	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/30/2013	0001	0 - 0	91.7			#		
pH	s.u.	05/30/2013	0001	0 - 0	8.24			#		
Specific Conductance	umhos/cm	05/30/2013	0001	0 - 0	743			#		
Temperature	C	05/30/2013	0001	0 - 0	16.4			#		
Uranium	mg/L	05/30/2013	0001	0 - 0	0.0017		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0274 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Ammonia Total as N	mg/L	05/30/2013	0001	0	-	0	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/30/2013	0001	0	-	0	95.1			#		
pH	s.u.	05/30/2013	0001	0	-	0	8.18			#		
Specific Conductance	umhos/cm	05/30/2013	0001	0	-	0	732			#		
Temperature	C	05/30/2013	0001	0	-	0	16.55			#		
Turbidity	NTU	05/30/2013	0001	0	-	0	504			#		
Uranium	mg/L	05/30/2013	0001	0	-	0	0.0017		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0401 WELL CF2

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/06/2013	0001	18 -	230			#	10	
Ammonia Total as N	mg/L	06/06/2013	0002	18 -	240			#	5	
Oxidation Reduction Potential	mV	06/06/2013	0001	18 -	128.9			#		
pH	s.u.	06/06/2013	0001	18 -	6.8			#		
Specific Conductance	umhos/cm	06/06/2013	0001	18 -	14996			#		
Temperature	C	06/06/2013	0001	18 -	16.23			#		
Turbidity	NTU	06/06/2013	0001	18 -	2.01			#		
Uranium	mg/L	06/06/2013	0001	18 -	2.1		J	#	0.00029	
Uranium	mg/L	06/06/2013	0002	18 -	2.1		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0403 WELL CF1

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/06/2013	0001	18 -	55			#	2	
Oxidation Reduction Potential	mV	06/06/2013	0001	18 -	127.8			#		
pH	s.u.	06/06/2013	0001	18 -	6.8			#		
Specific Conductance	umhos/cm	06/06/2013	0001	18 -	12025			#		
Temperature	C	06/06/2013	0001	18 -	16.7			#		
Turbidity	NTU	06/06/2013	0001	18 -	2.76			#		
Uranium	mg/L	06/06/2013	0001	18 -	1.4		J	#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0404 WELL CF3

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/06/2013	0001	18 -	190			#	10	
Oxidation Reduction Potential	mV	06/06/2013	0001	18 -	129.4			#		
pH	s.u.	06/06/2013	0001	18 -	6.83			#		
Specific Conductance	umhos/cm	06/06/2013	0001	18 -	12200			#		
Temperature	C	06/06/2013	0001	18 -	16.19			#		
Turbidity	NTU	06/06/2013	0001	18 -	0.87			#		
Uranium	mg/L	06/06/2013	0001	18 -	1.5		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0407 WELL CF1

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/06/2013	0001	17 -	47			#	2	
Oxidation Reduction Potential	mV	06/06/2013	0001	17 -	119.6			#		
pH	s.u.	06/06/2013	0001	17 -	7.03			#		
Specific Conductance	umhos/cm	06/06/2013	0001	17 -	6670			#		
Temperature	C	06/06/2013	0001	17 -	16.78			#		
Turbidity	NTU	06/06/2013	0001	17 -	0.91			#		
Uranium	mg/L	06/06/2013	0001	17 -	0.67		J	#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0410 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	05/29/2013	0001	27 -	66.9			#		
pH	s.u.	05/29/2013	0001	27 -	6.93			#		
Specific Conductance	umhos/cm	05/29/2013	0001	27 -	3582			#		
Temperature	C	05/29/2013	0001	27 -	19.25			#		
Turbidity	NTU	05/29/2013	0001	27 -	20.7			#		
Uranium	mg/L	05/29/2013	0001	27 -	0.48		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0411 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/29/2013	0001	9 -	1.6			#	0.1	
Oxidation Reduction Potential	mV	05/29/2013	0001	9 -	7			#		
pH	s.u.	05/29/2013	0001	9 -	7.66			#		
Specific Conductance	umhos/cm	05/29/2013	0001	9 -	9116			#		
Temperature	C	05/29/2013	0001	9 -	20.32			#		
Turbidity	NTU	05/29/2013	0001	9 -	37.5			#		
Uranium	mg/L	05/29/2013	0001	9 -	1.7		J	#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0412 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	06/04/2013	0001	10.5 -	126.2			#		
pH	s.u.	06/04/2013	0001	10.5 -	7.61			#		
Specific Conductance	umhos/cm	06/04/2013	0001	10.5 -	3224			#		
Temperature	C	06/04/2013	0001	10.5 -	17.73			#		
Turbidity	NTU	06/04/2013	0001	10.5 -	96.3			#		
Uranium	mg/L	06/04/2013	0001	10.5 -	2.4		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0413 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/04/2013	0001	11.5 -	46			#	2	
Oxidation Reduction Potential	mV	06/04/2013	0001	11.5 -	149.1			#		
pH	s.u.	06/04/2013	0001	11.5 -	7.63			#		
Specific Conductance	umhos/cm	06/04/2013	0001	11.5 -	6388			#		
Temperature	C	06/04/2013	0001	11.5 -	16.65			#		
Turbidity	NTU	06/04/2013	0001	11.5 -	3.59			#		
Uranium	mg/L	06/04/2013	0001	11.5 -	3.8		J	#	0.00058	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0414 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data QA		
Ammonia Total as N	mg/L	06/05/2013	0001	13 -	12		#	2	
Ammonia Total as N	mg/L	06/05/2013	0002	13 -	12		#	2	
Oxidation Reduction Potential	mV	06/05/2013	0001	13 -	-86.9		#		
pH	s.u.	06/05/2013	0001	13 -	7.02		#		
Specific Conductance	umhos/cm	06/05/2013	0001	13 -	11422		#		
Temperature	C	06/05/2013	0001	13 -	16.04		#		
Turbidity	NTU	06/05/2013	0001	13 -	8.19		#		
Uranium	mg/L	06/05/2013	0001	13 -	4.2		J #	0.00058	
Uranium	mg/L	06/05/2013	0002	13 -	3.9		J #	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0439 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	05/29/2013	0001	118 -	133.1			#		
pH	s.u.	05/29/2013	0001	118 -	6.61			#		
Specific Conductance	umhos/cm	05/29/2013	0001	118 -	10675			#		
Temperature	C	05/29/2013	0001	118 -	17.01			#		
Turbidity	NTU	05/29/2013	0001	118 -	7.53			#		
Uranium	mg/L	05/29/2013	0001	118 -	0.8		J	#	0.00015	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0440 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/30/2013	0001	117 -	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/30/2013	0001	117 -	163.1			#		
pH	s.u.	05/30/2013	0001	117 -	6.99			#		
Specific Conductance	umhos/cm	05/30/2013	0001	117 -	9882			#		
Temperature	C	05/30/2013	0001	117 -	19.01			#		
Turbidity	NTU	05/30/2013	0001	117 -	176			#		
Uranium	mg/L	05/30/2013	0001	117 -	0.03		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0453 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	05/29/2013	0001	80 -	129.7			#		
pH	s.u.	05/29/2013	0001	80 -	6.69			#		
Specific Conductance	umhos/cm	05/29/2013	0001	80 -	35407			#		
Temperature	C	05/29/2013	0001	80 -	21.22			#		
Turbidity	NTU	05/29/2013	0001	80 -	10.5			#		
Uranium	mg/L	05/29/2013	0001	80 -	2.1		J	#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0454 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/04/2013	0001	13 -	220			#	10	
Oxidation Reduction Potential	mV	06/04/2013	0001	13 -	122.5			#		
pH	s.u.	06/04/2013	0001	13 -	6.51			#		
Specific Conductance	umhos/cm	06/04/2013	0001	13 -	57317			#		
Temperature	C	06/04/2013	0001	13 -	17.36			#		
Turbidity	NTU	06/04/2013	0001	13 -	7.09			#		
Uranium	mg/L	06/04/2013	0001	13 -	2.1		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: 0492 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Oxidation Reduction Potential	mV	05/30/2013	0001	18	-	31			#		
pH	s.u.	05/30/2013	0001	18	-	7.2			#		
Specific Conductance	umhos/cm	05/30/2013	0001	18	-	9910			#		
Temperature	C	05/30/2013	0001	18	-	16.4			#		
Turbidity	NTU	05/30/2013	0001	18	-	1.46			#		
Uranium	mg/L	05/30/2013	0001	18	-	0.56		J	#	0.00015	
Uranium	mg/L	05/30/2013	0002	0	- 0	0.54		J	#	0.00015	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0810 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/15/2013	0001	10.4	-	40.4		J	#	10	
Ammonia Total as N	mg/L	05/16/2013	0001	10.4	-	40.4		J	#	10	
Ammonia Total as N	mg/L	05/21/2013	0001	10.4	-	40.4		J	#	10	
Oxidation Reduction Potential	mV	05/15/2013	0001	10.4	-	40.4			#		
Oxidation Reduction Potential	mV	05/16/2013	0001	10.4	-	40.4			#		
Oxidation Reduction Potential	mV	05/21/2013	0001	10.4	-	40.4			#		
pH	s.u.	05/15/2013	0001	10.4	-	40.4			#		
pH	s.u.	05/16/2013	0001	10.4	-	40.4			#		
pH	s.u.	05/21/2013	0001	10.4	-	40.4			#		
Specific Conductance	umhos/cm	05/15/2013	0001	10.4	-	40.4			#		
Specific Conductance	umhos/cm	05/16/2013	0001	10.4	-	40.4			#		
Specific Conductance	umhos/cm	05/21/2013	0001	10.4	-	40.4			#		
Temperature	C	05/15/2013	0001	10.4	-	40.4			#		
Temperature	C	05/16/2013	0001	10.4	-	40.4			#		
Temperature	C	05/21/2013	0001	10.4	-	40.4			#		
Turbidity	NTU	05/15/2013	0001	10.4	-	40.4			#		
Turbidity	NTU	05/16/2013	0001	10.4	-	40.4			#		
Turbidity	NTU	05/21/2013	0001	10.4	-	40.4			#		
Uranium	mg/L	05/15/2013	0001	10.4	-	40.4		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: 0810 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
							Lab	Data QA		
Uranium	mg/L	05/16/2013	0001	10.4	-	40.4	3	J	#	0.00029
Uranium	mg/L	05/21/2013	0001	10.4	-	40.4	3	J	#	0.00029

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0811 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Ammonia Total as N	mg/L	05/15/2013	0001	8.6	-	38.6	380	J	#	10		
Ammonia Total as N	mg/L	05/16/2013	0001	8.6	-	38.6	400	J	#	10		
Oxidation Reduction Potential	mV	05/15/2013	0001	8.6	-	38.6	103.6		#			
Oxidation Reduction Potential	mV	05/16/2013	0001	8.6	-	38.6	123.2		#			
pH	s.u.	05/15/2013	0001	8.6	-	38.6	6.72		#			
pH	s.u.	05/16/2013	0001	8.6	-	38.6	6.69		#			
Specific Conductance	umhos/cm	05/15/2013	0001	8.6	-	38.6	22649		#			
Specific Conductance	umhos/cm	05/16/2013	0001	8.6	-	38.6	22988		#			
Temperature	C	05/15/2013	0001	8.6	-	38.6	17.06		#			
Temperature	C	05/16/2013	0001	8.6	-	38.6	16.95		#			
Turbidity	NTU	05/15/2013	0001	8.6	-	38.6	4.21		#			
Turbidity	NTU	05/16/2013	0001	8.6	-	38.6	3.19		#			
Uranium	mg/L	05/15/2013	0001	8.6	-	38.6	2.6	J	#	0.00029		
Uranium	mg/L	05/16/2013	0001	8.6	-	38.6	2.5	J	#	0.00029		

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0812 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
							Lab	Data QA		
Ammonia Total as N	mg/L	05/16/2013	0001	14.2	- 44.2	400	J	#	10	
Ammonia Total as N	mg/L	05/21/2013	0001	14.2	- 44.2	430	J	#	10	
Ammonia Total as N	mg/L	05/24/2013	0001	14.2	- 44.2	410	J	#	10	
Oxidation Reduction Potential	mV	05/16/2013	0001	14.2	- 44.2	117.7		#		
Oxidation Reduction Potential	mV	05/21/2013	0001	14.2	- 44.2	116.8		#		
Oxidation Reduction Potential	mV	05/24/2013	0001	14.2	- 44.2	203		#		
pH	s.u.	05/16/2013	0001	14.2	- 44.2	6.69		#		
pH	s.u.	05/21/2013	0001	14.2	- 44.2	6.71		#		
pH	s.u.	05/24/2013	0001	14.2	- 44.2	6.67		#		
Specific Conductance	umhos/cm	05/16/2013	0001	14.2	- 44.2	18946		#		
Specific Conductance	umhos/cm	05/21/2013	0001	14.2	- 44.2	19872		#		
Specific Conductance	umhos/cm	05/24/2013	0001	14.2	- 44.2	25951		#		
Temperature	C	05/16/2013	0001	14.2	- 44.2	15.45		#		
Temperature	C	05/21/2013	0001	14.2	- 44.2	15.23		#		
Temperature	C	05/24/2013	0001	14.2	- 44.2	15.01		#		
Turbidity	NTU	05/16/2013	0001	14.2	- 44.2	2.17		#		
Turbidity	NTU	05/21/2013	0001	14.2	- 44.2	1.12		#		
Turbidity	NTU	05/24/2013	0001	14.2	- 44.2	7.25		#		
Uranium	mg/L	05/16/2013	0001	14.2	- 44.2	1.9	J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: 0812 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Uranium	mg/L	05/21/2013	0001	14.2	- 44.2	2		J	#	0.00029	
Uranium	mg/L	05/24/2013	0001	14.2	- 44.2	1.9		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0813 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
							Lab	Data QA		
Ammonia Total as N	mg/L	05/21/2013	0001	14.4	- 44.4	340	J	#	10	
Ammonia Total as N	mg/L	05/22/2013	0001	14.4	- 44.4	340	J	#	10	
Ammonia Total as N	mg/L	05/24/2013	0001	14.4	- 44.4	340	J	#	10	
Oxidation Reduction Potential	mV	05/21/2013	0001	14.4	- 44.4	112.8		#		
Oxidation Reduction Potential	mV	05/22/2013	0001	14.4	- 44.4	212		#		
Oxidation Reduction Potential	mV	05/24/2013	0001	14.4	- 44.4	173.1		#		
pH	s.u.	05/21/2013	0001	14.4	- 44.4	6.73		#		
pH	s.u.	05/22/2013	0001	14.4	- 44.4	6.57		#		
pH	s.u.	05/24/2013	0001	14.4	- 44.4	6.74		#		
Specific Conductance	umhos/cm	05/21/2013	0001	14.4	- 44.4	15107		#		
Specific Conductance	umhos/cm	05/22/2013	0001	14.4	- 44.4	15066		#		
Specific Conductance	umhos/cm	05/24/2013	0001	14.4	- 44.4	16125		#		
Temperature	C	05/21/2013	0001	14.4	- 44.4	14.81		#		
Temperature	C	05/22/2013	0001	14.4	- 44.4	14.66		#		
Temperature	C	05/24/2013	0001	14.4	- 44.4	14.45		#		
Turbidity	NTU	05/21/2013	0001	14.4	- 44.4	4.28		#		
Turbidity	NTU	05/22/2013	0001	14.4	- 44.4	1.45		#		
Turbidity	NTU	05/24/2013	0001	14.4	- 44.4	1.37		#		
Uranium	mg/L	05/21/2013	0001	14.4	- 44.4	1.4	J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: 0813 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Uranium	mg/L	05/22/2013	0001	14.4	- 44.4	1.4		J	#	0.00029	
Uranium	mg/L	05/24/2013	0001	14.4	- 44.4	1.4		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0814 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
								Lab	Data QA		
Ammonia Total as N	mg/L	05/15/2013	0001	12.4	-	42.4	200	J	#	10	
Ammonia Total as N	mg/L	05/16/2013	0001	12.4	-	42.4	200	J	#	10	
Ammonia Total as N	mg/L	05/22/2013	0001	12.4	-	42.4	240	J	#	10	
Oxidation Reduction Potential	mV	05/15/2013	0001	12.4	-	42.4	108.1		#		
Oxidation Reduction Potential	mV	05/16/2013	0001	12.4	-	42.4	108.2		#		
Oxidation Reduction Potential	mV	05/22/2013	0001	12.4	-	42.4	147.6		#		
pH	s.u.	05/15/2013	0001	12.4	-	42.4	6.74		#		
pH	s.u.	05/16/2013	0001	12.4	-	42.4	6.74		#		
pH	s.u.	05/22/2013	0001	12.4	-	42.4	6.73		#		
Specific Conductance	umhos/cm	05/15/2013	0001	12.4	-	42.4	25004		#		
Specific Conductance	umhos/cm	05/16/2013	0001	12.4	-	42.4	26214		#		
Specific Conductance	umhos/cm	05/22/2013	0001	12.4	-	42.4	29348		#		
Temperature	C	05/15/2013	0001	12.4	-	42.4	18.07		#		
Temperature	C	05/16/2013	0001	12.4	-	42.4	18		#		
Temperature	C	05/22/2013	0001	12.4	-	42.4	17.73		#		
Turbidity	NTU	05/15/2013	0001	12.4	-	42.4	1.66		#		
Turbidity	NTU	05/16/2013	0001	12.4	-	42.4	5.24		#		
Turbidity	NTU	05/22/2013	0001	12.4	-	42.4	1.95		#		
Uranium	mg/L	05/15/2013	0001	12.4	-	42.4	2.6	J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: 0814 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Uranium	mg/L	05/16/2013	0001	12.4	- 42.4	2.5		J	#	0.00029	
Uranium	mg/L	05/22/2013	0001	12.4	- 42.4	2.5		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: 0815 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
								Lab	Data QA		
Ammonia Total as N	mg/L	05/15/2013	0001	21.7	-	51.7	300	J	#	10	
Ammonia Total as N	mg/L	05/16/2013	0001	21.7	-	51.7	290	J	#	10	
Ammonia Total as N	mg/L	05/24/2013	0001	21.7	-	51.7	310	J	#	10	
Oxidation Reduction Potential	mV	05/15/2013	0001	21.7	-	51.7	110.7		#		
Oxidation Reduction Potential	mV	05/16/2013	0001	21.7	-	51.7	116.7		#		
Oxidation Reduction Potential	mV	05/24/2013	0001	21.7	-	51.7	167		#		
pH	s.u.	05/15/2013	0001	21.7	-	51.7	6.68		#		
pH	s.u.	05/16/2013	0001	21.7	-	51.7	6.67		#		
pH	s.u.	05/24/2013	0001	21.7	-	51.7	6.72		#		
Specific Conductance	umhos/cm	05/15/2013	0001	21.7	-	51.7	34098		#		
Specific Conductance	umhos/cm	05/16/2013	0001	21.7	-	51.7	35398		#		
Specific Conductance	umhos/cm	05/24/2013	0001	21.7	-	51.7	40204		#		
Temperature	C	05/15/2013	0001	21.7	-	51.7	17.84		#		
Temperature	C	05/16/2013	0001	21.7	-	51.7	18.02		#		
Temperature	C	05/24/2013	0001	21.7	-	51.7	17.35		#		
Turbidity	NTU	05/15/2013	0001	21.7	-	51.7	3.15		#		
Turbidity	NTU	05/16/2013	0001	21.7	-	51.7	1.97		#		
Turbidity	NTU	05/24/2013	0001	21.7	-	51.7	1.92		#		
Uranium	mg/L	05/15/2013	0001	21.7	-	51.7	2.5	J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: 0815 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Lab	Data	QA					
Uranium	mg/L	05/16/2013	0001	21.7	-	51.7	3	J	#	0.00029	
Uranium	mg/L	05/24/2013	0001	21.7	-	51.7	2.8	J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: 0816 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
								Lab	Data		
Ammonia Total as N	mg/L	05/21/2013	0001	20.9	-	50.9	180	J	#	10	
Ammonia Total as N	mg/L	05/22/2013	0001	20.9	-	50.9	190	J	#	10	
Ammonia Total as N	mg/L	05/24/2013	0001	20.9	-	50.9	200	J	#	10	
Oxidation Reduction Potential	mV	05/21/2013	0001	20.9	-	50.9	113.7		#		
Oxidation Reduction Potential	mV	05/22/2013	0001	20.9	-	50.9	176.5		#		
Oxidation Reduction Potential	mV	05/24/2013	0001	20.9	-	50.9	171.3		#		
pH	s.u.	05/21/2013	0001	20.9	-	50.9	6.81		#		
pH	s.u.	05/22/2013	0001	20.9	-	50.9	6.8		#		
pH	s.u.	05/24/2013	0001	20.9	-	50.9	6.79		#		
Specific Conductance	umhos/cm	05/21/2013	0001	20.9	-	50.9	25524		#		
Specific Conductance	umhos/cm	05/22/2013	0001	20.9	-	50.9	25789		#		
Specific Conductance	umhos/cm	05/24/2013	0001	20.9	-	50.9	27318		#		
Temperature	C	05/21/2013	0001	20.9	-	50.9	17.2		#		
Temperature	C	05/22/2013	0001	20.9	-	50.9	17.05		#		
Temperature	C	05/24/2013	0001	20.9	-	50.9	16.92		#		
Turbidity	NTU	05/21/2013	0001	20.9	-	50.9	0.94		#		
Turbidity	NTU	05/22/2013	0001	20.9	-	50.9	0.9		#		
Turbidity	NTU	05/24/2013	0001	20.9	-	50.9	1.41		#		
Uranium	mg/L	05/21/2013	0001	20.9	-	50.9	2.5	J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: 0816 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Uranium	mg/L	05/22/2013	0001	20.9	- 50.9	2.9		J	#	0.00029	
Uranium	mg/L	05/24/2013	0001	20.9	- 50.9	2.3		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: AMM-2 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data QA		
Oxidation Reduction Potential	mV	06/04/2013	0001	48 -	168.3		#		
pH	s.u.	06/04/2013	0001	48 -	6.89		#		
Specific Conductance	umhos/cm	06/04/2013	0001	48 -	21258		#		
Temperature	C	06/04/2013	0001	48 -	16.96		#		
Turbidity	NTU	06/04/2013	0001	48 -	9.81		#		
Uranium	mg/L	06/04/2013	0001	48 -	1.9	J	#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: AMM-3 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data QA		
Oxidation Reduction Potential	mV	06/05/2013	0001	48 -	-96.4		#		
pH	s.u.	06/05/2013	0001	48 -	6.94		#		
Specific Conductance	umhos/cm	06/05/2013	0001	48 -	18752		#		
Temperature	C	06/05/2013	0001	48 -	19.89		#		
Turbidity	NTU	06/05/2013	0001	48 -	2.05		#		
Uranium	mg/L	06/05/2013	0001	48 -	2.5	J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: ATP-2-D WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/29/2013	0001	88 -	280		J	#	10	
Oxidation Reduction Potential	mV	05/29/2013	0001	88 -	-233.5			#		
pH	s.u.	05/29/2013	0001	88 -	7.84			#		
Specific Conductance	umhos/cm	05/29/2013	0001	88 -	132665			#		
Temperature	C	05/29/2013	0001	88 -	17.1			#		
Turbidity	NTU	05/29/2013	0001	88 -	20.8			#		
Uranium	mg/L	05/29/2013	0001	88 -	0.0029		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: ATP-2-S WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/29/2013	0001	25 -	410		J	#	10	
Oxidation Reduction Potential	mV	05/29/2013	N001	25 -	-12.7			#		
pH	s.u.	05/29/2013	N001	25 -	8.44			#		
Specific Conductance	umhos/cm	05/29/2013	N001	25 -	17117			#		
Temperature	C	05/29/2013	N001	25 -	17.24			#		
Turbidity	NTU	05/29/2013	N001	25 -	44.8			#		
Uranium	mg/L	05/29/2013	0001	25 -	0.0017		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: CR1 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/28/2013	0001	0 - 0	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/28/2013	0001	0 - 0	137.2			#		
pH	s.u.	05/28/2013	0001	0 - 0	7.33			#		
Specific Conductance	umhos/cm	05/28/2013	0001	0 - 0	700			#		
Temperature	C	05/28/2013	0001	0 - 0	17.29			#		
Turbidity	NTU	05/28/2013	0001	0 - 0	316			#		
Uranium	mg/L	05/28/2013	0001	0 - 0	0.0017		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: CR2 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/30/2013	0001	0 - 0	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/30/2013	0001	0 - 0	97.6			#		
pH	s.u.	05/30/2013	0001	0 - 0	8.14			#		
Specific Conductance	umhos/cm	05/30/2013	0001	0 - 0	723			#		
Temperature	C	05/30/2013	0001	0 - 0	17.31			#		
Turbidity	NTU	05/30/2013	0001	0 - 0	455			#		
Uranium	mg/L	05/30/2013	0001	0 - 0	0.002		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: CR3 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/30/2013	0001	0 - 0	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/30/2013	0001	0 - 0	104.3			#		
pH	s.u.	05/30/2013	0001	0 - 0	8.37			#		
Specific Conductance	umhos/cm	05/30/2013	0001	0 - 0	745			#		
Temperature	C	05/30/2013	0001	0 - 0	18.13			#		
Turbidity	NTU	05/30/2013	0001	0 - 0	6.35			#		
Uranium	mg/L	05/30/2013	0001	0 - 0	0.0018		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: CR5 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/28/2013	0001	0 - 0	0.1	U	J	#	0.1	
Oxidation Reduction Potential	mV	05/28/2013	0001	0 - 0	76.6			#		
pH	s.u.	05/28/2013	0001	0 - 0	7.96			#		
Specific Conductance	umhos/cm	05/28/2013	0001	0 - 0	741			#		
Temperature	C	05/28/2013	0001	0 - 0	18.32			#		
Turbidity	NTU	05/28/2013	0001	0 - 0	3.18			#		
Uranium	mg/L	05/28/2013	0001	0 - 0	0.0019		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: SMI-MW01 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	06/04/2013	0001	16 -	32.3			#		
pH	s.u.	06/04/2013	0001	16 -	7.41			#		
Specific Conductance	umhos/cm	06/04/2013	0001	16 -	5866			#		
Temperature	C	06/04/2013	0001	16 -	17.01			#		
Turbidity	NTU	06/04/2013	0001	16 -	42.9			#		
Uranium	mg/L	06/04/2013	0001	16 -	4.2		J	#	0.00058	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
 REPORT DATE: 9/10/2013
 Location: SMI-PW02 WELL CF5

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Ammonia Total as N	mg/L	05/21/2013	0001	20	-	60	480	J	#		10	
Ammonia Total as N	mg/L	05/22/2013	0001	20	-	60	490	J	#		10	
Oxidation Reduction Potential	mV	05/21/2013	0001	20	-	60	134.4		#			
Oxidation Reduction Potential	mV	05/22/2013	0001	20	-	60	192		#			
pH	s.u.	05/21/2013	0001	20	-	60	6.71		#			
pH	s.u.	05/22/2013	0001	20	-	60	6.71		#			
Specific Conductance	umhos/cm	05/21/2013	0001	20	-	60	37527		#			
Specific Conductance	umhos/cm	05/22/2013	0001	20	-	60	41511		#			
Temperature	C	05/21/2013	0001	20	-	60	16.51		#			
Temperature	C	05/22/2013	0001	20	-	60	16.32		#			
Turbidity	NTU	05/21/2013	0001	20	-	60	1.63		#			
Turbidity	NTU	05/22/2013	0001	20	-	60	1.17		#			
Uranium	mg/L	05/21/2013	0001	20	-	60	2.8	J	#		0.00029	
Uranium	mg/L	05/22/2013	0001	20	-	60	2.7	J	#		0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: SMI-PZ1S WELL Baseline Area

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/06/2013	0001	18 -	130			#	10	
Oxidation Reduction Potential	mV	06/06/2013	0001	18 -	170			#		
pH	s.u.	06/06/2013	0001	18 -	6.76			#		
Specific Conductance	umhos/cm	06/06/2013	0001	18 -	8606			#		
Temperature	C	06/06/2013	0001	18 -	13.75			#		
Turbidity	NTU	06/06/2013	0001	18 -	19.1			#		
Uranium	mg/L	06/06/2013	0001	18 -	1		J	#	0.00015	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: SMI-PZ3D2 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/03/2013	0001	78 -	450			#	10	
Oxidation Reduction Potential	mV	06/03/2013	0001	78 -	81.9			#		
pH	s.u.	06/03/2013	0001	78 -	6.87			#		
Specific Conductance	umhos/cm	06/03/2013	0001	78 -	25371			#		
Temperature	C	06/03/2013	0001	78 -	19.23			#		
Turbidity	NTU	06/03/2013	0001	78 -	2.88			#		
Uranium	mg/L	06/03/2013	0001	78 -	1.4		J	#	0.00015	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: SMI-PZ3M WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Oxidation Reduction Potential	mV	06/03/2013	0001	59	-	76.3			#		
pH	s.u.	06/03/2013	0001	59	-	7.42			#		
Specific Conductance	umhos/cm	06/03/2013	0001	59	-	11486			#		
Temperature	C	06/03/2013	0001	59	-	19.17			#		
Turbidity	NTU	06/03/2013	0001	59	-	1.14			#		
Uranium	mg/L	06/03/2013	0001	59	-	0.6		J	#	0.00015	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: SMI-PZ3S WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Oxidation Reduction Potential	mV	06/03/2013	0001	25	-	93.4			#		
pH	s.u.	06/03/2013	0001	25	-	7.64			#		
Specific Conductance	umhos/cm	06/03/2013	0001	25	-	5506			#		
Temperature	C	06/03/2013	0001	25	-	18.9			#		
Turbidity	NTU	06/03/2013	0001	25	-	2.51			#		
Uranium	mg/L	06/03/2013	0001	25	-	1		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: TP-01 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	05/28/2013	0001	22 -	-32.9			#		
pH	s.u.	05/28/2013	0001	22 -	7.44			#		
Specific Conductance	umhos/cm	05/28/2013	0001	22 -	7782			#		
Temperature	C	05/28/2013	0001	22 -	16.7			#		
Turbidity	NTU	05/28/2013	0001	22 -	3.52			#		
Uranium	mg/L	05/28/2013	0001	22 -	0.075		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: TP-17 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/05/2013	0001	28 -	3			#	0.1	
Oxidation Reduction Potential	mV	06/05/2013	0001	28 -	-103.9			#		
pH	s.u.	06/05/2013	0001	28 -	6.88			#		
Specific Conductance	umhos/cm	06/05/2013	0001	28 -	132064			#		
Temperature	C	06/05/2013	0001	28 -	15.56			#		
Turbidity	NTU	06/05/2013	0001	28 -	7.48			#		
Uranium	mg/L	06/05/2013	0001	28 -	0.019		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: TP-20 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Oxidation Reduction Potential	mV	06/04/2013	0001	32	-	-103.2			#		
pH	s.u.	06/04/2013	0001	32	-	6.7			#		
Specific Conductance	umhos/cm	06/04/2013	0001	32	-	150782			#		
Temperature	C	06/04/2013	0001	32	-	19.59			#		
Turbidity	NTU	06/04/2013	0001	32	-	2.47			#		
Uranium	mg/L	06/04/2013	0001	32	-	0.0025		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: TP-22 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Oxidation Reduction Potential	mV	06/04/2013	0001	17	-	85.3			#		
pH	s.u.	06/04/2013	0001	17	-	6.65			#		
Specific Conductance	umhos/cm	06/04/2013	0001	17	-	30541			#		
Temperature	C	06/04/2013	0001	17	-	19.42			#		
Turbidity	NTU	06/04/2013	0001	17	-	311			#		
Uranium	mg/L	06/04/2013	0001	17	-	0.21		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: TP-23 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/04/2013	0001	25 -	190			#	10	
Oxidation Reduction Potential	mV	06/04/2013	0001	25 -	128			#		
pH	s.u.	06/04/2013	0001	25 -	6.62			#		
Specific Conductance	umhos/cm	06/04/2013	0001	25 -	59755			#		
Temperature	C	06/04/2013	0001	25 -	18.98			#		
Turbidity	NTU	06/04/2013	0001	25 -	116			#		
Uranium	mg/L	06/04/2013	0001	25 -	3.4		J	#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: UPD-17 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/03/2013	0001	14.5 -	290			#	10	
Oxidation Reduction Potential	mV	06/03/2013	0001	14.5 -	133.2			#		
pH	s.u.	06/03/2013	0001	14.5 -	7.05			#		
Specific Conductance	umhos/cm	06/03/2013	0001	14.5 -	13880			#		
Temperature	C	06/03/2013	0001	14.5 -	17.43			#		
Turbidity	NTU	06/03/2013	0001	14.5 -	8.94			#		
Uranium	mg/L	06/03/2013	0001	14.5 -	1.3		J	#	0.00029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: UPD-18 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/29/2013	0001	13 -	230		J	#	10	
Oxidation Reduction Potential	mV	05/29/2013	0001	13 -	70.6			#		
pH	s.u.	05/29/2013	0001	13 -	6.92			#		
Specific Conductance	umhos/cm	05/29/2013	0001	13 -	11156			#		
Temperature	C	05/29/2013	0001	13 -	16.86			#		
Turbidity	NTU	05/29/2013	0001	13 -	9.4			#		
Uranium	mg/L	05/29/2013	0001	13 -	1.1		J	#	0.00015	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: UPD-20 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	06/03/2013	0001	17 -	12.3			#		
pH	s.u.	06/03/2013	0001	17 -	7.63			#		
Specific Conductance	umhos/cm	06/03/2013	0001	17 -	3841			#		
Temperature	C	06/03/2013	0001	17 -	20.57			#		
Turbidity	NTU	06/03/2013	0001	17 -	20.8			#		
Uranium	mg/L	06/03/2013	0001	17 -	0.08		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: UPD-21 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	06/03/2013	0001	25 -	143			#		
pH	s.u.	06/03/2013	0001	25 -	7.12			#		
Specific Conductance	umhos/cm	06/03/2013	0001	25 -	4050			#		
Temperature	C	06/03/2013	0001	25 -	22.04			#		
Turbidity	NTU	06/03/2013	0001	25 -	2.4			#		
Uranium	mg/L	06/03/2013	0001	25 -	5		J	#	0.00058	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: UPD-22 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	06/04/2013	0001	9 -	116.7			#		
pH	s.u.	06/04/2013	0001	9 -	7.64			#		
Specific Conductance	umhos/cm	06/04/2013	0001	9 -	3817			#		
Temperature	C	06/04/2013	0001	9 -	17.01			#		
Turbidity	NTU	06/04/2013	0001	9 -	2.91			#		
Uranium	mg/L	06/04/2013	0001	9 -	3.9		J	#	0.00058	

Appendix A. Water Quality Data

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/10/2013
Location: UPD-23 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/05/2013	0001	26 -	2.4			#	0.1	
Oxidation Reduction Potential	mV	06/05/2013	0001	26 -	135.7			#		
pH	s.u.	06/05/2013	0001	26 -	7.28			#		
Specific Conductance	umhos/cm	06/05/2013	0001	26 -	4647			#		
Temperature	C	06/05/2013	0001	26 -	21.36			#		
Uranium	mg/L	06/05/2013	0001	26 -	0.74		J	#	0.00015	

Appendix A. Water Quality Data

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site

REPORT DATE: 9/10/2013

Location: UPD-24 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data QA		
Ammonia Total as N	mg/L	06/03/2013	0001	27 -	0.93		#	0.1	
Ammonia Total as N	mg/L	06/03/2013	0002	27 -	0.85		#	0.1	
Oxidation Reduction Potential	mV	06/03/2013	0001	27 -	117		#		
pH	s.u.	06/03/2013	0001	27 -	7.43		#		
Specific Conductance	umhos/cm	06/03/2013	0001	27 -	5644		#		
Temperature	C	06/03/2013	0001	27 -	18.71		#		
Turbidity	NTU	06/03/2013	0001	27 -	2.76		#		
Uranium	mg/L	06/03/2013	0001	27 -	7.9		J #	0.00058	
Uranium	mg/L	06/03/2013	0002	27 -	7		J #	0.0029	

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.

Appendix A. Water Quality Data

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.	Q	Qualitative result due to sampling technique.	R	Unusable result.
U	Parameter analyzed for but was not detected.	X	Location is undefined.		

QA QUALIFIER:

Validated according to quality assurance guidelines.

Appendix A. Water Quality Data (continued)

BLS = below land surface; $\mu\text{mhos/cm}$ = micromhos per centimeter; mV = millivolt; NTU = nephelometric turbidity unit; SL = surface location; S.U. = standard unit; TS = treatment system; WL = well

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

QA QUALIFIER:

Validated according to quality assurance guidelines.

Appendix A. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site							
REPORT DATE: 9/10/2013							
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Time	Date	Depth From Top of Casing (Ft)	Water Elevation (MSL)	Water Level Flag
0401	O	3969.60	6/6/2013		12.75	3956.85	
0403	O	3968.95	6/6/2013		14.75	3954.2	
0404	O	3968.3	6/6/2013		13.48	3954.82	
0407	O	3969.09	6/6/2013		15.1	3953.99	
0410	O	3981.05	5/29/2013		24.59	3956.46	
0411	O	3962.43	5/29/2013		8.18	3954.25	
0412	O	3962.48	6/4/2013		6.83	3955.65	
0413	O	3963.19	6/4/2013		8.11	3955.08	
0414	O	3959.20	6/5/2013		4	3955.2	
0439	O	4055.27	5/29/2013		97.89	3957.38	
0440	O	4070.71	5/30/2013		111.93	3958.78	
0454		3966.53	6/4/2013		11.88	3954.65	
0492		3967.56	5/30/2013		13.15	3954.41	
AMM-2	O	3964.09	6/4/2013		9.38	3954.71	
AMM-3	O	3962.9	6/5/2013		7.84	3955.06	
ATP-2-D	O	3962.17	5/29/2013		5.8	3956.37	
ATP-2-S	O	3962.17	5/29/2013		13.95	3948.22	
SMI-MW01	O	3960.22	6/4/2013		4.94	3955.28	
SMI-PZ1S	O	3964.13	6/6/2013		9.04	3955.09	
SMI-PZ3D2	O	3975.13	6/3/2013		19	3956.13	
SMI-PZ3M	O	3975.23	6/3/2013		18.83	3956.4	
SMI-PZ3S	O	3975.03	6/3/2013		18.68	3956.35	

Appendix A. Water Level Data (continued)

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site							
REPORT DATE: 9/10/2013							
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Time	Date	Depth From Top of Casing (Ft)	Water Elevation (MSL)	Water Level Flag
TP-17	D	3963.69	6/5/2013		10.56	3953.13	
TP-20	D	3967.55	6/4/2013		14.82	3952.73	
TP-22		3966.51	6/4/2013		12.7	3953.81	
TP-23		3962.6	6/4/2013		8.43	3954.17	
UPD-17		3970.71	6/3/2013		12.45	3958.262	
UPD-18		3968.74	5/29/2013		12.27	3956.47	
UPD-20		3978.73	6/3/2013		21.88	3956.85	
UPD-21		3981.45	6/3/2013		24.77	3956.68	
UPD-22		3966.20	6/4/2013		10.1	3956.1	
UPD-23		3982.38	6/5/2013		25.88	3956.5	
UPD-24		3977.1	6/3/2013		20.66	3956.44	

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

Appendix A. Trip Report (continued)



Date: July 16, 2013
To: Ken Pill
From: James Ritchey
Subject: May 2013 Site-wide Sampling Event
Site: Moab

Date of Sampling Event: May 15 – June 06, 2013

Team Members: K. Pill and J. Ritchey

RIN Number Assigned: All samples were assigned to RIN 1305066.

Sample Shipment: Four coolers were shipped overnight UPS to ALS from Moab, Utah, on May 30 and June 06, 2013 (Tracking numbers 0196907580, 0195806397, 0199467603, and 0195787211).

May 2013 Site-wide Sampling

Number of Locations Sampled: The purpose of the site-wide sampling event was to update contaminant plume maps. A total of 35 well locations and seven surface water locations were sampled during this event. Including four duplicates, a total of 46 samples were collected during the May 2013 site-wide sampling event.

Locations Not Sampled/Reason: Well TP-19 and surface water location 0228 were inaccessible due to overgrown vegetation. UPD-19 was blocked by sediment and could not be sampled.

Field Variance: To minimize costs, some ground water samples were not submitted to the laboratory for ammonia analysis. However, all ground water samples were analyzed on site with the ammonia probe. All surface water samples were sent to the laboratory, but only location 0274 was analyzed on site. See the Location Specific Information section for details concerning filtering and lab analysis.

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

False ID	True ID	Sample Type	Associated matrix
2000	0492	Duplicate from 18 ft bgs	Ground Water
2001	UPD-24	Duplicate from 27 ft bgs	Ground Water
2002	0414	Duplicate from 13 ft bgs	Ground Water
2003	0401	Duplicate from 18 ft bgs	Ground Water

ft bgs = feet below ground surface; ID = identification

Appendix A. Trip Report (continued)

Location-specific Information: All of the locations were sampled using a peristaltic pump and dedicated tubing unless otherwise noted. The table below provides additional information:

Location	Date	Sample Depth (ft bgs)	Ammonia Probe Results (mg/L)	Ammonia Lab Analysis	Comments
0218	5/30/2013	NA	–	Yes	Water is ~3" deep, rocky substrate.
0226	5/30/2013	NA	–	Yes	Sandy substrate, 4" deep, 1' from bank.
0274	5/30/2013	NA	<1	Yes	
0401	6/06/2013	18	226	Yes	Duplicate.
0403	6/06/2013	18	48.1	Yes	
0404	6/06/2013	18	178.6	Yes	
0407	6/06/2013	17	42.5	Yes	
0410	5/29/2013	27	<1	No	Dropped the tubing down ~2 ft. De-watered at 0.75L.
0411	5/29/2013	9.5	2.14	Yes	De-watered at ~125 mL
0412	6/04/2013	10.5	<1	No	
0413	6/04/2013	11.5	45.3	Yes	
0414	6/05/2013	13	11.59	Yes	Duplicate.
0439	5/29/2013	118	6.61	No	Sampled with dedicated bladder pump.
0440	5/30/2013	117	<1	Yes	Sampled with dedicated bladder pump.
0453	5/29/2013	80	423	No	Sampled with dedicated bladder pump. DTW was below pump, DTW > 73.6 ft btoc. Suspect low recharge. Bladder pump would not produce.
0454	6/04/2013	13	228	Yes	Tubing slid down 1 ft
0492	5/30/2013	18	37.3	No	Duplicate
AMM-2	6/04/2013	48	526	No	
AMM-3	6/05/2013	48	297	No	
ATP-2-D	5/29/2013	88	245	Yes	
ATP-2-S	5/29/2013	25	379	Yes	Type II well. Well did not recharge overnight. Sample collected, then parameters.
CR1	5/28/2013	NA	–	Yes	~3 in from surface and 1 ft from bank, moderate flow
CR2	5/30/2013	NA	–	Yes	Rocky substrate. Moderate flow. Water is 3" deep.
CR3	5/30/2013	NA	–	Yes	~4" deep, ~1' off bank, stagnant.
CR5	5/28/2013	NA	–	Yes	Water is ~6" deep
SMI-MW01	6/04/2013	16	1.995	No	
SMI-PZ1S	6/06/2013	18	126.2	Yes	
SMI-PZ3D2	6/03/2013	78	434	Yes	
SMI-PZ3M	6/03/2013	59	34.0	No	Sulfur odor
SMI-PZ3S	6/03/2013	25	0.893	No	
TP-01	5/28/2013	22	<1	No	Pump head tubing gummy and had inconsistent flow
TP-17	6/05/2013	28	3.01	Yes	Black floaties. Strong sulfur odor.
TP-20	6/04/2013	32	3.47	No	
TP-22	6/04/2013	17	<1	No	Dropped tubing to bottom of well. Dewatered.
TP-23	6/04/2013	25	167.5	Yes	
UPD-17	6/03/2013	14.5	242	Yes	Turbid water. Placed new tubing in well.
UPD-18	5/29/2013	13	201	Yes	Tubing lowered ~2 ft below line.
UPD-20	6/03/2013	17	<1	No	
UPD-21	6/03/2013	25	6.43	No	
UPD-22	6/04/2013	9	3.56	No	
UPD-23	6/05/2013	26	2.48	Yes	Sampled 1 ft from bottom, tubing not marked. Dewatered at 0.5 L after moving tubing to the bottom.
UPD-24	6/3/2013	27	0.893	Yes	Duplicate

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

Appendix A. Trip Report (continued)

Water Level Measurements: Water level data are provided in the table below. These data represent depth to water (ft btoc) measurements. Water levels were not obtainable at locations TP-01 and UPD-19 due to broken and blocked casings. Well TP-19 was inaccessible due to vegetation overgrowth. In well 0453, the water level was below the bladder pump and the indicator could not fit below the pump. The top of the pump was measured at 73.6 feet below top of casing (ft btoc).

Well No.	Depth to Water (ft btoc)
0401	12.75
0403	14.75
0404	13.48
0407	15.10
0410	24.59
0411	8.18
0412	6.83
0413	8.11
0414	4.00
0439	97.89
0440	111.93
0453	> 73.6
0454	11.88
0492	13.15
AMM-2	9.38
AMM-3	7.84
ATP-2-D	5.80
ATP-2-S	13.95
SMI-MW01	4.94
SMI-PZ1S	9.04
SMI-PZ3D2	19.00
SMI-PZ3M	18.83
SMI-PZ3S	18.68
TP-01	NA
TP-17	10.56
TP-20	14.82
TP-22	12.70
TP-23	8.43
UPD-17	12.45
UPD-18	12.27
UPD-20	21.88
UPD-21	24.77
UPD-22	10.10
UPD-23	25.88
UPD-24	20.66

Appendix A. Trip Report (continued)



Surface Water Location CR1



Surface Water Location CR2

Appendix A. Trip Report (continued)



Surface Water Location CR3



Surface Water Location CR5

Appendix A. Trip Report (continued)



Surface Water Location 0218



Surface Water Location 0226

Appendix A. Trip Report (continued)

May 2013 Configuration 5 Sampling

Number of Locations Sampled: Eight extraction wells (0810, 0811, 0812, 0813, 0814, 0815, 0816, and SMI-PW02) were sampled. Six of the wells were sampled at three different flow rates, and two wells were sampled at two different flow rates. A total of 22 samples were collected during the May 2013 sampling event.

Locations Not Sampled: None.

Field Variance: None.

Location-specific Information – Extraction Wells: Extraction wells were sampled using dedicated submersible pumps. Samples were collected into open containers and filtered using dedicated flexible tubing. Sample depths and water levels for each extraction well are listed below.

Well No.	Date	Time	Ticket Number	Flow Rate (gpm)	Depth to Water (ft btoc)	Ammonia Probe Results (mg/L)	Pump Intake Depth (ft bgs)
0810	5/15/2013	13:45	MAY 001	12.86	9.24	313	35
	5/16/2013	14:40	MAY 005	25.24	9.77	315	
	5/21/2013	11:10	MAY 010	38.84	10.00	309	
0811	5/15/2013	14:15	MAY 002	13.68	19.09	392	35
	5/16/2013	14:55	MAY 006	23.06	27.68	378	
0812	5/21/2013	11:55	MAY 012	15.92	9.54	395	40
	5/16/2013	15:15	MAY 007	25.90	11.65	404	
	5/24/2013	08:15	MAY 019	39.80	16.99	443	
0813	5/21/2013	12:15	MAY 013	15.20	9.04	337	40
	5/22/2013	10:25	MAY 015	25.18	9.40	348	
	5/24/2013	08:35	MAY 020	43.60	10.24	341	
0814	5/15/2013	14:35	MAY 003	19.64	9.10	203	40
	5/16/2013	15:35	MAY 009	31.00	9.40	211	
	5/22/2013	11:00	MAY 017	38.60	9.80	223	
0815	5/15/2013	14:55	MAY 004	13.15	11.80	310	45
	5/16/2013	15:25	MAY 008	32.76	12.42	308	
	5/24/2013	09:10	MAY 022	42.81	13.39	294	
0816	5/21/2013	12:40	MAY 014	15.01	8.47	173	45
	5/22/2013	10:40	MAY 016	25.44	8.66	177	
	5/24/2013	08:55	MAY 021	46.68	9.38	190	
SMI-PW02	5/21/2013	11:40	MAY 011	26.14	16.50	451	55
	5/22/2013	14:10	MAY 018	40.75	19.21	473	

Well Inspection Summary: A well inspection was not conducted.

Equipment: None.

Regulatory: None.

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

Appendix A. Trip Report (continued)

Date	Daily Mean Flow (cfs)
5/15/2013	7,250
5/16/2013	9,000
5/17/2013	10,200
5/18/2013	11,300
5/19/2013	11,900
5/20/2013	11,100
5/21/2013	9,560
5/22/2013	7,990
5/23/2013	7,070
5/24/2013	7,230
5/25/2013	8,560
5/26/2013	9,850
5/27/2013	10,400
5/28/2013	10,800
5/29/2013	10,700
5/30/2013	9,670
5/31/2013	8,280
6/1/2013	7,120
6/2/2013	6,240
6/3/2013	5,980
6/4/2013	6,680
6/5/2013	7,640
6/6/2013	8,320

Corrective Action Required/Taken: None.